

**Control of stripe rust of spring wheat with foliar fungicides, 2010.**

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 'Lemhi' soft white spring wheat was seeded in rows spaced 14 in. apart at 60 lb/A (99% germination rate) with a drill planter on 30 Apr 10. 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 2 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 16.0-17.9 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 was done on 18 Jun when stripe rust was just appearing (1% severity) and the second timing at early boot on 22 Jun when stripe rust reached 5% severity. A 601C backpack sprayer was used with a CO<sub>2</sub> 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 6 Jul, 19 Jul, and 26 Jul or 14, 27, and 34 days after the second fungicide application timing, respectively. Plots were harvested on 30 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 prevented rust development by 6 Jul compared with the non-treated control. Differences in stripe rust severity between the fungicide and non-treated control treatments remained significant 27 days after the second fungicide application timing for all treatments except the treatments of Topguard at 7 and 10 fl oz/A at late jointing only and BAS 70302F at 2.47 and 3.00 fl oz/A at late jointing stage. Relative AUDPC values of all treatments were significantly less than the non-treated control, and were significantly different among some of the treatments. The treatments of Quilt 1.66SC at 14 fl oz/A, Quilt Xcel 2.20SC at 10.5 fl oz/A, Tilt 3.60EC at 4.0 fl oz/A, Prostaro, Muscle, and Headline at 3.0 plus Bumper 432EC at 4.0 fl oz/A were in the best ranking group for controlling stripe rust. Of the 31 fungicide treatments, 15 significantly increased grain test weight. Except for the treatments of BAS 7004F at 4.57 fl oz/A and BAS 70302F at 2.47 fl oz/A sprayed at late jointing, all fungicide treatments significantly increased grain yield by 23.1% from 3.0 fl oz/A Headline 250EC at late jointing stage to 66.9% from Muscle.

Product, rate/A, at timing of application <sup>x</sup>	Stripe rust severity (%) <sup>z</sup>				Test weight <sup>y</sup> (lb/bu)	Yield <sup>y</sup>	
	6 Jul Early heading	19 Jul Milk	26 Jul Soft dough	Relative AUDPC <sup>w</sup>		Mean (bu/A)	Increase (%)
Non-treated control .....	31.3 a <sup>v</sup>	100.0 a	100.0 a	100.0 a	58.6 ij	36.17 o	0.0
Topguard 1.04SC 7 fl oz/A (late jointing-18 Jun) .....	0.0 c	87.5 abc	100.0 a	78.9 bc	58.8 ij	46.9 ijklm	29.6
Topguard 1.04SC 10 fl oz/A (late jointing-18 Jun) .....	1.3 bc	88.8 abc	100.0 a	80.2 bc	58.9 ghij	45.9 jklmn	26.8
Topguard 1.04SC 14 fl oz/A (late jointing-18 Jun) .....	0.3 c	57.5 efg	90.0 abc	57.4 ef	58.9 ghij	47.4 hijklmn	30.9
Topguard 1.04SC 7 fl oz/A (boot-22 Jun) .....	0.0 c	58.8 ef	75.0 def	54.7 fg	59.2 cdefghi	53.0 bcdefghi	46.5
Topguard 1.04SC 10 fl oz/A (boot-22 Jun) .....	0.0 c	28.8 jk	51.3 gh	30.1 ij	59.5 abcdefg	52.4 bcdefghij	44.9
Topguard 1.04SC 14 fl oz/A (boot-22 Jun) .....	0.0 c	15.0 lmno	31.3 jk	16.7 lm	59.4 bcdefgh	54.4 abcdefg	50.4
Topguard 1.04SC 7 fl oz/A (late jointing-18 Jun) fb <sup>u</sup> Topguard 1.04SC 7 fl oz/A (boot-22 Jun) .....	0.0 c	26.3 jkl	48.8 hi	27.9 ijk	59.7 abc	51.4 cdefghijk	42.1
Topguard 1.04SC 7 fl oz/A + Nuance 75WDG 0.33 oz/A (late jointing-18 Jun) fb <sup>u</sup> Topguard 7 fl oz/A (boot-22 Jun) .....	0.0 c	25.0 jklm	45.0 hi	26.2 ijkl	58.3 j	50.3 defghijkl	39.2
Quilt 1.66SC 14 fl oz/A (boot-22 Jun) .....	0.0 c	4.3 opq	8.8 m	4.7 no	60.1 a	56.5 abcd	56.1
Quilt Xcel 2.20SC 10.5 fl oz/A (boot-22 Jun) .....	0.0 c	5.3 nopq	11.3 m	5.9 no	60.0 ab	58.5 ab	61.8
Tilt 3.60EC 4 fl oz/A (boot-22 Jun) .....	0.0 c	3.8 opq	12.5 lm	5.2 no	59.7 abc	53.2 bcdefg	47.0

Stratego Pro 500SC 4 fl oz/A (boot-22 Jun) .....	0.0 c	13.8 lmnop	25.0 kl	14.5 mn	59.7 abcd	55.6 abcdef	53.8
Prosaro 421.42SC 6.5 fl oz/A (boot-22 Jun).....	0.0 c	0.0 q	0.0 m	0.0 o	59.8 ab	58.2 abc	61.0
BAS 70004F 300.0SC 2.28 fl oz/A (boot-22 Jun).....	1.3 bc	77.5 cd	96.3 ab	72.1 cd	58.9 fg	42.4 mno	17.1
BAS 70004F 300.0SC 4.57 fl oz/A (boot-22 Jun) .....	3.0 b	78.8 bcd	98.8 ab	74.2 bcd	58.7 ij	44.9 klmn	24.1
BAS 70302F 500.0SC 2.47 fl oz/A (late jointing-18 Jun)	3.0 b	91.3 ab	100.0 a	82.5 b	58.6 ij	41.5 no	14.8
Headline 250EC 3.0 fl oz/A (late jointing-18 Jun) .....	1.5 bc	87.5 abc	100.0 a	79.5 bc	58.7 ij	44.5 lmn	23.1
BAS 70302F 500.0SC 4.11 fl oz/A (boot-22 Jun) .....	1.3 bc	57.5 efg	86.3 bcd	57.0 ef	58.9 ghij	49.4 efghijkl	36.6
BAS 70302F 500.0SC 4.93 fl oz/A (boot-22 Jun) .....	0.3 c	70.0 de	90.0 abc	65.5 de	58.8 hij	49.0 fghijklm	35.5
Twinline 210EC 7.0 fl oz/A (boot-22 Jun) .....	0.0 c	45.0 ghi	68.8 ef	44.5 gh	58.8 hij	49.1 fghijklm	35.7
Quilt Xcel 264.0SE 10.5 fl oz/A (boot-22 Jun) .....	0.0 c	12.5 mnopq	27.5 jk	14.3 mn	59.6 abcde	55.8 abcdef	54.2
BAS 70302F 500.0SC 4.11 fl oz/A + Caramba at 50.0 G A/HA (boot-22 Jun).....	0.5 c	46.3 fgh	76.3 de	47.2 fg	59.0 efgh	53.8 abcdefgh	48.8
Quadris 2.08SC 6.2 fl oz/A (boot-22 Jun).....	0.3 c	25.0 jklm	38.8 hij	24.9 ijkl	59.5 abcdefg	50.3 defghijkl	39.0
Quilt 200SC 14 fl oz/A (boot-22 Jun).....	0.0 c	17.5 klmn	31.3 jk	18.3 klm	59.5 abcdefg	54.5 abcdefg	50.7
Twinline 210EC 9.0 fl oz/A (boot-22 Jun).....	0.0 c	32.5 ij	62.5 fg	35.0 hi	59.1 defghi	53.4 bcdefghi	47.6
Bumper 432EC 4 fl oz/A (boot-22 Jun).....	0.0 c	22.5 jklm	37.5 ijk	22.9 jklm	59.5 abcdefg	54.2 abcdefgh	49.9
Muscle 250EC 4.0 fl oz/A (boot-22 Jun) .....	0.0 c	0.0 q	0.0 m	0.0 o	59.9 ab	60.4 a	66.9
BAS 70302F 500.0SC 4.11 fl oz/A (boot-22 Jun).....	0.5 c	42.5 hi	80.0 cde	45.6 g	59.2 cdefghi	48.3 ghijklmn	33.6
BAS 70302F 500.0SC 4.93 fl oz/A (boot-22 Jun).....	0.5 c	50.0 fgh	82.5 cd	51.0 fg	59.1 cdefghi	46.9 ijklmn	29.7
Headline 250EC 3.0 fl oz/A + Bumper 432EC 4.0 fl oz/A (boot-22 Jun) .....	0.0 c	1.3 pq	4.0 m	1.7 o	59.6 abcd	56.0 abcde	54.8
Headline 250EC 3.0 fl oz/A + Bumper 432EC 3.0 fl oz/A (boot-22 Jun).....	1.8 bc	85.0 bc	97.5 ab	77.4 bc	58.8 ij	45.6 jklmn	26.1
LSD ( $P \leq 0.05$ ) .....	2.2	13.0	13.1	10.3	0.6	6.9	

<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> Crop Oil Concentrate (COC) at 1% v/v was applied in treatments of Quilt, Quilt Xcel, Tilt, Stratego Pro, Prosaro, Headline, Twinline, Quadris, and Muscle.

<sup>w</sup> 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.

<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.