

Control of stripe rust of winter wheat with foliar fungicides, 2008.

The study was conducted in a field with Palous silt loam under natural infection of stripe rust near Pullman, WA. Urea (46-0-0) was applied at 60 lb/A at the time of cultivation. Susceptible wheat cultivars ‘Hatton’ and ‘PS 279’ were seeded in rows spaced 14 in. apart at 60 lb/A (99% germination rate for both cultivars) with a drill planter on 16 Oct 07. Harmony Extra 0.33 oz plus Buctril 0.75 pt/A with Agridex crop oil concentrate (COC) at 1% of spray volume was applied on 13 May 08 when wheat plants were at tillering stage. Before the first fungicide application, the field was divided into individual plots of 5 ft (4 rows) in width and 16.5-17.2 ft in length by cutting plants between plots with a rototiller. Fungicides were applied in 16 gal water/A on different dates and stages depending upon the treatments. The first applications of Topguard for the two-application treatments were done on 24 May at late jointing stage when there was no sign of rust in plots. The single applications of Topguard, Headline, BAS 556, Quilt, and Stratego and second application of Topguard were done on 12 Jun when plants were at boot stage. A 601C backpack sprayer was used with a CO₂ pressurized spray boom at 18 psi having three operating nozzles spaced 19 in apart. A randomized block design was used with four replications. Rust severity (percentage of diseased foliage on whole plot) was assessed from each plot on 12 Jun just before the second application and 19 Jun, 26 Jun, 3 Jul, 10 Jul, and 16 Jul or 7, 14, 21, 28, and 34 days after the second fungicide application, respectively. Plots were harvested on 6 Aug when kernels were naturally dry, and test weight of kernels was measured. Area under disease progress curve (AUDPC) was calculated for each plot using the six sets of severity data. Relative AUDPC was calculated as percent of the non-treated control. Rust severity, relative AUDPC, test weight, and yield data were subjected to analysis of variance and means were separated by Fisher’s protected LSD test.

All fungicide treatments significantly reduced rust severity 7 days after the second application. Differences in stripe rust severity between the fungicide and non-treated control treatments remained significant thereafter. Relative AUDPC values of all treatments were significantly lower than the non-treated control, and were not significantly different from each other. Treatments with two applications of Topguard at 10 fl oz/A and one application of Headline, BAS 556 at 9 fl oz/A, Quilt at 14 fl oz/A and Stratego at 10 fl oz/A significantly increased grain test weight of PS 279 while no fungicide treatment significantly increased grain test weight of Hatton. All treatments significantly increased grain yield on PS 279, but the increases on Hatton were not significant compared to the non-treated control.

Cultivar, treatment, rate/A, and timing of application ^x	Stripe rust severity (%) ^z						Test weight ^y (lb/bu)	Yield ^y		
	12 Jun Boot	19 Jun Early heading	26 Jun Early flowering	3 Jul Early milk	10 Jul Soft dough	16 Jul Dough		Relative AUDPC ^w	Mean (bu/A)	Increase (%)
Hatton										
Non-treated control ...	1.0 b ^v	1.3 a	13.8 a	45.0 a	70.0 a	85.0 a	100.0 a	63.9 ab	72.0 a	0.0
Topguard 1.04SC 7 fl oz/A (late jointing-24 May) + Topguard 1.04SC 7 fl oz/A (boot-12 Jun)...	1.0 b	0.0 c	0.0 b	0.0 b	0.3 b	0.5 b	0.7 b	64.0 ab	75.8 a	5.4
Topguard 1.04SC 10 fl oz/A (late jointing-24 May) + Topguard 1.04SC 10 fl oz/A (boot-12 Jun)	1.0 b	0.0 c	0.0 b	0.0 b	0.3 b	0.3 b	0.5 b	63.9 ab	71.7 a	-0.3
Topguard 1.04SC 14 fl oz/A (late jointing-24 May) + Topguard 1.04SC 14 fl oz/A (boot-12 Jun)	1.0 b	0.0 c	0.0 b	0.0 b	0.0 b	0.3 b	0.4 b	63.7 ab	72.2 a	0.3
Topguard 1.04SC 14 fl oz/A (boot-12 Jun)	1.0 b	0.0 c	0.0 b	0.0 b	0.0 b	0.3 b	0.4 b	63.5 ab	75.2 a	4.5
Headline 2.09EC 6 fl oz/A (boot-12 Jun)..	1.0 b	0.3 bc	0.3 b	0.0 b	1.0 b	1.0 b	1.9 b	63.8 ab	74.5 a	3.5
BAS 556 01 1.75EC 7 fl oz/A (boot-12 Jun)	1.0 b	0.0 c	0.0 b	0.0 b	0.0 b	0.5 b	0.4 b	64.0 a	75.2 a	4.5
BAS 556 01 1.75EC 9 fl oz/A (boot-12 Jun)	1.0 b	0.5 b	0.0 b	0.0 b	0.0 b	0.3 b	0.7 b	64.1 a	74.2 a	3.1

Quilt 1.66SC 10.5 fl oz (boot-12 Jun)....	1.0 b	0.0 c	0.0 b	0.0 b	0.0 b	0.0 b	0.3 b	63.5 ab	73.4 a	2.0
Quilt 1.66SC 14 fl oz (boot-12 Jun)	1.3 a	0.0 c	0.0 b	0.0 b	0.0 b	0.3 b	0.5 b	64.0 ab	74.3 a	3.3
Stratego 2.08EC 7 fl oz/A (boot-12 Jun).....	1.0 b	0.3 bc	0.0 b	0.0 b	0.5 b	0.0 b	1.1 b	63.7 ab	76.1 a	5.8
Stratego 2.08EC 10 fl oz/A (boot-12 Jun)	1.0 b	0.0 c	0.0 b	0.0 b	0.0 b	0.3 b	0.4 b	63.4 b	75.0 a	4.3
LSD ($P \leq 0.05$)	0.2	0.4	3.1	11.0	11.2	5.4	14.9	0.6	11.7	
PS 279										
Non-treated control ...	1.0 b	18.0 a	37.5 a	77.5 a	97.5 a	100.0 a	100.0 a	60.1 b	53.4 b	0.0
Topguard 1.04SC 7 fl oz/A (late jointing-24 May) + Topguard 1.04SC 7 fl oz/A (boot-12 Jun) ..	1.0 b	0.5 b	0.0 b	1.8 b	3.3 bc	21.3 b	5.6 b	60.8 ab	72.2 a	35.1
Topguard 1.04SC 10 fl oz/A (late jointing-24 May) + Topguard 1.04SC 10 fl oz/A (boot-12 Jun)	1.0 b	0.3 b	0.0 b	0.5 b	0.8 c	4.0 c	1.4 b	61.9 a	71.5 a	33.9
Topguard 1.04SC 14 fl oz/A (late jointing-24 May) + Topguard 1.04SC 14 fl oz/A (boot-12 Jun)	1.0 b	0.3 b	0.0 b	0.3 b	1.8 bc	4.3 c	1.7 b	61.5 ab	72.1 a	34.8
Topguard 1.04SC 14 fl oz/A (boot-12 Jun)	2.0 ab	2.0 b	0.0 b	1.5 b	4.3 bc	10.5 bc	4.9 b	61.3 ab	72.2 a	35.0
Headline 2.09EC 6 fl oz/A (boot-12 Jun)...	1.0 b	1.0 b	1.0 b	8.0 b	7.0 b	10.3 bc	8.0 b	61.9 a	70.6 a	32.0
BAS 556 01 1.75EC 7 fl oz/A (boot-12 Jun)	1.0 b	1.5 b	0.0 b	1.8 b	4.0 bc	7.8 c	4.0 b	61.3 ab	71.7 a	34.2
BAS 556 01 1.75EC 9 fl oz/A (boot-12 Jun)	1.0 b	0.0 b	0.0 b	2.8 b	3.0 bc	3.8 c	4.9 b	61.8 a	76.1 a	42.4
Quilt 1.66SC 10.5 fl oz (boot-12 Jun)....	1.0 b	0.0 b	0.0 b	0.8 b	2.8 bc	4.0 c	2.1 b	61.0 ab	73.9 a	38.2
Quilt 1.66SC 14 fl oz (boot-12 Jun)	1.0 b	0.0 b	0.0 b	0.0 b	0.3 c	0.3 c	0.3 b	62.3 a	70.2 a	31.3
Stratego 2.08EC 7 fl oz/A (boot-12 Jun).....	1.0 b	1.0 b	1.5 b	0.3 b	0.8 c	0.8 c	1.6 b	61.4 ab	72.5 a	35.6
Stratego 2.08EC 10 fl oz/A (boot-12 Jun)	3.3 a	5.0 b	2.5 b	0.3 b	0.3 c	2.5 c	4.0 b	62.0 a	70.7 a	32.3
LSD ($P \leq 0.05$)	2.0	6.5	8.2	13.9	5.6	13.2	11.6	1.5	8.7	

^z Stripe rust severity was recorded as percentage of leaf area with disease.

^y Test weight (lb/bu) and yield (lb/A) based on 3-5% moisture measured for each plot.

^x Crop Oil Concentrate (COC) at 1% v/v was applied in treatments of Headline, Quilt, and Stratego.

^w AUDPC is area under disease progress curve, = $\sum[\text{rust severity (i)} + \text{rust severity (i+1)}]/2 \times \text{days}$. Relative AUDPC was calculated for each treatment as the percent of the AUDPC (as 100%) of the non-treated control.

^v Column numbers followed by the same letter are not significantly different at $P = 0.05$ as determined by LSD test.

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