

Evaluation of Different Fungicide Application Timings for Management of Fusarium Head Blight of Wheat, 2021

Carl A. Bradley, Kelsey Mehl, John Walsh, and Nathan White; Department of Plant Pathology, University of Kentucky, Research & Education Center, Princeton, KY 42445
PH: (859) 562-1306; Email: carl.bradley@uky.edu

INTRODUCTION:

Fusarium head blight (FHB; also known as scab) is likely the most economically important disease of wheat in Kentucky. Caused by the fungus, *Fusarium graminearum*, FHB can lead to reduced quality of harvested grain and reduced yields. The fungus produces a toxin known as deoxynivalenol (DON; also known as vomitoxin), that can contaminate grain. Harvested grain that has a DON level of at least 2 ppm may be subject to discounts or outright rejection at grain elevators. Complete control of FHB and DON with foliar fungicides used alone is not possible, and the use of moderately-resistant wheat varieties along with a fungicide application at the Feekes 10.5.1 growth stage (beginning flowering) is the recommended method of management. The fungicides Prosaro (Bayer CropScience), Caramba (BASF Corporation), and Miravis Ace have been shown to be the most effective fungicides in reducing FHB and DON in multi-state research studies conducted over several years. A research trial was conducted at the University of Kentucky Research & Education Center (UKREC) in Princeton, KY during the 2020-21 growing seasons with the objective of evaluating different fungicide application timings for control of FHB and DON.

PROCEDURES:

A soft red winter wheat variety susceptible to FHB (AgriMaxx 446) was no-till planted into corn stubble, and a mist-irrigation system was installed and ran during the wheat heading stages to provide an environment favorable for *F. graminearum* infection and FHB development. Fungicide treatments were applied to wheat plots using a CO₂-pressurized backpack sprayer, and included the following treatments:

- Non-treated check
- Prosaro at Feekes 10.51 (6.5 fl oz/A)
- Caramba at Feekes 10.51 (13.5 fl oz/A)
- Miravis Ace at Feekes 10.3 (13.7 fl oz/A)
- Miravis Ace at Feekes 10.51
- Miravis Ace at 4-6 days after Feekes 10.51
- Miravis Ace at Feekes 10.51, followed by Prosaro 4-6 days after
- Miravis Ace at Feekes 10.51, followed by Caramba 4-6 days after
- Miravis Ace at Feekes 10.51, followed by Folicur 4-6 days after
- Sphaerex at Feekes 10.51 (7.3 fl oz/A)
- Miravis Ace at Feekes 10.3, followed by Prosaro 4-6 days after
- Miravis Ace at Feekes 10.3, followed by Caramba 4-6 days after
- Miravis Ace at Feekes 10.3, followed by Folicur 4-6 days after

- Headline at Feekes 9 (6 fl oz/A), followed by Miravis Ace at Feekes 10.51
- Headline at Feekes 9, followed by Miravis Ace at Feekes 10.3
- Headline at Feekes 9

Note that some of the treatments evaluated are for research purposes only and may not be registered for use or may be an application that is not in accordance with the label.

At the soft dough stage, wheat heads were rated for FHB severity and incidence and a “FHB index” was calculated by (FHB incidence X FHB severity/100). The FHB index is on a scale of 0 – 100, with the most severe level of FHB having a rating of 100. Grain samples were collected at harvest from each plot and were submitted to the University of Minnesota DON Testing Laboratory (St. Paul, MN) to test for the amount of DON in each sample. The trial was set up in a randomized complete block design with 4 replications. Data collected were statistically analyzed using SAS software (v. 9.4; Cary, NC).

RESULTS:

In general, the FHB index was low, with the nontreated control having only an FHB index value of 1.07, on a 0 to 100 scale. All fungicide treatments, except Caramba at Feekes 10.51, significantly (statistically significant with 95% confidence) reduced FHB index when compared to the non-treated check (Table 1).

The only treatments that statistically improved test weight compared to the non-treated control were Miravis Ace at Feekes 10.51, Miravis Ace at 4-6 days after Feekes 10.51, and Miravis Ace at Feekes 10.3 followed by Caramba at 4-6 days after Feekes 10.51 (Table 1). The only treatment that statistically improved yield compared to the nontreated control was Miravis Ace at Feekes 10.3 followed by Caramba at 4-6 days after Feekes 10.51.

DON values ranged from 1.1 to 4.6 ppm (Table 1). Treatments that had a DON value statistically significantly less than the nontreated check included Prosaro applied at Feekes 10.41, Miravis Ace applied 4-6 days after Feekes 10.51, Sphaerex applied at Feekes 10.51 and the combination treatments of Miravis Ace applied at either Feekes 10.3 or 10.51 followed with either Prosaro or Caramba applied 4-6 days after Feekes 10.51.

CONCLUSIONS:

Very low FHB disease was observed in this 2021 research trial, which makes it difficult truly assess differences of fungicides and application timings for efficacy against FHB. In general, test weights and yields were relatively high across the board. More analyses will be conducted to help determine the economic benefit of each treatment.

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TABLE 1. EFFECT OF DIFFERENT FUNGICIDE PRODUCTS APPLIED TO WHEAT AT DIFFERENT TIMINGS AND SEQUENTIALLY ON FUSARIUM HEAD BLIGHT (FHB) SEVERITY INDEX, ON TEST WEIGHT, AND ON GRAIN YIELD. (Note that some of the treatments evaluated are for research purposes only and may not be registered for use or may be an application that is not in accordance with the label.)

Treatment	Application timing	FHB index (0-100)	Test weight (lb/bu)	Yield (bu/A)	DON (ppm)
Nontreated		1.07	61.1	97.2	3.3
Prosaro	Feekes 10.51	0.20	61.8	87.0	1.9
Caramba	Feekes 10.51	0.79	60.0	91.5	3.3
Miravis Ace	Feekes 10.3	0.17	61.5	108.1	4.6
Miravis Ace	Feekes 10.51	0.02	62.4	104.8	2.5
Miravis Ace	4-6 days after Feekes 10.51	0.19	63.1	106.9	1.9
Miravis Ace fb* Prosaro	Feekes 10.51 fb 4-6 days after	0.08	61.7	95.8	1.6
Miravis Ace fb Caramba	Feekes 10.51 fb 4-6 days after	0.13	62.0	104.6	1.1
Miravis Ace fb Folicur	Feekes 10.51 fb 4-6 days after	0.34	62.2	105.1	2.3
Sphaerex	Feekes 10.51	0.28	61.2	103.5	2.0
Miravis Ace fb Prosaro	Feekes 10.3 fb 4-6 days after Feekes 10.51	0.03	62.1	105.0	2.0
Miravis Ace fb Caramba	Feekes 10.3 fb 4-6 days after Feekes 10.51	0.11	62.5	118.0	1.6
Miravis Ace fb Folicur	Feekes 10.3 fb 4-6 days after Feekes 10.51	0.10	61.7	103.9	2.7
Headline fb Miravis Ace	Feekes 9 fb Feekes 10.51	0.15	61.7	106.9	2.8
Headline fb Miravis Ace	Feekes 9 fb Feekes 10.3	0.45	61.0	95.9	3.1
Headline	Feekes 9	0.29	61.0	104.5	3.7
	LSD 0.05**	0.53	1.3	11.4	1.1

*Followed by (fb).

**Fisher's least significant difference value at the 95% level of confidence (LSD 0.05). When compared, means that have a difference of at least this value are considered significantly different.