

# EVALUATION OF FUNGICIDES FOR CONTROL OF FUSARIUM HEAD BLIGHT AND DEOXYNIVALENOL CONTAMINATION, GLUME BLOTCH AND LEAF DISEASES IN A SOFT RED WINTER WHEAT CULTIVAR IN KENTUCKY, 2009.

D. Hershman, B. Kennedy and T. Yielding  
Plant Pathology Department  
University of Kentucky, Princeton, KY 42445  
PH: (270) 365-7541 Ext. 215; Email: don.hershman@uky.edu

The soft red winter wheat cultivar 'Cumberland' was planted with a no-till planter following corn harvest on 14 Oct 08 on the Kevil Tract of the University of Kentucky Research and Education Center in Princeton, KY. Wheat strips (4.3 ft-wide) were planted at a rate that would achieve a final stand of approximately 36 plants ft<sup>2</sup> and consisted of seven rows on 7-inch spacing. Warrior insecticide was applied (3.5 fl oz/A) on 10 Nov 08 and again on 17 Mar 09 at crop green-up to reduce the potential for barley yellow dwarf. Liquid nitrogen (28-0-0) was applied in a February/March split application at a rate of approximately 40 and 80 lbs/A on 7 Feb 09 and 23 Mar 09, respectively. Weeds were controlled by applying Harmony Extra herbicide (0.5 fl oz/A) on 17 Mar 09. On 16 Apr 09, strip rows were subdivided into 20-ft plots by application of Round-up herbicide. The experimental design was a randomized complete block with four replications. Fungicide treatments were applied with a hand-held CO<sub>2</sub>-powered backpack boom sprayer equipped with two Teejet 8002VS nozzles at 40 psi and delivering approximately 20 gpa of spray solution. Treatments were applied on 17 Mar, 17 Apr, 30 Apr, and 2 May corresponding to Feeke's (F) growth stages 4-5, F8, F10.1-3, F10.5 and F10.51, respectively. Plots were rated for leaf

blotch complex (primarily *S. nodorum*, but low levels of speckled leaf blotch (*Septoria tritici*) and tan spot (*Pyrenophora tritici-repentis*) were also present, as was leaf rust at the late-milk stage (11.1) on 28 May 09. Foliar ratings were made by visually estimating the percentage leaf surface area diseased for flag and flag-1 leaves of 10 arbitrarily-selected plants per plot. Fusarium head blight (FHB) and glume blotch assessments were made in the laboratory by visually estimating the severity of each disease on 100 heads arbitrarily-collected from plots on 27 May 09. Glume blotch severity was determined by visually estimating the percent surface area diseased per spike. FHB severity was estimated by counting the no. of infected spikelets per spike and dividing by the mean number of total spikelets of 10 arbitrarily-selected spikes (i.e. 100% of spike surface area) and multiplying by 100. Plots were harvested on 25 Jun 09 using a Wintersteiger small-plot combine. Yields were adjusted to 13.5% moisture and 60 lb/bu. A hand-cleaned, 25-g grain sample from each plot was assessed for Fusarium damaged kernels (FDK) using an air separation technique and submitted to the University of Minnesota, DON Analysis Laboratory, St. Paul, MN for deoxynivalenol (DON) analysis. Percentage data were arcsine-transformed prior to analysis using

ANOVA and Student-Newman-Keuls test ( $P \leq 0.05$ ). Although statistics provided are based on transformed data, arithmetic means are presented in order to provide a better indication of the level of disease control provided by each treatment, as well as the overall disease pressure in the trial.

Wet weather coincided with the onset of anthesis (F10.51) making conditions highly favorable for FHB and the leaf blotch complex. Interestingly, DON levels were not as high as expected, considering the extent of FHB in the test. For most treatments, no significant differences were

observed for any parameter when compared to the non-treated control. However, F10.51 treatments involving applications of Prosaro or Caramba yielded substantially higher than the non-treated control and most other treatments. Higher yields were apparently due to the suppression of FHB and the control of leaf blotch complex. As anticipated, post-heading applications of the strobilurins Headline (pyraclostrobin) or YT 669 (picoxystrobin) significantly increased DON compared to the non-treated control. No phytotoxicity was noted in the test.

Treatment, rate/A, and growth stage applied <sup>z</sup>	Leaf blotch complex <sup>y</sup>		Glume blotch <sup>x</sup>	Leaf rust <sup>w</sup>	Fusarium head blight			FDK <sup>s</sup>	DON <sup>r</sup>	Yield <sup>q</sup>	Test weight
	Flag (%)	F-1 (%)	Index (%)	Flag (%)	Inc. <sup>v</sup> (%)	Sev. <sup>u</sup> (%)	Index <sup>t</sup> (%)	(%)	(ppm)	(bu/A)	(lb/bu)
Non-treated.....	40.8a <sup>p</sup>	99.8a	4.1a	1.7a	46.8a	24.6a	11.2a	3.6a-c	2.6cd	78.9c	50.9c
USF0731											
5 fl oz F8°.....	16.1c-e	85.8b-e	2.4a-d	0.2b	44.7a	25.6a	11.4a	4.8a	3.0b-d	85.2bc	50.8c
Prosaro 421 SC											
6.5 fl oz F8°.....	9.6d-g	69.7e-g	3.1a-c	0.2b-d	37.3ab	21.9a	8.4a	3.5a-c	2.3cd	84.3bc	51.0c
LEM17 EC											
24 fl oz F8.....	26.3bc	98.5ab	3.5ab	0.2b-d	41.0a	27.8a	11.5a	3.5a-c	2.5cd	81.0bc	51.0c
Topguard 1.04 SC											
7 fl oz F8.....	29.6b	98.0ab	3.0a-c	1.7a	41.3a	23.9a	10.0a	3.5a-c	2.4cd	81.7bc	51.1c
Topguard 1.04 SC											
10 fl oz F8.....	19.2b-d	93.3a-d	3.3a-c	0.5b	35.8ab	22.2a	7.8a	3.0a-c	2.7cd	83.0bc	51.8c
Topguard 1.04 SC											
14 fl oz F8.....	19.4b-d	97.5a-c	3.1a-c	0.6b	40.8a	22.6a	9.1a	3.4a-c	2.7cd	87.3bc	51.9c
Topguard 1.04 SC											
7 fl oz F10.1-3.....	12.8d-f	94.7a-d	1.5b-f	0.5b	35.7ab	24.3a	8.4a	3.8a-c	2.7cd	87.2bc	52.0c
Topguard 1.04 SC											
10 fl oz F10.1-3.....	9.0d-g	89.1a-e	1.7a-e	0.3b	44.8a	28.3a	12.5a	4.1ab	3.8bc	82.9bc	50.9c
Topguard 1.04 SC											
14 fl oz F10.1-3.....	5.4fg	87.5b-e	1.5b-f	0.2bc	42.3a	22.5a	9.4a	4.0ab	3.6bc	88.5b	52.3c
Topguard 1.04 SC											
7 fl oz F8 fb											
Topguard 1.04 SC											
7 fl oz F10.1-3.....	7.6e-g	94.0a-d	1.8a-e	0.2b-d	45.8a	22.9a	9.9a	2.3a-c	2.5cd	83.9bc	52.2c
YT669 2.08 SC											
9 fl oz F10.5°.....	5.7fg	83.8c-e	0.1h	0.3b	51.3a	22.6a	11.7a	3.4a-c	5.8a	82.9bc	51.5c
Prosaro 421 SC											
6.5 fl oz F10.51°.....	1.8h	47.9gh	0.4e-h	0.0d	12.0cd	23.1a	2.5b	0.8bc	1.1d	98.4a	55.6ab
Prosaro 421 SC											
8.2 fl oz F10.51°.....	0.3h	42.5h	0.5e-h	0.0d	8.8d	12.6bc	1.1b	1.3a-c	1.2d	100.9a	57.3a
LEM17 EC											
16 fl oz F10.51°.....	7.6e-g	97.5a-c	1.2c-g	0.2b-d	48.0a	18.3ab	8.9a	2.9a-c	4.0bc	80.8bc	50.7c
LEM17 EC											
24 fl oz F10.51°.....	7.9e-g	91.9a-d	0.8d-h	0.0cd	41.3a	20.9a	8.7a	2.5a-c	3.7bc	83.1bc	51.5c
Headline 2.09 EC											
6 fl oz F10.51°.....	3.7gh	75.3d-f	0.2gh	0.0cd	38.7a	26.2a	10.0a	3.0a-c	4.5b	87.9bc	51.1c
Caramba											
13.5 fl oz F10.51°.....	0.5h	56.0f-h	0.3f-h	0.0d	23.7bc	10.4c	2.6b	1.1c	1.1d	96.2a	54.8b
GEM 500 SC											
1.5 fl oz F4-5° fb											
Prosaro 421SC											
6.5 fl oz F10.51°.....	1.1h	68.9e-g	0.6e-h	0.0d	14.0cd	21.3a	2.9b	1.2bc	1.2d	97.8a	55.7ab
USF0731											
2 fl oz F4-5° fb											
Prosaro 421 SC											
6.5 fl oz F10.51°.....	0.5h	45.2gh	0.6e-h	0.0d	14.5cd	12.3bc	1.7b	1.2a-c	1.4d	98.2a	55.6ab
<i>P</i> -value of F statistic	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0002	<.0001	<.0001	<.0001
CV (%)	22.76	10.47	26.33	38.79	12.67	10.23	12.95	25.58	26.12	4.01	2.22

<sup>z</sup>Feeke's growth stage (F). Fb = followed by.

<sup>y</sup>Percentage of leaf blotch complex (primarily *S. nodorum*) was visually estimated on flag and flag-1 leaves of 10 plants per plot.

<sup>x</sup>Glume blotch ratings were based on visual estimation of infected spikelets on 100 heads rated under laboratory conditions. Glume blotch

severity was determined by visually estimating the percent surface area diseased per spike. Index = (% severity x % incidence)/100.

<sup>w</sup>Leaf rust, *Puccinia triticina* was visually estimated on flag leaves of 10 plants per plot.

<sup>v</sup>Fusarium head blight incidence was based on visual estimation of infected spikelets on 100 heads rated under laboratory conditions.

<sup>u</sup>Fusarium head blight severity was calculated by counting the no. of infected spikelets/spike and dividing by the mean number of total spikelets of 10 arbitrarily-selected spikes (i.e. 100% of spike surface area) and multiplying by 100.

<sup>t</sup>Fusarium head blight index = (% incidence x % severity)/100.

<sup>r</sup>Fusarium damaged kernels were assessed by air separation.

<sup>s</sup>Deoxynivalenol (DON).

<sup>q</sup>Based on 13.5% moisture and 60 lb/bu.

<sup>p</sup>Column numbers followed by the same letter are not significantly different, Student-Newman-Keuls test ( $P \leq 0.05$ ).

<sup>o</sup>Induce was added at 0.125% v/v.

<sup>n</sup>Induce was added at 0.25% v/v.