

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

Carl A. Bradley, Kelsey Mehl, and Josh Duckworth
Department of Plant Pathology
University of Kentucky Research & Education Center
Princeton, KY 42445
PH: (270) 365-7541 Ext. 21306; Email: carl.bradley@uky.edu

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 2017-2018 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 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)
- Miravis Ace applied at the boot stage (13.7 fl oz/A)
- 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

For treatments applied at the boot stage or at the heading stage, all treatments except Folicur, significantly reduced the FHB index compared to the non-treated check (Table 1). All treatments applied at 5 days after the heading stage, significantly reduced the FHB index compared to the non-treated check. In general, the lowest FHB index values were observed when

treatments were applied at 5 days after the heading stage.

No statistically significant differences were observed among treatments for DON in harvested grain. Although not statistically significant, treatments applied at 5 days after heading had the numerically lowest DON values (Table 1).

Fungicide	Timing	FHB index (0-100)	DON (ppm)
Nontreated check	-	22.5 a*	4.6 a
Prosaro	Boot stage	9.4 cdef	6.1 a
Caramba	Boot stage	10.9 cde	3.7 a
Folicur	Boot stage	15.5 abc	6.4 a
Miravis Ace	Boot stage	4.9 defg	4.1 a
Prosaro	Heading stage	12.3 cd	6.0 a
Caramba	Heading stage	14.0 bc	3.8 a
Folicur	Heading stage	21.1 ab	4.4 a
Miravis Ace	Heading Stage	3.4 efg	4.0 a
Prosaro	5 d after heading	2.3 fg	2.5 a
Caramba	5 d after heading	7.6 cdefg	2.8 a
Folicur	5 d after heading	10.9 cde	3.6 a
Miravis Ace	5 d after heading	0.1 g	2.0 a

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

CONCLUSIONS

From our results, 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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