

Control of stripe rust of winter wheat with foliar fungicides, 2010.

The study was conducted in a field with Palouse 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 'PS 279' winter club wheat was seeded in rows spaced 14 in. apart at 60 lb/A (99% germination rate) with a drill planter on 26 Oct 09. 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 11 May 10 when wheat plants were at late tillering stage. Before the first fungicide application, the field was divided into individual plots of 4.8 ft (4 rows) in width and 16.0-17.8 ft in length by eliminating 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 fungicide application timing at late jointing stage was done on 21 May when stripe rust was just appearing (1% severity) and the second at boot stage on 8 Jun when stripe rust reached 5% severity. 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. Disease severity (percentage of diseased foliage on whole plot) was assessed from each plot on 8 Jun, 11 Jun, 24 Jun, and 8 Jul or on the same day and 3, 16, and 30 days after the second fungicide application timing, respectively. Plots were harvested on 10 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 four 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 compared to the non-treated control at flowering stage. Relative AUDPC values of all treatments were significantly less than the non-treated control, and were significantly different among some of the treatments. Topguard applied at late jointing stage at all three tested rates and applied at 7 fl oz/A at boot stage had similar relative AUDPC values, which were significantly lower than that of the non-treated control, but significantly higher than those of all remaining treatments with Topguard, Quilt, Quilt Xcel, Tilt, Stratego Pro, and Prosar. Except the treatments of Topguard at 7 and 10 fl oz/A applied at late jointing only, all treatments significantly increased test weight. All treatments significantly increased grain yield compared to the non-treated control. Yield increases ranged from 34.6% by the treatment of Topguard at the rate of 7 fl oz/A at late jointing to 147.2% by the treatment of Prosar.

Product, rate/A, and timing of application ^x	Stripe rust severity (%) ^z				Relative AUDPC ^w	Test weight ^y (lb/bu)	Yield ^y	
	8 Jun	11 Jun	24 Jun	8 Jul			Mean	Increase
	Early boot	Late boot	Flowering	Soft dough			(bu/A)	(%)
Non-treated control	2.8 abc ^v	10.0 ab	85.0 a	100.0 a	100.0 a	56.1 h	35.4 g	0.0
Topguard 1.04SC 7 fl oz/A (late jointing-21 May)	0.3 c	1.3 cd	40.0 b	100.0 a	64.7 b	56.9 gh	47.6 f	34.6
Topguard 1.04SC 10 fl oz/A (late jointing-21 May)	0.3 c	1.5 cd	32.5 b	100.0 a	59.6 b	56.8 gh	47.7 f	34.8
Topguard 1.04SC 14 fl oz/A (late jointing-21 May)	0.0 c	0.0 d	31.3 b	98.8 a	57.6 b	57.0 g	49.2 f	39.1
Topguard 1.04SC 7 fl oz/A (boot-8 Jun)	1.8 abc	15.0 a	40.0 b	46.3 b	51.1 b	58.0 ef	55.3 ef	56.3
Topguard 1.04SC 10 fl oz/A (boot-8 Jun)	2.3 abc	6.8 bc	6.3 c	13.8 ef	12.3 c	58.4 de	65.6 cde	85.4
Topguard 1.04SC 7 fl oz/A (late jointing-21 May) fb ^u Topguard 7 fl oz/A (boot-8 Jun)	0.0 c	1.8 cd	3.0 c	28.8 cd	13.0 c	58.3 de	69.2 bcd	95.8
Topguard 1.04SC 7 fl oz/A + Nuance 75WDG 0.33 oz/A (late jointing-21 May) fb ^u Topguard 7 fl oz/A (boot-8 Jun)	0.3 c	0.8 cd	11.8 c	40.0 bc	23.0 c	57.3 fg	62.6 de	77.1
Quilt 1.66SC 14 fl oz/A (boot-8 Jun)	3.3 ab	3.3 cd	6.8 c	10.0 ef	9.9 c	59.5 bc	70.1 bcd	100.7
Quilt Xcel 2.20SC 10.5 fl oz/A (boot-8 Jun)	1.3 bc	2.0 cd	4.0 c	19.3 de	10.7 c	59.1 cd	73.6 bc	107.9
Tilt 3.60EC 4 fl oz/A (boot-8 Jun)..	2.3 abc	15.0 a	12.5 c	14.3 ef	20.3 c	60.3 ab	75.7 bc	114.0
Stratego Pro 500SC 4 fl oz/A (boot-8 Jun)	2.3 abc	5.8 bcd	12.5 c	4.0 f	12.7 c	60.3 ab	77.7 ab	119.6
Prosaro 421.42SC 6.5 fl oz/A (boot-8 Jun)	4.3 a	15.0 a	15.0 c	8.8 ef	20.2 c	61.1 a	87.4 a	147.2

LSD ($P \leq 0.05$)	2.8	6.6	15.1	13.7	14.3	0.9	10.6
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^z Stripe rust severity was recorded as percentage of whole plot leaf area with disease.

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

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

^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.

^u fb = followed by.