

**Control of stripe rust of winter wheat with foliar fungicides, 2011.**

The study was conducted in a field with Palouse silt loam under natural infection of stripe rust near Pullman, WA. Fertilizer (Osmocota 14-14-14) was applied at 60 lb/A at the time of cultivation on 19 Oct 10. 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 20 Oct 10. Huskie 15 fl oz plus R-11 30 ml/A was applied on 1 Jun when wheat plants were at early jointing stage. Before the first fungicide application, the field was divided into individual plots of 4.4 ft (4 rows) in width and 15.0-17.5 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 treatment. The first fungicide application timing at jointing stage was done on 3 Jun when stripe rust was 10-30% severity in the field and the second at boot stage on 17 Jun when stripe rust in the non-treated plots reached 70-90% severity. A 601C backpack sprayer was used with a CO<sub>2</sub> pressurized spray boom at 18 psi having three operating ¼ in. 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 3 Jun, 16 Jun, 28 Jun, 11 Jul, and 25 Jul or on the same day and 13, 25, 38, and 52 days after the first fungicide application timing, respectively. Plots were harvested on 30 Aug when kernels had 3-5% kernel moisture 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.

Because the considerable level of stripe rust had developed by the fungicide application dates, none of the fungicide treatments provided complete protection of the crop from the disease. However, all fungicide treatments significantly reduced rust severity compared to the non-treated control at heading stage. Relative AUDPC values of all treatments were significantly less than the non-treated control, and were significantly different among some of the treatments. Priaxor (2 fl oz/A), Headline (3 fl oz/A), and Tilt (2 fl oz/A) applied at jointing stage and Priaxor (4 fl oz/A), Tilt (4 fl oz/A), and Absolute (5 fl oz/A) applied at boot stage had similar relative AUDPC values, which were significantly lower than that of the non-treated control, but significantly higher than some of the remaining treatments with Twinline, Priaxor, Quilt, Stratego, DPX-LEM17, or combinations of different fungicides. Two applications of different fungicides, Priaxor (2.0 fl oz/A at jointing stage) plus Twinline (7 fl oz/A at boot stage) and Headline (3 fl oz/A at jointing stage) plus Priaxor (4 fl oz/A at boot stage), had the lowest relative AUDPC values. The three only jointing applications (Priaxor 2 fl oz/A, Headline 3 fl oz/A, and Tilt 2 fl oz/A) had test weight significantly lower than the non-treated control. All of the remaining treatments, except the treatment of Priaxor 4 fl oz/A applied at boot stage, significantly increased test weight compared to the non-treated plots. All treatments, except Tilt (4 fl oz/A) applied at boot stage, significantly increased grain yield compared to the non-treated control. Yield increases ranged from 93.7% by the treatment of Tilt at the rate of 4 fl oz/A at boot stage to 862.8% by the treatment of Priaxor (3 fl oz/A) applied at jointing plus Twinline (7 fl oz/A) applied at boot stage. The non-treated control plots produced only 10% grain of the best treatments.

Product, rate/A, and timing of application <sup>x</sup>	Stripe rust severity (%) <sup>z</sup>					Relative AUDPC <sup>w</sup>	Test weight <sup>y</sup> (lb/bu)	Yield <sup>y</sup>	
	3 Jun Jointing	16 Jun Boot	28 Jun Heading	11 Jul Flowering	25 Jul Soft dough			Mean (bu/A)	Increase (%)
Non-treated control ...	15.0 abc <sup>v</sup>	80.0 ab	92.5 a	100.0 a	100.0 a	100.0 a	60.4 d	6.0 e	0.0
Priaxor 500SC 2 fl oz/A (jointing-3Jun)..	12.5 bc	22.5 cd	57.5 b	98.8 a	100.0 a	72.3 bc	59.5 e	33.8 b	464.5
Headline 250SC 3 fl oz/A (jointing-3 Jun).	13.8 abc	17.5 d	70.0 b	95.0 a	100.0 a	73.5 b	59.5 e	36.3 b	505.7
Tilt 3.60EC 2 fl oz/A (jointing-3 Jun) .....	12.5 bc	7.5 e	62.5 b	95.0 a	100.0 a	68.5 bcd	59.2 e	50.5 a	742.4
Priaxor 500SC 2 fl oz/A (jointing-3 Jun) fb <sup>u</sup> Twinline 210EC 7 fl oz/A (boot-17 Jun).	13.8 abc	25.0 cd	30.0 cde	27.5 e	30.0 de	31.5 g	62.5 a	57.7 a	862.8
Headline 250SC 3 fl oz/A (jointing-3 Jun) fb <sup>u</sup> Priaxor 500SC 4 fl oz/A (boot-17 Jun).	15.0 abc	27.5 c	17.5 e	32.5 de	25.0 e	29.8 g	61.6 bc	52.5 a	775.4
Priaxor 500SC 4 fl oz/A (boot-17 Jun) ...	18.8 a	82.5 a	40.0 c	55.0 bcd	72.5 b	67.5 bcde	61.1 cd	16.8 cd	179.6
Twinline 210EC 7 fl oz/A (boot-17 Jun) ...	13.8 abc	80.0 ab	25.0 de	32.5 de	35.0 de	48.8 f	62.6 a	18.4 cd	207.2
Priaxor 500SC 5 fl oz/A (boot-17 Jun) ...	15.0 abc	80.0 ab	30.0 cde	40.0 cde	45.0 cde	54.0 ef	62.2 ab	15.4 cd	156.3
Twinline 210SC 9 fl oz/A (boot-17 Jun)...	11.3 c	72.5 b	37.5 cd	48.8 bcde	52.5 bcd	57.8 def	62.2 ab	18.0 cd	199.7
Headline 250SC 4 fl oz/A + Tilt 3.60EC 4 fl oz/A (boot-17 Jun).	13.8 abc	82.5 a	25.0 de	35.0 cde	42.5 de	51.3 f	62.5 a	20.6 c	243.8

Tilt 3.60EC 4 fl oz/A (boot-17 Jun) .....	12.5 bc	77.5 ab	62.5 b	67.5 b	70.0 bc	75.3 b	62.0 ab	11.6 de	93.7
Quilt 1.66SC 14 fl oz/A (boot-17 Jun)....	13.8 abc	82.5 a	25.0 de	40.0 cde	42.5 de	52.8 f	62.5 a	18.1 cd	202.6
Absolute 500SC 5 fl oz/A (boot-17 Jun) ...	17.5 abc	77.5 ab	60.0 b	56.3 bc	52.5 bcd	68.8 bcd	62.5 a	14.7 cd	145.7
Stratego YLD 4 fl oz/A (boot-17 Jun) ...	10.0 c	75.0 ab	35.0 cd	57.5 bc	47.5 bcde	59.0 cdef	62.4 a	16.4 cd	172.8
DPX-LEM17 (Vertisan) 20 fl oz/A (boot-17 Jun) .....	12.5 bc	77.5 ab	20.0 e	42.5 cde	50.0 bcde	51.5 f	61.9 abc	18.4 cd	207.7
LSD ( $P \leq 0.05$ ) .....	5.6	8.1	13.7	22.7	25.3	14.2	0.8	7.5	

<sup>z</sup> Stripe rust severity was recorded as percentage of whole plot leaf area with disease.

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

<sup>x</sup> Induce 90S at 0.125% v/v was applied in treatments of Priaxor 2 fl oz (jointing-3 Jun), Headline 3 fl oz/A (jointing-3 Jun), Tilt 2 fl oz/A (jointing-3 Jun), Priaxor 2 fl oz/A (jointing-3 Jun) followed by Twinline 7 fl oz/A (boot-17 Jun), Headline 3 fl oz/A (jointing-3 Jun) followed by Priaxor 4 fl oz/A (boot-17 Jun), Priaxor 4 fl oz/A (boot-17 Jun), Twinline 7 fl oz/A (boot-17 Jun), Absolute 5 fl oz/A (boot-17 Jun), and Stratego YLD 4 fl oz/A (boot-17 Jun); surfactant-nonionic 100 at 0.25% v/v was applied in treatments of Priaxor 5 fl oz/A (boot-17 Jun), Twinline 9 fl oz/A (boot-17 Jun), Headline 4 fl oz/A plus Tilt 4 fl oz/A (boot-17 Jun), Tilt 4 fl oz/A (boot-17 Jun), and Quilt 14 fl oz/A (boot-17 Jun).

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

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

<sup>u</sup> fb = followed by.