Control of stripe rust of winter wheat with various foliar fungicides, 2013.

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 29 Oct 2012. Stripe rust susceptible ‘PS 279’ winter wheat was seeded in rows spaced 14 in. apart at 60 lb/A (99% germination rate) with a drill planter on 30 Oct 2012. Nitrogen fertilizer (46-0-0) and herbicides (Huskie, 15 fl oz/A, Axial, 80 ml/A, and M-90, 140 ml/A) were applied on 7 May 2013 when wheat plants were at the early jointing stage. Before the first fungicide application, the field was divided into individual plots of 4.4 ft (4 rows) in width and 15.1 to 16.8 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 treatment. The first fungicide application timing at jointing stage (Feekes 5) was made on 20 May when stripe rust was 0 to 5% severity in the field. The second application was done at the boot stage (Feekes 10) on 11Jun when stripe rust in the plots without first fungicide application reached 8 to 35% severity. A 601C backpack sprayer was used with a CO₂-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 per whole plot) was assessed from each plot on 20 May, 10 Jun, 17 Jun (data not presented), 25 Jun, and 3 Jul or on the day of fungicide application and 21, 28, 36, and 44 days after the first fungicide application timing, respectively. Plots were harvested on 5 Aug when kernels had 3 to 5% kernel moisture and test weight of kernels was measured. Area under disease progress curve (AUDPC) was calculated for each plot using the five sets of severity data. Relative AUDPC (rAUDPC) was calculated as percent of the non-treated control. Rust severity, rAUDPC, test weight, and yield data were subjected to analysis of variance and means were separated by Fisher’s protected LSD test.

The first fungicide was applied as stripe rust began to develop (Feekes 5) and the second application as the disease reached 8 to 35% severity (Feekes 10) in the plots without the first application. Stripe rust reached 100% severity in the nontreated check plots approximately 44 days after the first application, slower than in the past several years as the weather was hot and dry during the late growing season. All fungicide treatments significantly reduced rust severity compared to the nontreated at the milk stage. The rAUDPC values of all treatments were significantly less than the nontreated, except the treatment of Topguard alone at Feekes 10. Among all treatments, the treatments of Aproach at Feekes 5 followed by Aproach Prima at Feekes 10 provided the best disease control, but the treatments of Topguard 5 fl oz/A at Feekes 5 followed by Feekes 10, A18126 4.76 ozwtpr/A at Feekes 10, and A15457 4.1 fl oz/A plus Tilt + Quadris at Feekes 10 had similar control. Among the single fungicide treatments with one application at Feekes 10, A18126 2.86 ozwtpr/A, A18126 4.67 ozwtpr/A, A18993 9 fl oz/A, Aproach Prima at 6.0 fl oz/A, Aproach Prima at 3.4 fl oz/A, 5.0 fl oz/A, and 6.8 fl oz/A, Custodia 8.6 fl oz/A, and Quilt Xcel 10.5 fl oz/A provided similar levels of stripe rust control. All treatments, except Topguard 14 fl oz/A at Feekes 10, significantly increased test weight compared to the nontreated. The treatment of A15457 4.1 fl oz/A + Tilt 4.0 fl oz/A + Quadris 6 fl oz/A at Feakes 10 produced the greatest test weight, and the test weights of eight other treatments were not significantly different from one another. Except treatments made at Feekes 10 with Topguard 14 fl oz/A, Aproach 6.0 fl oz/A, Aproach Prima 5.0 fl oz/A, and Bumper 4 fl oz/A, all other treatments significantly increased yield compared with the nontreated. The treatments with Aproach 3.0 fl oz/A at Feekes 5 followed by Aproach Prima 6.8 fl oz/A at Feekes 10 and Topguard 5 fl oz/A at Feekes 5 followed by Feekes 10 produced the greatest yields, increasing by 73.6% and 58.0%, respectively compared with the nontreated.
<table>
<thead>
<tr>
<th>Treatment; rate [fl oz/A or lb/A or oz (wt product/A)]</th>
<th>Growth stage(^a) (Feeskes)</th>
<th>Stripe rust severity (%)*</th>
<th>Relative AUDPC(^c)</th>
<th>Test weight(^d) (lb/bu)</th>
<th>Yield(^e) (bu/A)</th>
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</thead>
<tbody>
<tr>
<td>Non-treated ..................................................</td>
<td>---</td>
<td>20 May Jointing 10 Jun Boot 25 Jun Milk 3 Jul Dough</td>
<td>2.08 SC; 6 oz; Topguard 1.04 SC; Topguard 1.04 SC 5 oz A15457 100 EC 4.1 oz + Tilt 3.6 EC; 4.0 oz + Quadris 6.8 SC; 6 oz; A18126 45 WG; 4.76 oz wtpr; A18126 45 WG; 2.86 oz wtpr; A18893 200 EC; 9 oz; A1816 45 SC; 8.6 oz; Aproach Prima 2.34 SC; 1.5 lb; Aproach Prima 2.34 SC; 6.8 oz; Aproach Prima 2.34 SC; 3.4 oz; Bumper 3.6 EC; 4 oz + Orius 3.6 F; 4 oz; Custodia 1.67 SC; 8.6 oz; Prosaro 3.52 SC; 6.5 oz; Quilt Xcel 2.2 SE; 10.5 oz; Topguard 1.04 SC; 14 oz; Topguard 1.04 SC; 4.3 oz + Quadris 2.08 SC; 3.15 oz; Topguard 1.04 SC; 7.5 oz + Koverall 75% WG; 1.5 lb; Topguard 1.04 SC; 10 oz + Koverall 75% WG; 1.5 lb; Viathon 5.1 SC; 32 oz</td>
<td>10</td>
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<tr>
<td>(LSD (P \leq 0.05)) ............................................</td>
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<td>---</td>
<td>0.16</td>
<td>0.52</td>
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\(^a\) Stripe rust severity was recorded as percentage of whole plot leaf area with disease.

\(^b\) The first application at Feeske 5 was done on 20 May when wheat plants were at jointing stage and the second application at Feeske 10 was done on 10 Jun when wheat plants were at boot stage.

\(^c\) AUDPC is area under disease progress curve, \(\sum\) 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.

\(^d\) Test weight (lb/bu) and yield (bu/A) based on 3 to 5% kernel moisture.

\(^e\) Column numbers followed by the same letter are not significantly different at \(P = 0.05\) as determined by LSD test.

\(^f\) fb, followed by.

\(^g\) Non-ionic (NIS) 90% SL 25% v/v tank mixed with the fungicide.

\(^h\) Crop oil concentrate (COC) SL 1% v/v mixed with the fungicide.

\(^i\) NIS (Induce 90 SL) 0.125% v/v tank mixed with the fungicide.

\(^j\) NIS 100% 0.25% v/v tank mixed with the fungicide.