

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

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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. A research trial was conducted at the University of Kentucky Research & Education Center (UKREC) in Princeton, KY during the 2015-16 growing season 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 into no-till 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 CO₂-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)
- Prosaro applied at heading
- Caramba applied at heading
- Folicur applied at heading
- Prosaro applied 5 days after heading
- Caramba applied 5 days after heading
- Folicur 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

As observed in Table 1, the only treatments that had a significantly lower FHB index than the nontreated check was Caramba applied at

heading or 5 days after heading, Prosaro applied 5 days after heading, and Folicur applied 5 days after heading. In general, the lowest FHB index values were achieved when Prosaro or Caramba were applied 5 days after heading. In addition, the only treatment that had a significantly lower DON value than the nontreated check was Caramba applied 5 days after heading.

TABLE 1. EFFECT OF FUNGICIDE APPLICATION TIMING ON FUSARIUM HEAD BLIGHT (FHB) INDEX OF WINTER BARLEY AND DEOXYNIVALENOL (DON) CONTAMINATION IN HARVESTED GRAIN			
Fungicide	Timing	FHB index (0-100)	DON (ppm)
Nontreated check	-	26.7 a*	2.5 ab
Prosaro	Boot stage	20.8 ab	3.4 a
Caramba	Boot stage	16.5 abc	3.4 a
Folicur	Boot stage	27.0 a	2.6 ab
Prosaro	Heading stage	17.3 abc	2.5 ab
Caramba	Heading stage	13.0 bcd	2.9 ab
Folicur	Heading stage	20.9 ab	3.2 a
Prosaro	5 d after heading	3.8 d	1.6 bc
Caramba	5 d after heading	7.5 cd	0.8 c
Folicur	5 d after heading	13.7 bcd	2.2 ab

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

CONCLUSIONS

To draw firm conclusions, it is important that this trial be repeated to ensure that the effects of the treatments evaluated are consistent. From this one year of research, it appears that an application of an effective foliar fungicide should be made at 5 days after heading to achieve the best control of FHB and DON. However, it is important to note that environment and barley variety may affect when flowering occurs. The flowering stages of small grain crops is considered the most critical period when plants

are susceptible to FHB. Therefore, it is critical that this study be conducted over multiple environments (and possibly additional varieties) before strong recommendations on fungicide application timing can be made.

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