EVALUATION OF FOLIAR FUNGICIDE APPLICATION TIMING FOR MANAGEMENT OF FUSARIUM HEAD BLIGHT OF WINTER BARLEY, 2019

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INTRODUCTION

Fusarium head blight (FHB; also known as scab) is one of the most important disease of winter barley 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, and any detectable level of DON in grain used for malting purposes may be outright rejected. Since nearly every winter barley variety adapted to this region is susceptible to FHB, foliar fungicides are one of the major practices used to manage this disease; however, little data are available on fungicides applied to winter barley for this region. Since the flowering stage is considered the period in which small grain crops are most susceptible to FHB, targeting the flowering stage for the fungicide application time might make the most sense. However, many spring barley varieties flower when the head is still in the boot, making fungicide coverage of the head difficult. Depending on the variety and the growing conditions, winter barley may not always flower when the head is in the boot. Research trials were conducted at the University of Kentucky Research & Education Center (UKREC) in Princeton, KY 2018-2019 growing seasons with the objective of evaluating different fungicide application timings for management of FHB and DON in winter barley.

PROCEDURES

Winter barley (variety Thoroughbred) was planted no-till 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 winter barley plots using a CO_2-pressurized backpack sprayer, and included the following treatments:

- Nontreated check
- Prosaro applied at the boot stage (6.5 fl oz/A)
- Caramba applied at the boot stage (13.5 fl oz/A)
- Folicur applied at the boot stage (4 fl oz/A)
- Miravis Ace applied at the boot stage (13.7 fl oz/A)
- Quadris applied at the boot stage (6 fl oz/A)
- Quadris applied at boot stage, followed by Miravis Ace at 5 days after heading
- Prosaro applied at heading
- Caramba applied at heading
- Folicur applied at heading
- Miravis Ace applied at heading
- Prosaro applied 5 days after heading
- Caramba applied 5 days after heading
- Folicur applied 5 days after heading
- Miravis Ace applied 5 days after heading

At the soft dough stage, barley 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

All treatments significantly reduced FHB index compared to the non-treated check (Table 1). For boot applications, only Miravis Ace significantly reduced DON compared to the non-treated check. For heading applications and 5 days after heading applications, all treatments significantly reduced DON compared to the non-treated check except Folicur. Treatments that resulted into DON values less than 2 ppm included Miravis Ace applied at boot, Prosaro, Caramba, and Miravis Ace applied at either heading or 5 days after heading. No statistically significant differences were observed among treatments for yield (Table 1).

Table 1. Effect of Fungicide Application Timing on Fusarium Head Blight (FHB) Index of Winter Barley, Deoxynivalenol (DON) Contamination in Harvested Grain, and Grain Yield

Fungicide	Timing	FHB index (0-100)	DON (ppm)	Yield (bu/A)
Nontreated check	-	8.3	3.3	52.7
Prosaro	Boot stage	2.4	2.5	60.5
Caramba	Boot stage	1.3	2.2	45.9
Folicur	Boot stage	1.9	2.7	46.1
Miravis Ace	Boot stage	1.8	1.7	53.0
Quadris	Boot stage	4.1	3.0	57.0
Quadris fb* Miravis Ace	Boot fb 5 d after heading	1.5	3.0	66.6
Prosaro	Heading stage	1.9	1.0	44.2
Caramba	Heading stage	0.5	1.0	66.7
Folicur	Heading stage	0.5	2.7	76.2
Miravis Ace	Heading Stage	0.3	1.1	78.6
Prosaro	5 d after heading	0.3	1.6	49.1
Caramba	5 d after heading	1.9	1.8	55.1
Folicur	5 d after heading	2.1	2.7	66.9
Miravis Ace	5 d after heading	0.8	0.9	71.4
	LSD 0.05**	2.8	1.4	NS***

*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.
***No statistically significant differences were detected (NS).

CONCLUSIONS

Applying a fungicide treatment at either heading or 5 days after heading appeared to be the best in managing FHB in 'Thoroughbred' winter barley. As observed in previous years, applying fungicides at boot stage is too early to achieve the best control of FHB and DON in Thoroughbred winter barley.

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