EVALUATION OF DIFFERENT FUNGICIDE APPLICATION TIMINGS FOR MANAGEMENT OF FUSARIUM HEAD BLIGHT OF WHEAT

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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) and Caramba (BASF Corporation) have been shown to be the most effective fungicides in reducing FHB and DON in multi-state research studies conducted over several years. Although these fungicides are the best available, improved control of FHB and DON with fungicides is still needed. In addition, a new fungicide known as Miravis Ace (Syngenta Crop Protection) is in the process of being registered for use on wheat in the U.S., and may be available as another tool that could be used to help manage FHB and DON in the future. A research trial was conducted at the University of Kentucky Research & Education Center (UKREC) in Princeton, KY during the 2017-18 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 CO_2-pressurized backpack sprayer, and included the following treatments:

- Nontreated check
- Caramba applied at Feekes 10.3 (13.5 fl oz/A)
- Prosaro applied at Feekes 10.3 (6.5 fl oz/A)
- Miravis Ace applied at Feekes 10.3 (6.5 fl oz/A)
- Caramba applied at Feekes 10.5.1 (13.5 fl oz/A)
- Prosaro applied at Feekes 10.5.1 (6.5 fl oz/A)
- Miravis Ace applied at Feekes 10.5.1 (13.7 fl oz/A)
- Folicur applied at Feekes 10.5.1 (4 fl oz/A)
- Caramba at Feekes 10.5.1 followed by Folicur 4 days later
- Prosaro at Feekes 10.5.1 followed by Folicur 4 days later
- Miravis Ace at Feekes 10.5.1 followed by Folicur 4 days later
- Folicur at Feekes 10.5.1 followed by Folicur 4 days later

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

As observed in Table 1, all treatments significantly reduced FHB index compared to the nontreated check. In general, fungicides applied at Feekes 10.5.1 performed better than when applied at Feekes 10.3. The exception to this was with Miravis Ace, which had similar FHB index values when applied at either Feekes 10.3 or Feekes 10.5.1. Significant differences between a solo product applied at Feekes 10.5.1 and the corresponding product applied sequentially with Folicur generally were not observed. The exception to this was with Folicur, in which the sequentially applied treatment significantly lowered the FHB index value compared to Folicur applied singly at Feekes 10.5.1.

Also observed in Table 1, all treatments significantly reduced DON compared to the nontreated check. When fungicides were applied at Feekes 10.5.1, DON values were numerically lower, but not always statistically significantly lower, than DON values with applications made at Feekes 10.3. Significant differences between a solo product applied at Feekes 10.5.1 and the corresponding product applied sequentially with Folicur were not observed.

TABLE 1. EFFECT OF DIFFERENT FUNGICIDE PRODUCTS APPLIED TO WHEAT AT DIFFERENT TIMINGS AND SEQUENTIALLY ON FUSARIUM HEAD BLIGHT (FHB) SEVERITY INDEX AND ON DEOXYNIVALENOL (DON) IN HARVESTED GRAIN.

Treatment	Application timing	FHB index (0-100)	DON (ppm)
Non-treated		27.1 a*	2.0 a
Caramba	Feekes 10.3	11.1 b	1.0 bcde
Prosaro	Feekes 10.3	10.6 b	1.3 b
Miravis Ace	Feekes 10.3	3.3 c	1.2 bc
Caramba	Feekes 10.5.1	1.5 c	0.5 e
Prosaro	Feekes 10.5.1	2.4 c	0.7 cde
Miravis Ace	Feekes 10.5.1	2.1 c	1.1 bcd
Folicur	Feekes 10.5.1	12.1 b	1.1 bcd
Caramba fb Folicur	Feekes 10.5.1 / 4 d later	0.0 c	0.5 e
Prosaro fb Folicur	Feekes 10.5.1 / 4 d later	0.3 c	0.5 e
Miravis Ace fb Folicur	Feekes 10.5.1 / 4 d later	2.5 c	0.6 de
Folicur fb Folicur	Feekes 10.5.1 fb 4 d later	0.9 c	0.6 de

*Values followed by the same letter are not significantly different at the 95% level of confidence.

CONCLUSIONS

As observed in past research trials, applying a fungicide for FHB management at Feekes 10.5.1 generally will be better than applying at an earlier growth stage. The exception to this was with Miravis Ace, in which Feekes 10.3 applications and Feekes 10.5.1 applications were similar in their effect on FHB index and DON values. In general, sequential application of fungicides evaluated in this study were not much different than applications of fungicides applied at Feekes 10.5.1. This suggests that sequential application likely would not be worth considering for management of FHB and DON.

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