

Evaluation of Various Fungicide Treatments at Different Application Times on Prominent Cultivars to Manage Fusarium Head Blight of Barley

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Objective: To evaluate the efficacy of fungicides in single and sequential applications to manage Fusarium head blight (FHB) in barley.

Methods:

Location: NDSU Langdon Research Extension Center

Experimental design: Randomized complete block with split plot arrangement, four replications.

Previous crop: Canola

Cultivars of barley tested: ND Genesis (moderately susceptible/susceptible, released by NDSU) and AAC Synergy (moderately resistant, Syngenta)

Planting: 1.25 million pure live seeds/acre planted on May 20, 2020. A border plot was planted between treated plots to minimize interference from spray drift.

Plot size: Seven rows at six inch spacing, 5 ft. x 20 ft., mowed back to 5 ft. x 16 ft.

Herbicides applied: Huskie Complete (1 pt/A) + Axial Bold (15 fl oz/A) on 6/8/2020

Inoculation: Plots were inoculated by spreading corn spawn inoculum around boot stage (Feekes 9-10) at the rate of 300 g/plot.

Disease development: Supplemental moisture was provided by running overhead irrigation from Feekes 9 to 11.2.5 at the rate of one hour per day to create a conducive environment for FHB development.

Fungicide treatments: Fungicides were applied with a CO₂-pressurized backpack sprayer with a three-nozzle boom (XR-8002) and the water volume used was 20 GPA. Fungicide (Miravis Ace) application was made at half head emergence on July 2nd. Miravis Ace, Prosaro and Caramba were applied at full head emergence stage on July 5th and repeated 5 days after the full head emergence (July 9th) as per the protocol requirements. Refer to Table 2 for the treatments, dosages and application timings.

Disease assessment: Data on FHB incidence was obtained by counting the number of heads showing FHB symptoms out of 50 heads. FHB head severity was rated using 0-100% scale on arbitrary 50 heads, excluding two outer rows. FHB index (Index) was calculated using the formula: $\text{Index} = (\text{SEV} * \text{INC}) / 100$.

Harvest: Plots were harvested on August 24th with a small plot combine and the yield was determined at 13.5% moisture.

Data analysis: Statistical analysis was done using Agrobase Generation II software. Fisher's least significant difference (LSD) was used to compare means at p ($\alpha = 0.05$). Means were presented in the table for simplicity of understanding.

Results: Statistically significant differences were obtained among the barley cultivars tested when the variables of DON, yield and test weight were compared. However, there were no significant differences obtained among the variables of FHB incidence, severity and index (Table 1). There was no interaction effect found between the main plot (varieties) and the subplot (fungicide) treatments. Among the fungicides tested at different application timings, the treatment of Miravis Ace at 5 days after full head emergence has shown better performance in

terms of FHB incidence, severity, index, and DON values. Likewise, yield is on par with the highest yielded treatment of the trial (Miravis Ace sprayed at Feekes 10.3 (half head emergence) stage) (Table 2).

Table 1: Mean values of the variables tested on the barley cultivars ND Genesis and AAC Synergy obtained on application of fungicide treatments.

Cultivars	Fusarium Head Blight				Yield (bu/A)	Test Weight (lbs/bu)
	Incidence (%)	Severity (%)	Index	DON (ppm)		
ND Genesis	58	19	13	2.0	73	45
AAC Synergy	66	24	17	3.3	79	46
Mean	45	22	15	2.7	76	45
CV (%)	61	40	60	3.3	6	1
LSD	NS	NS	NS	0.5	2	0
p-Value (0.05)	0.1199	0.547	0.2	0.00001*	0.00001*	0.00001*

* Indicates the variables are statistically significant between the cultivars tested.

NS: Indicates the variables are statistically non-significant between the cultivars tested

Table 2: Mean values of the variables tested on application of various fungicide treatments applied at different timings on two barley cultivars.

Treatments	Rate (fl oz/A)	Application (Feekes) Stage	Fusarium Head Blight				Yield (bu/A)	Test Weight (lbs/bu)
			Incidence (%)	Severity (%)	Index	DON		
Caramba	13.5	10.5.1	71	23	17	3.8	76	44
Miravis Ace	13.7	10.3	62	27	13	2.7	82	46
Miravis Ace	13.7	10.5.1	48	17	8	2.3	77	45
Miravis Ace	13.7	5 Days after 10.5.1 spray	37	17	10	0.9	77	46
Miravis Ace+Tebuconazole	13.5 + 4.0	10.5.1 + 5 Days after 10.5.1 spray	60	17	11	1.5	74	45
Prosaro	6.5	10.5.1	67	21	16	3.0	74	45
Non-Treated Check	Check	Check	90	36	32	4.3	73	44
		Mean	62	22	15	2.7	76	45
		CV (%)	33	40	60	32.0	6	1
		LSD	21	9	9	0.9	4	0
		p-Value	0.0005*	0.0008*	0.0001*	0.00001*	0.0075*	0.00001*

* Indicates treatments are statistically significant.

Note: All treatments were applied with NIS @ 0.125 v/v.

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