

Evaluation of Various Fungicide Treatments at Different Application Times on Two Cultivars of Barley

Venkat Chapara, Amanda Arens and Andrew Friskop

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 April 30, 2021. 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: Wide Match (1.33 pt/a) + Axial Bold (15 fl oz/a) and 2 4-D Amine (1 pt/a) on June 14, 2021.

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

Disease development: Supplemental moisture was provided for a month starting from boot to soft dough stage 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 June 25. Miravis Ace, Prosaro, and Caramba were applied at full head emergence stage on June 29 and repeated 5 days after the full head emergence (July 5) as per protocol requirements. Refer to Table 2 for the treatments, dosages and application timings.

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

Harvest: Plots were harvested on August 23 with a small plot combine and the yield was determined at 13.5% moisture.

Data analysis: Statistical analysis was done using Agrobases Generation II software. Fisher's least significant difference (LSD) was used to compare means at $p (\alpha = 0.05)$.

Results: There were no statistically significant differences found in any of the variables tested among the two barley cultivars (Table 1). However, there were significant differences in FHB incidence, severity, index, DON, and test weight observed between non-treated check and the fungicide treatments tested at different application stages (Table 2). There was no interaction effect found between the main plot (cultivars) and the subplot (fungicide) treatments.

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)	Plump (%)
	Incidence (%)	Severity (%)	Index	DON (ppm)			
ND Genesis	15	8	1.87	1.6	74	48	87
AAC Synergy	21	12	4.41	2.2	72	48	97
Mean	18	10	3.14	1.9	73	48	93
CV (%)	83	65	156	107	17	1	20
LSD	NS	NS	NS	NS	NS	NS	NS
P-Value (0.05)	NS	NS	NS	NS	NS	NS	NS

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 and their application timings	Rate (fl.oz/a)	Fusarium Head Blight				Yield (bu/a)	Test Weight (lbs/bu)	Plump (%)
		Incidence (%)	Severity (%)	INDEX (0-100)	DON (ppm)			
NON-INOCULATED, NON-TREATED	CHK	47	19	11.84	3.7	73	48	86
SPHAEREX@10.5.1	7.3	11	8	1.05	0.6	62	48	97
CARAMBA@10.5.1	13.5	20	11	2.63	2.4	74	48	96
MIRAVICE ACE@10.5.1	13.7	5	4	0.28	1.2	72	49	97
PROSARO@10.5.1	6.5	9	6	0.83	1.3	73	49	97
MIRAVIS ACE@10.5.1+TEBUCONAZOLE @5 DAYS AFTER	13.7 + 4	5	3	0.22	0.7	73	49	97
INOCULATED, NON-TREATED	CHK	36	16	7.11	3.8	80	48	86
MIRAVIS ACE @HALFSPIKE	13.7	11	9	1.2	1.4	78	49	86
Mean		18	10	3.1	1.9	73	48.4	93
CV%		82.8	65	156	106.5	17.4	1.1	19
LSD		15	6	4.9	1.02	NS	0.53	NS
P-Value (0.05)		0.00001*	0.0001*	0.0001*	0.04*	NS	0.003*	NS

* Indicates treatments are statistically significant.

Note: All treatments were applied with non-ionic surfactant (NIS) @ 0.125 v/v.

Funded By: US Wheat and Barley Scab Initiative