WHEAT (*Triticum aestivum* 'Lemhi')
Stripe rust; *Puccinia striiformis* f. sp. *tritici*

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Control of stripe rust of spring 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. Susceptible 'Lemhi' spring wheat was seeded in rows spaced 14 in. apart at 60 lb/A (99% germination rate) with a drill planter on 4 May. Huskie 15 fl oz plus R-11 30 ml/A was applied on 26 Jun when wheat plants were at early jointing stage. Before the first fungicide application, the field was divided into individual plots of 4.3 ft (4 rows) in width and 15.1-18.0 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 early jointing stage was done on 26 Jun when stripe rust was 20-40% severity and the second at boot stage on 6 Jul when stripe rust in the non-treatedplots reached 50-70% severity. A 601C backpack sprayer was used with a CO_2 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 28 Jun, 6 Jul, 20 Jul, 2 Aug, and 15 Aug or 2, 10, 24, 37, and 50 days after the first fungicide application timing, respectively. Plots were harvested on 15 Sep 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 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 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. Priaxor (4 fl oz/A and 5 fl oz/A), Twinline (both 7 fl oz/A and 9 fl oz/A), Headline (4 fl oz/A) plus Tilt (4 fl oz/A), Tilt (4 fl oz/A), Quilt (14 fl oz/A), and Stratego YLD (4 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 treatments with Priaxor (2 fl oz/A), Headline (3 fl oz/A), and Tilt (2 fl oz/A) applied at jointing stage and Priaxor (2 fl oz/A) at jointing stage followed by Twinline (7 fl oz/A) at boot stage or Headline (3 fl oz/A) at jointing stage followed by Priaxor (4 fl oz/A) at boot stage. All treatments with an early application at jointing stage had the lowest relative AUDPC values. All treatments significantly increased test weight compared to the non-treated control. The treatments with an early application at jointing stage all increased grain yield significantly compared to the non-treated control. Only the single treatments of Twinline (both 7 fl oz/A and 9 fl oz/A) and Tilt (4 fl oz/A) at boot stage significantly increased grain yield compared to the non-treated plots. Yield increases ranged from 18.6% by the treatment of Priaxor (5 fl oz/A) at boot stage to 66.1% by the treatment of Priaxor (2 fl oz/A) applied at jointing stage and the treatment of Priaxor (2 fl oz/A) applied at jointing stage followed by Twinline (7 fl oz/A) at boot stage. The non-treated control had 40% yield loss compared to the treatment producing the highest grain yield.

	Stripe rust severity (%)[z]						Test	Yield[y]	
Product, rate/A, and timing of application[x]	28 Jun Jointing	6 Jul Boot	20 Jul Flowering	2 Aug Milk	15 Aug Soft dough	Relative AUDPC[w]	weight[y] (lb/bu)	Mean (bu/A)	Increase (%)
Non-treated control ……..	26.3 b[v]	65.0 a	87.5 a	93.8 a	100.0 a	100.0 a	60.2 f	33.9 d	0.0
Priaxor 500SC 2 fl oz/A (jointing-27 Jun)……	27.5 bc	20.0 c	15.0 ghi	25.0 d	52.5 bc	30.5 de	60.9 abcde	56.4 a	66.1
Headline 250SC 3 fl oz/A (jointing-27 Jun)……	30.0 ab	31.3 c	20.0 fgh	25.0 d	47.5 bcd	41.8 d	60.8 de	50.7 abc	49.3
Tilt 3.60EC 2 fl oz/A (jointing-27 Jun) ….....	27.5 ab	22.5 c	7.5 hi	27.5 cd	47.5 bcd	28.5 de	60.8 cde	50.2 abc	47.9
Priaxor 500SC 2 fl oz/A (jointing-27 Jun) fb[u] Twinline 210EC 7 fl oz/A (boot-6 Jul)……	27.5 ab	22.5 c	5.0 i	8.8 e	15.0 h	27.3 e	61.2 abcd	56.3 a	66.1
Headline 250SC 3 fl oz/A (jointing-27 Jun) fb[u] Priaxor 500SC 4 fl oz/A (boot-6 Jul)……	27.5 ab	26.3 c	6.3 i	11.3 e	17.5 gh	31.0 de	61.2 abcd	52.2 ab	53.8
Priaxor 500SC 4 fl oz/A (boot-6 Jul) ..	30.0 ab	65.0 a	42.5 bc	42.5 b	57.5 b	78.8 b	60.7 e	42.9 bcd	26.4

Twinline 210EC 7 fl oz/A (boot-27 Jun) ……...	28.8 ab	65.0 a	27.5 defg	25.0 d	27.5 fgh	70.8 bc	60.9 bcde	50.2 abc	48.1
Priaxor 500SC 5 fl oz/A (boot-6 Jul)…	26.3 b	60.0 ab	40.0 bcd	42.5 b	47.5 bcd	72.8 bc	60.9 abcde	40.2 cd	18.6
Twinline 210SC 9 fl oz/A (boot-6 Jul)…….	27.5 ab	67.5 a	20.0 fgh	30.0 bcd	30.0 feg	68.5 bc	61.1 abcde	50.6 abc	49.1
Headline 250SC 4 fl oz/A + Tilt 3.60EC 4 fl oz/A (boot-6 Jul)……	27.5 ab	60.0 ab	25.0 efg	30.0 bcd	25.0 fgh	65.5 bc	61.1 abcde	41.0 bcd	20.8
Tilt 3.60EC 4 fl oz/A (boot-6 Jul)..	27.5 ab	57.5 ab	52.5 b	40.0 bc	47.5 bcd	77.3 bc	61.3 ab	52.3 ab	54.2
Quilt 1.66SC 14 fl oz/A (boot-6 Jul)…	30.0 ab	65.0 a	22.5 fg	32.5 bcd	32.5 ef	68.8 bc	61.2 abc	45.5 abcd	34.3
Absolute 500SC 5 fl oz/A (boot-6 Jul) ……...	28.8 ab	50.0 b	37.5 cde	35.0 bcd	37.5 def	64.5 c	61.3 a	42.2 bcd	24.4
Stratego YLD 4 fl oz/A (boot-6 Jul) ..	31.3 a	65.0 a	30.0 cdef	30.0 bcd	42.5 cde	73.0 bc	61.2 abcd	40.9 bcd	20.5
DPX-LEM17 (Vertisan) 20 fl oz/A (boot-6 Jul)..	30.0 ab	57.5 ab	25.0 efg	27.5 cd	35.0 def	64.5 c	60.7 e	45.2 abcd	33.2
LSD ($P \leq 0.05$) …	4.4	13.7	13.0	13.2	15.0	13.6	0.4	11.8	

[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] 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); sufactant-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) .

[w] AUDPC is area under disease progress curve, = ∑[rust severity (i) + rust severity (i+1)]/2*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.