

EVALUATION OF FUNGICIDES FOR CONTROL OF FOLIAR DISEASES AND FUSARIUM HEAD BLIGHT OF WINTER WHEAT IN KENTUCKY, 2011.

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WHEAT (*Triticum aestivum* 'Cumberland') Fusarium head blight; *Fusarium graminearum*
Stagonospora blotch; *Stagonospora nodorum* Leaf rust; *Puccinia triticina*

The soft red winter wheat cultivar 'Cumberland' was planted with a no-till planter following corn harvest on 14 Oct 10 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/ft² and consisted of seven rows on 7-in. spacing. Warrior insecticide was applied (3.5 fl oz/A) on 19 Nov 10 and again on 26 Feb at crop green-up to reduce the potential for barley yellow dwarf. Liquid nitrogen (28-0-0) was applied in a split application at a rate of approximately 40 and 80 lb/A on 17 Feb and 21 Apr, respectively. Weeds were controlled by applying Harmony Extra herbicide (0.5 fl oz/A) on 26 Feb. On 26 Mar, wheat passes were subdivided into 20-ft plots by application of Round-up herbicide. The experimental design was a randomized complete block with five replications. Fungicides applied at Feeke's (F) growth stage F5-8 were made with a hand-held CO₂-powered backpack boom sprayer equipped with two Teejet 8002VS nozzles.

Later applications (F10.5-10.51+3 days) were made using the same boom sprayer equipped with four Teejet 8004VS nozzles in two, dual-swivel nozzle bodies. Nozzles at each configuration were spaced at 19-in. apart and delivered approximately 20 gal/A of spray solution (40 psi). Treatments were applied on 8 Mar, 24 Mar, 14 Apr, 30 Apr and 4 May

corresponding to F5 (pseudostem erection), F6 (jointing), F8 (flag leaf just visible), F10.5 (head completely emerged), and F10.51+3 days (anthesis), respectively. A wet period coincided with anthesis and prevented F10.51 fungicide applications for 3 days. Plots were rated for Stagonospora blotch and leaf rust at the late-milk to early dough stage (F11.1-2) on 27 May. 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) incidence was based on visual estimation of infected spikelets on a total of 30 spikes per plot at late-milk (F11.1) on 25 May. FHB severity was visually estimated as a percentage of surface area affected on 30 total spikes per plot at late milk (F11.1) on 25 May. Plots were harvested on 17 Jun 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 kernel health by counting the number of shriveled kernels (SK) per 100 kernel sample 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.

Weather conditions in May were favorable for *Stagonospora* blotch development and a wet period coinciding with anthesis (F10.51) favored FHB infections. Leaf rust and *Stagonospora* blotch of glumes was observed late in the season, however, values are not presented due to low disease levels (<2% severity). Significant differences were observed among treatments for all variables evaluated except for shriveled kernels (SK) and yield. All fungicides applied at each growth stage significantly reduced the level of *Stagonospora* blotch on the flag leaves when compared to the non-treated control; however, treatments comprised of Caramba, Prosaro, PZX74, Q8X63, Quilt, Vertisan, Vertisan+ Folicur applied at F10.5 or later were far superior to earlier treatments and provided nearly 100% control. Several of the later

treatments (including Caramba, Prosaro and Vertisan+Folicur) also provided the excellent control of *Stagonospora* blotch on f-1 leaves (77-90% control) when compared to the non-treated control. FHB pressure was moderate in the test with mean FHB incidence reaching 48% with disease indexes and DON levels ranging from 0.5 to 11% and 0.5-2.6%, respectively. When compared to the non-treated control, the F10.51 treatments containing Caramba, Prosaro and Vertisan+Folicur provided significant suppression of FHB (incidence, severity and index). In most cases, these treatments also had significantly lower DON levels and significantly higher test weights. Yields throughout the test were surprisingly high despite the high and moderate levels of *Stagonospora* blotch and FHB, respectively, and no significant differences in yield were detected among treatments. No phytotoxicity was noted in the test.

Treatment, rate/A	Feeke's stage applied ²	Stagonospora blotch ^y		Fusarium head blight (FHB)			SK ^u (%)	DON ^t (ppm)	Yield ^s (bu/A)	Test weight (lb/bu)
		Flag (%)	F-1 (%)	Inc. ^x (%)	Sev. ^w (%)	Index ^v (%)				
Non-treated ^f	NA	10.3a ^q	78.9ab	38.0a	21.2b-d	8.2ab	9.4NS ^p	1.9a-c	97.2NS	58.2d
Stratego Pro 2 fl oz ^o	5	6.0b	60.9a-c	42.0a	18.7b-d	8.4ab	5.2	1.6a-d	95.0	59.5b-d
Stratego Pro 2 fl oz fb ⁿ Prosaro 6.5 fl oz ^o	5, 10.51	0.1e	14.8fg	14.0c	4.7f	0.9d	4.6	0.7c-e	107.0	61.4a
Aproach 2.08 SC 3 fl oz fb Vertisan 1.67 EC 1 pt ^m	6, 8	5.7b	73.9ab	32.0ab	27.3a-c	8.8ab	8.8	1.7a-d	94.6	58.9b-d
Headline 2.09 EC 3 fl oz fb Headline 2.09 EC 6 fl oz ^m ..	6, 8	4.3bc	61.3a-c	37.3a	28.7a-c	11.0a	9.6	1.6a-d	97.6	58.4cd
Aproach 2.08 SC 6 fl oz ^m Vertisan 1.67 EC 1.5 pt ^m ...	8	4.1bc	64.9a-c	35.3ab	29.1a-c	10.3a	7.8	2.0ab	101.1	58.4cd
Aproach 2.08 SC 6 fl oz fb Vertisan 1.67 EC 1.5 pt ^m ...	8, 10.51	0.5de	21.0fg	30.0ab	12.1de	3.6bc	7.4	2.0ab	106.9	59.9a-d
Aproach 2.08 SC 9 fl oz ^o ...	8	5.0bc	66.5a-c	34.0ab	29.5a-c	10.1a	8.4	1.6a-d	96.7	58.4cd
Headline 2.09 EC 6 fl oz ^o ...	8	4.7bc	59.8a-c	31.3ab	30.0a-c	9.7a	6.8	1.5a-e	97.2	59.2b-d
Priaxor 4 fl oz ^o	8	2.9bc	63.1a-c	35.3ab	27.7a-c	9.8a	7.0	1.7a-d	93.4	58.2d
PZX74 SC 6.25 fl oz ^m	8	4.1bc	54.6b-d	32.7ab	31.3ab	10.2a	10.4	1.7a-d	100.5	58.2d
Q8X63 SC 19.2 fl oz ^m	8	4.3bc	63.2a-c	30.0ab	26.4a-c	8.0ab	7.0	1.7a-d	90.5	58.5cd
Vertisan 1.67 EC 1 pt ^m	8	4.3bc	82.1a	32.0ab	35.1a	10.9a	9.4	1.3b-e	95.9	58.1d
Priaxor 4 fl oz ^o	10.5	2.4cd	33.3d-f	38.7a	17.9b-d	6.8ab	5.6	2.6a	98.9	59.6b-d
PZX74 SC 6.25 fl oz ^m	10.5	0.4de	32.7d-f	46.0a	18.3b-d	8.7ab	6.6	2.0ab	102.6	59.3b-d
Q8X63 SC 19.2 fl oz ^m	10.5	0.6de	46.1c-e	42.7a	17.8cd	8.1ab	6.2	2.2ab	95.8	60.1a-c
Quilt 16 fl oz ^m	10.5	0.0e	25.6ef	48.7a	17.8b-d	8.9ab	6.4	2.2ab	95.7	60.2a-c
Caramba 13.5 fl oz ^o	10.51	0.0e	17.9fg	15.3c	5.8f	1.1cd	4.4	0.5e	105.6	60.0a-d
Prosaro 6.5 fl oz ^o	10.51	0.0e	7.2g	10.0c	4.4f	0.5d	8.0	0.6de	98.9	61.2a
Vertisan 1.67 EC 1.5 pt ^m ...	10.51	0.8de	43.6c-e	20.7bc	12.0de	2.7cd	6.6	2.3ab	97.6	59.5b-d
Vertisan 1.67 EC 12 fl oz + Folicur 4 fl oz ^m	10.51	0.1e	13.4fg	15.3c	8.8ef	1.5cd	5.6	0.6de	95.5	60.6ab
P-value of F statistic		<.0001	<.0001	<.0001	<.0001	<.0001	0.6400	<.0001	0.1741	<.0001
CV (%)		32.8	18.2	15.1	17.0	23.4	33.1	30.9	8.5	1.4

²Feeke's growth stage (F); Fungicide applications were made 8 Mar, 24 Mar, 14 Apr, 30 Apr and 4 May corresponding to F5, 6, 8, 10.5, and 10.51 + 3 days, respectively.

^yPercentage of Stagonospora blotch was visually estimated on flag and flag-1 leaves of 10 plants per plot at late-milk-early dough stage (F11.1-2) on 27 May.

^xFHB incidence was based on visual estimation of infected spikelets rated under laboratory conditions on a total of 30 spikes per plot at late-milk (F11.1) on 25 May.

^wFHB severity was visually estimated as a percentage of surface area affected on 30 total spikes rated under laboratory conditions.

^vFHB index = (% incidence x % severity)/100.

^uPercentage of shriveled kernels in a 100 kernel grain sample.

^tDeoxynivalenol (DON).

^sBased on 13.5% moisture and 60 lb/bu.

^fNon-treated data are the mean of 10 replications.

^qColumn numbers followed by the same letter are not significantly different, Student-Newman-Keuls test ($P \leq 0.05$).

^pNS = no significant differences with the column of data ($P \leq 0.05$).

^oInduce was added to treatments at 0.125% v/v.

ⁿFb = followed by.

^mInduce was added to treatments at 0.25% v/v.