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#### Highlights:

- Results are from only one location and year.
- Study was carried out with artificial inoculation with *F. graminearum* and under supplemental overhead irrigation to promote disease.
- Mixed application of experimental product with Proline 480SC at Feekes 10.4 growth stage followed by 5 days after was the most effective in terms of controlling FHB disease, reducing DON levels and yield increase.
- Though two treatments; Proline 480SC + experimental product applied at five days after Feekes 10.4 and at Feekes 10.4 followed by 5 days after; resulted in numerically higher yield by 12.79 and 12.08 bu/A more yield than the untreated, it was not statistically significant.
- None of the treatments resulted in significantly higher or lower test weight and protein content compared to the untreated.

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## OBJECTIVES

Objectives of this study was to evaluate efficacy of an experimental product in comparison to Proline for controlling Fusarium head blight (FHB).

## METHODS

**Location:** NDSU Langdon Research Extension Center.

**Experimental Design:** Randomized complete block with four replications.

**Previous crop:** Hard red spring wheat.

**Cultivars:** FHB susceptible cultivar 'Velva' was used.

**Planting:** 1.2 million pure live seed/A was planted on May 24, 2013. A border plot was planted between treated plots to minimize interference from spray drift.

**Plot size:** Seven rows at six inch spacing. Individual plot was 5 x 20 sq. ft., mowed back to 5 x15 sq. ft.

**Inoculation:** Plots were inoculated by spreading corn spawn inoculum at around boot stage (Feekes 9-10) at the rate of 286 g/plot.

**Disease development:** Supplemental moisture was provided by running overhead irrigation from Feekes 10.4 to 11.25 at the rate of 1 hour per day to create conducive environment for FHB development.

**Fungicide treatments:** Fungicide treatments, their chemistry and application rates and time are listed in Table 1. Fungicides were applied, with CO<sub>2</sub>-pressurized backpack sprayer with three nozzle boom (XR8001), at the water volume of 10 GPA. Fungicides were applied at Feekes' growth stage 10.4 on July 09 (wind direction N, speed seven MPH, temperature 59 °F at 11:30 AM), 5 days after Feekes 10.4 on July 14 (wind direction NE, speed six MPH, temperature 71 °F at 11:00 AM), and Feekes 10.51 on July 15 (wind direction E, speed three MPH, temperature 67 °F at 9:00 AM).

**FHB Assessment:** FHB head severity (SEV) was rated using 0-100% scale on arbitrary 25 heads, excluding two outer rows on 18 and 26 Days after treatment (DAT) of Feekes 10.51 application timing on July 29 and August 06, respectively. FHB incidence (INC) was calculated by counting numbers of heads showing FHB symptoms out of 25 heads that were rated for severity. FHB index (FHBI) was calculated using formula  $FHBI = (SEV * INC) / 100$ .

**Harvest:** Plots were harvested 04 September (103 days after planting) with a small plot combine and the yield and test weight determined. Deoxynivalenol (DON) was tested on 50 g sub-sample at Veterinary Diagnostic Laboratory, NDSU. Protein content was tested at North Central Research Extension Center, NDSU.

**Data Analysis:** Data on 18 DAT FHB incidence, severity and index were squared root transformed to achieve homoscedasticity. 26 DAT FHB severity and index were log transformed. Other variables were analyzed untransformed. Data were analyzed using the general linear model (GLM) in SAS. Fisher's least significant difference (LSD) were used to compare means at  $P \leq 0.05$ . Actual means are presented in table for simplicity of understanding.

**Table 1. Fungicide treatments, their chemistry and FRAC group, and rate of application.**

TRT #	Treatments	Chemistry (FRAC group)	App. rate
1	Untreated	-	
2	Proline 480SC (C)	Prothioconazole (3)	5 fl. Oz/A
3	Expt. Product (C)	-	5.2 wt. Oz/A
4	Proline 480SC (C) Expt. Product (C)	Prothioconazole (3) -	5 fl. Oz/A 5.2 wt. Oz/A
5	Expt. Product (AB)	-	5.2 wt. Oz/A
6	Proline 480SC (A) Expt. Product (A)	Prothioconazole (3) -	5 fl. Oz/A 5.2 wt. Oz/A
7	Proline 480SC (B) Expt. Product (B)	Prothioconazole (3) -	5 fl. Oz/A 5.2 wt. Oz/A
8	Proline 480SC (AB) Expt. Product (AB)	Prothioconazole (3) -	5 fl. Oz/A 5.2 wt. Oz/A

Notes: A: Feekes 10.4 application, B: five days after Feekes 10.4 application, C: Feekes 10.51 application

## RESULTS

Table 2. FHB incidence (%), severity (%) and index, rated on 18 and 26 days after treatment (DAT), yield (bu/A), test weight (lb/bu), protein, and DON (ppm) in hard red spring wheat.

TRT#	Treatments <sup>1</sup>	18 DAT			26 DAT			Yield (bu/A)	Test Weight (lb/bu)	Protein @12% moisture	DON (ppm)
		FHB INC <sup>v</sup> (%)	FHB SEV <sup>w</sup> (%)	FHB I <sup>x</sup>	FHB INC <sup>v</sup> (%)	FHB SEV <sup>w</sup> (%)	FHB I <sup>x</sup>				
1	Untreated	64.00 a	7.39 a	4.82 a	88.00 a	16.72 a	14.83 a	78.77 ab	59.88 ab	14.03 a	5.18 bc
2	Proline 480SC (C)	35.00 b	3.22 b	1.20 b	69.00 b	7.73 bc	5.40 bc	77.11 ab	59.78 ab	14.36 a	4.88 bc
3	Expt. Product (C)	67.00 a	8.10 a	5.46 a	87.00 a	17.31 a	15.31 a	77.11 ab	59.58 b	14.30 a	7.23 a
4	Proline 480SC (C) Expt. Product (C)	37.00 b	3.62 b	1.38 b	68.00 b	10.85 b	7.60 b	81.20 ab	60.40 ab	13.90 a	5.88 ab
5	Expt. Product (AB)	69.00 a	9.11 a	6.41 a	90.00 a	16.76 a	15.14 a	71.66 b	59.75 ab	14.22 a	5.95 ab
6	Proline 480SC (A) Expt. Product (A)	39.00 b	3.15 b	1.26 b	67.00 b	9.72 b	6.50 bc	80.25 ab	60.50 ab	13.76 a	4.78 bc
7	Proline 480SC (B) Expt. Product (B)	44.00 b	4.48 b	2.05 b	60.00 b	7.51 bc	4.62 c	91.56 a	60.69 a	14.03 a	3.88 cd
8	Proline 480SC (AB) Expt. Product (AB)	33.00 b	2.90 b	1.04 b	49.00 c	5.15 c	2.54 d	90.85 a	60.48 ab	14.16 a	2.98 d
% CV		17.78	24.69	42.82	20.85	23.54	27.44	15.02	1.26	2.94	29.48
Mean		48.50	5.25	2.95	72.25	11.47	8.99	81.07	60.13	14.09	5.09
Max		69.00	9.11	6.41	90.00	17.31	15.31	91.56	60.69	14.36	7.23
Min		33.00	2.90	1.04	49.00	5.15	2.54	71.66	59.58	13.76	2.98

<sup>1</sup> A: Feekes 10.4 application, B: five days after Feekes 10.4 application, C: Feekes 10.51  
<sup>v</sup> Means with same letter within individual variable (within column) are not statistically different at P<0.05  
<sup>w</sup> FHB INC: Fusarium head blight incidence  
<sup>x</sup> FHB SEV: Fusarium head blight severity  
<sup>y</sup> FHB I: Fusarium head blight index

Results are presented in Table 2.

**FHB Incidence:** Except for experimental product applied at Feekes 10.51, and at Feekes 10.4 followed by five days after, all other treatments resulted in significantly reduced 18 and 26 DAT FHB incidence compared to the untreated. Lowest FHB incidence was observed in the treatment Proline 480SC + the experimental product applied at Feekes 10.4 followed by five days after.

**FHB Severity:** Similar to FHB incidence, except for experimental product applied at Feekes 10.51, and at Feekes 10.4 followed by five days, all other treatments resulted in significantly reduced 18 and 26 DAT FHB severity compared to the untreated. Lowest FHB severity was observed in the treatment Proline 480SC + the experimental product applied at Feekes 10.4 followed by five days after.

**FHB Index:** Same trend of FHB incidence and severity was observed for FHB index and the treatment Proline 480SC + the experimental product applied at Feekes 10.4 followed by five days after, resulted in the lowest FHB disease index.

**Deoxynivalenol:** Only two treatments; Proline 480SC + experimental product applied at five days after Feekes 10.4 and at Feekes 10.4 followed by 5 days after; resulted in significantly lower level of DON compared to the untreated. Experimental product applied at feekes 10.51 resulted in significantly higher DON levels than in the untreated. The treatment Proline 480SC + the experimental product applied at Feekes 10.4 followed by five days after resulted in the lowest DON level.

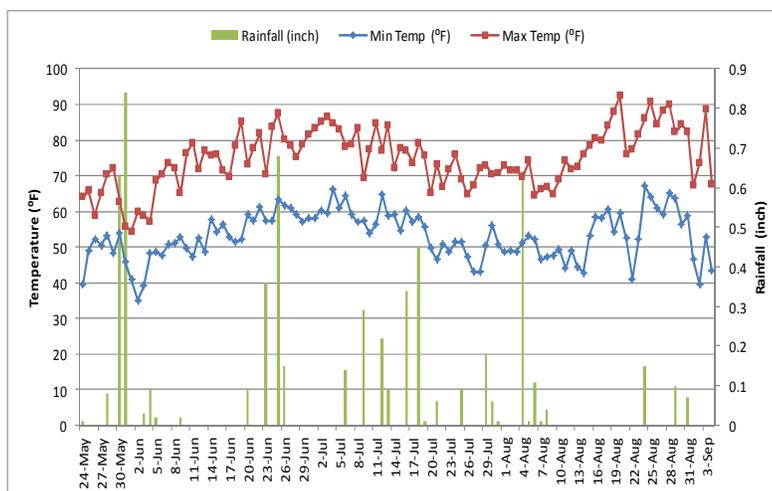
**Yield:** Though two treatments; Proline 480SC + experimental product applied at five days after Feekes 10.4 and at Feekes 10.4 followed by 5 days after; resulted in numerically higher yield by 12.79 and 12.08 bu/A more yield than the untreated, it was not statistically significant. Similarly, Proline 480SC + the experimental product applied at flowering also resulted in numerically 2.43 bu/A more yield than the untreated. Other remaining treatments resulted in lower yield by 1.11 - 1.66 bu/A compared to the untreated.

**Test Weight:** None of the treatments resulted in significantly higher or lower test weight compared to the untreated. However, the treatment Proline 480SC + the experimental product applied at five days after Feekes 10.4 growth stage resulted in significantly higher test weight by 1.11 lb/bu than the treatment of only experimental product at Feekes 10.51.

**Protein:** None of the treatments significantly differed for protein content. Protein content ranged from 13.76 - 14.36 at 12% moisture.

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Daily minimum and maximum temperature, and rainfall recorded in Langdon, ND during planting to harvest of hard red spring wheat in this study.