

# Hard Red Spring Wheat

WHEAT (*Triticum aestivum* L. 'Barlow')

Tan spot; *Pyrenophora tritici-repentis*  
Septoria; *Septoria* spp.  
Fusarium head blight; *Fusarium graminearum*  
Leaf rust; *Puccinia recondita*

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### **Bayer Foliar Fungicide in spring wheat near Regent, ND 2011.**

This experiment was conducted in a field located near Regent, ND (SW ¼, Section 18, T134N, R95W – Hettinger County, ND) with a previous cropping history of spring wheat in 2010. A randomized complete block design with four replications was used. Plots were 6 ft wide by 50 ft long with a 4 ft wide spring wheat buffer between plots. A burndown application of 0.5 ae/a glyphosate + ammonium sulfate was applied on 21 May to eliminate volunteer wheat and early germinating weeds. Plots were seeded by the producer with a JD 1895 drill equipped with single disc openers and mid-row fertilizer disc openers on 26 May at the rate of 200 pls m<sup>-2</sup>. Urea at the rate of 225 lbs/a (103.5 lbs/a N) was applied through the mid-row band disc openers of the drill and 75lbs/a of 12-36-6-5 (9 lb/a N, 27 lbs/a P<sub>2</sub>O<sub>5</sub>, 4.5 lbs/a K<sub>2</sub>O, and 3.8 lbs/a S) as a starter was placed with the seed during the seeding operation. A post emergent herbicide application of Wolverine at 27.4 fl oz/a was made with the CO<sub>2</sub> plot sprayer on 23 Jun to all plots in this trial. Fungicide application at the 4 to 5 leaf stage were made on 23 Jun, the flag leaf stage application on 15 Jul, and flower application was made on 19 Jul. All treatments were applied in 19.1 gal/a water at 30 psi using a CO<sub>2</sub> pressurized hand-held spray boom equipped with 8002VS flat fan nozzles. Tan spot disease evaluations were conducted on 30 Jun, flag leaf evaluation on 19 Jul, and late season leaf disease and FHB was done on 27 Jul. Leaf disease evaluations consisted of observations made on ten consecutive plants in the center row of each plot. Incidence was recorded as the percent of plants with at least one lesion observed, and severity was recorded as the average leaf area covered by lesions for all leaves for the early season evaluation and the flag leaf for the late season evaluation. Crop injury observations were made at the same time as the disease evaluations. No crop injury from the applications were detected. No visual symptoms of FHB were detected. Grain samples from the untreated check plots were sent to NDSU for DON analysis and no DON was detected in these samples. No further testing for DON in grain samples produced from fungicide treatments was done. Precipitation at the North Dakota Agricultural Weather Network Mott, ND weather station in May, Jun, Jul, and Aug was 4.29, 2.79, 1.89, and 2.45 inches respectively or more than 119% of normal for the growing season. Moist conditions throughout May and Jun promoted tan spot but dry weather conditions throughout July were not conducive for any of the leaf diseases. August moisture promoted bacterial leaf streak and late season leaf diseases. Harvest was with a Massy Ferguson 8XP combine on 7 Aug. Grain yield, and test weight were adjusted to a 12% moisture basis. All data was statistically analyzed using SAS Statistical software v 9.1 Proc ANOVA.

Leaf disease evaluations for Barlow HRSW plants treated with selected foliar fungicides at various application times, Regent, ND, 2011.

Treatment <sup>1</sup>	App Rate fl oz/acre	----- Disease evaluation <sup>2</sup> -----					
		I1	S1	I2	S2	I3	S3
Untreated		17.5	19.8	20.0	22.8	100.0	14.5
4-5L, Stratego YLD+ Wolverine	1.5 + 27.4	10.0	1.5	10.0	14.0	92.5	7.3
Flag, Prosaro 421SC + NIS	5.0 + 0.125%v/v	20.0	15.5	17.0	9.8	47.5	1.5
Flowering, Prosaro 421SC + NIS	6.5 + 0.125%v/v	20.0	16.0	17.5	17.0	42.5	3.0
4-5L, Stra YLD + Wolv/ Flag, Prosaro 421 + NIS	1.5 + 27.4 / 5.0+0.125%v/v	10.0	2.3	10.0	7.5	22.5	1.0
Mean		15.5	11.1	15.0	14.2	61.0	5.5
CV%		14.4	49.3	30.4	38.1	29.3	91.0
LSD.05		3.4	8.4	7.0	8.3	27.6	7.6

<sup>1</sup>Treatment fungicide and herbicide including crop stage at application

<sup>2</sup>Disease evaluation I = Incidence of leaf disease symptom in treatment observed 1 = 30 Jun, 2 = 19 Jul and 3 = 27 Jul. S = Severity of leaf disease symptoms in treatment as observed 1 = 30 Jun, 2 = 19 Jul, 3 = Jul 27.

Grain yield and test weight of Barlow HRSW treated with selected foliar fungicides at various application times, Regent, ND, 2011.

Treatment	App Rate fl oz/acre	----- Grain <sup>1</sup> -----	
		Yield bu/acre	Test wt lb/bu
Untreated		26.1	54.7
4-5L, Stratego YLD+ Wolverine	1.5oz + 27.4 Oz	27.3	55.6
Flag, Prosaro 421SC + NIS	5.0 oz + 0.125%v/v	25.7	57.3
Flowering, Prosaro 421SC + NIS	6.5oz + 0.125%v/v	34.4	57.0
4-5L, Stra YLD + Wolv/ Flag, Prosaro 421 + NIS	1.5 oz+27.4oz/5.0oz+0.125%v/v	29.0	56.5
Mean		28.5	56.2
CV%		13.1	3.7
LSD.05		5.77	NS

<sup>1</sup>Grain yield and test weight adjusted to 12% moisture basis.

Tan spot; *Pyrenophora tritici-repentis*  
Septoria; *Septoria* spp.  
Fusarium head blight; *Fusarium graminearum*  
Leaf rust; *Puccinia recondita*  
Wheat stem sawfly; *Cephus cinctus*

### **Evaluation of Quilt, Tilt, and Stratego foliar fungicide treatments for control of leaf diseases and Warrior and Endigo ZCX insecticides in spring wheat near Regent, ND 2011.**

This experiment was conducted in a field located near Regent, ND (SW ¼, Section 18, T134N, R95W – Hettinger County, ND) with a previous cropping history of spring wheat in 2010. A randomized complete block design with four replications was used. Plots were 6 ft wide by 50 ft long with a 4 ft wide spring wheat buffer between plots. A burndown application of 0.5 ae/a glyphosate + ammonium sulfate was applied on 21 May to eliminate volunteer wheat and early germinating weeds. Plots were seeded by the producer with a JD 1895 drill equipped with single disc openers and mid-row fertilizer disc openers on 26 May at the rate of 200 pls m<sup>-2</sup>. Urea at the rate of 225 lbs/a (103.5 lbs/a N) was applied through the mid-row band disc openers of the drill and 75lbs/a of 12-36-6-5 (9 lb/a N, 27 lbs/a P<sub>2</sub>O<sub>5</sub>, 4.5 lbs/a K<sub>2</sub>O, and 3.8 lbs/a S) as a starter was placed with the seed during the seeding operation. A post emergent herbicide application of Wolverine at 1.7 pt/a was made with a pickup mounted sprayer on 2 Jul. Fungicide and fungicide plus insecticide applications at Feekes growth stage 23 were made on 23 Jun. All treatments were applied in 19.1 gal/a water at 30 psi using a CO<sub>2</sub> pressurized hand-held spray boom equipped with 8002VS flat fan nozzles. Tan spot disease evaluations were conducted on 30 Jun and late season leaf disease was done on 27 Jul. Wheat stem sawfly evaluations were conducted on 17 Aug. Leaf disease evaluations consisted of observations made on ten consecutive plants in the center row of each plot. Wheat stem sawfly evaluation was conducted on 25 plants per plot. Selected plants were split and the presence of larva noted. Disease incidence was recorded as the percent of plants with at least one lesion observed, and severity was recorded as the average leaf area covered by lesions for all leaves for the early season evaluation and the flag leaf for the late season evaluation. Crop injury observations were made at the same time as the disease evaluations. No crop injury from the application was detected. No visual symptoms of FHB were detected. Grain samples from the untreated check plots were sent to NDSU for DON analysis and no DON was detected in these samples. No further testing for DON in grain samples produced from fungicide treatments was done. Precipitation at the North Dakota Agricultural Weather Network Mott, ND weather station in May, Jun, Jul, and Aug was 4.29, 2.79, 1.89, and 2.45 inches respectively or more than 119% of normal for the growing season. Moist conditions throughout May and Jun promoted tan spot but dry weather conditions throughout July were not conducive for any of the leaf diseases. August moisture promoted bacterial leaf streak. Wheat stem sawfly infestations were very low throughout the plot, less than 1%, and no significant differences were found among treatments with and without insecticide. Harvest was with a Massy Ferguson 8XP combine on 7 Aug. Grain yield, and test weight were adjusted to a 12% moisture basis. All data was statistically analyzed using SAS Statistical software v 9.1 Proc ANOVA.

Disease evaluations, grain test weight and yield for selected foliar fungicide and foliar fungicide + insecticide treatments on Barlow HRSW near Regent, ND, 2011.

Treatment <sup>1</sup>	App Rate fl oz/acre	Evaluations <sup>2</sup>					Grain <sup>3</sup>	
		I1	S1	I3	S3	SF	Yield bu/acre	Test wt lb/bu
Untreated Check		17.5	19.8	100.0	9.3	0.25	27.7	55.3
Tilt	2.0	10.0	2.5	100.0	14.5	0.00	26.6	56.9
Tilt + Warrior II	2.0 + 1.28	10.0	3.3	100.0	6.8	0.50	35.7	58.1
Tilt + Endigo ZCX	2.0 + 3.5	10.0	3.5	100.0	9.5	0.50	25.7	56.6
Tilt + Endigo ZCX	2.0 + 4.0	10.0	2.5	95.0	12.0	0.25	35.1	58.4
Tilt + Endigo ZCX	2.0 + 4.5	10.0	5.0	92.5	13.5	0.75	35.7	57.3
Headline	3.0	10.0	1.8	100.0	12.0	0.75	28.3	55.9
Stratego	4.0	10.0	1.5	95.0	9.8	0.75	28.1	56.8
Mean		10.9	5.0	97.8	10.9	0.47	30.4	56.9
CV%		16.1	86.9	7.3	57	137	9.4	2.01
LSD 0.05		2.6	6.3	NS	NS	NS	4.2	1.7

<sup>1</sup>Treatment applied on 23 Jun during Feekes Growth Stage 2.3

<sup>2</sup>I = Disease Incidence, S = Disease Severity, Evaluation Date 1 = 30 Jun and 2 = 27 Jul.

<sup>3</sup>Test wt and Yield are reported on a 12% moisture basis.

## Fargo: 2011 Spring Wheat Trial Information

Investigator: Marcia McMullen, NDSU Plant Pathology Dept.

**Location:** ND Ag. Experiment Station Plots, Fargo Campus

**Planting Date:** May 6, 2011, onto field plots that were drain tiled in fall of 2007

### Varieties Planted with Grain Drill:

Wheat on Wheat for early season leaf disease studies: Alsen HRSW

Wheat on bean ground for FHB studies: Samson HRSW

### Cone Seeder plantings:

Cropping system studies planted on May 16

Post planting herbicides applied on June 3: Wolverine for wheat;

### Fungicide applications

Early season fungicide applications, June 6, 85 degrees F

Feekes 6 applications, June 14

Feekes 8-9, June 20

Feekes 10.1 wheat, June 28

Feekes 10.3, wheat, June 30

Feekes 10.52 wheat, July 5 (a day or two past early flowering of main stems)

Cropping System study: July 6, Feekes 10.51 Briggs; Feekes 10.51 Glenn, July 8; Samson and Steele ND, July 11

**Inoculum:** *Fusarium graminearum* inoculum sprayed on FHB wheat study plots of Sampson spring wheat on July 5, at 100,000 spores/ml and 30 gal/acre; all other diseases from natural infection

**Disease notes,** week of July 25;

**Harvested:** Most wheat Aug. 9; Cropping system study Aug. 22

**Weather: Rainfall:** May, 4.28" total, = 2" above 30 year normal; June, 4", = 0.5" above normal; July, 4.1", = 1.2" above normal

**Temp:** May, 57<sup>o</sup>F avg., 58<sup>o</sup> normal; June, 66<sup>o</sup>F, 66<sup>o</sup>F normal; July, 75<sup>o</sup>F, 71<sup>o</sup>F normal; July had 4 days in 90s; Night time temperatures in July averaged 5 degrees above normal, with some nighttime temperatures not dropping below 73<sup>o</sup>F.

**Dew Point:** June, avg. 55<sup>o</sup>F, with 5 days above 60; July, 63<sup>o</sup>F avg., 6 days averaged above 70<sup>o</sup>F

**Summary:** 2011 growing season characterized by above normal rainfall and warm July temperatures and dew points above normal; result was a multitude of diseases in plots. In wheat, many diseases impacted crop, including tan spot, *Stagonospora*, bacterial leaf streak and black chaff, and barley yellow dwarf virus (grain aphid vectors treated for with malathion once, early, in jointing stage, but BYDV still severe). Bacterial leaf streak masked leaf spot diseases in Samson HRSW. **Leaf rust did not develop at all in our wheat plots in 2011.** Heat in July also was not favorable for small grain crop development.

9/19/2011 (2011 BASF FKS 2 WHEAT)

## North Dakota State University

**2011 BASF FKS 2 WHEAT: Alsen spring wheat**  
 Location: FARGO      Study Director: CHRIS WHARAM  
 Investigator: Marcia McMullen

Measurement Name Measurement Type					Flag leaf sev. %	Yield bu/acre	Twt lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage	1	2	3
1	UNTREATED				13.43 a	44.53 b	55.90 ab
2	TWINLINE NIS	EC XL	7 fl oz/a 0.125 % v/v	FKS 2 FKS 2	5.70 bcd	48.92 a	55.65 ab
3	HEADLINE NIS	SC XL	3 fl oz/a 0.125 % v/v	FKS 2 FKS 2	5.33 bcd	47.57 ab	55.23 b
4	HEADLINE AMP NIS	SC XL	5 fl oz/a 0.125 % v/v	FKS 2 FKS 2	4.35 d	48.70 a	56.33 a
5	PRIAXOR NIS	SC XL	2 fl oz/a 0.125 % v/v	FKS 2 FKS 2	6.83 bc	47.01 ab	55.20 b
6	PRIAXOR NIS	SC SL	4 fl oz/a 0.125 % v/v	FKS 2 FKS 2	5.20 bcd	48.91 a	55.48 ab
7	TILT NIS	EC XL	2 fl oz/a 0.125 % v/v	FKS 2 FKS 2	6.98 bc	47.68 ab	56.03 ab
8	QUILT XCEL NIS	SC XL	5 fl oz/a 0.125 % v/v	FKS 2 FKS 2	7.38 b	46.73 ab	55.28 b
9	EVITO NIS	SC XL	2 fl oz/a 0.125 % v/v	FKS 2 FKS 2	4.93 cd	46.78 ab	55.60 ab
LSD (P=.10)					2.289	3.391	0.988
Standard Deviation					1.892	2.803	0.817
CV					28.33	5.91	1.47
Replicate F					1.200	3.596	13.532
Replicate Prob(F)					0.3311	0.0282	0.0001
Treatment F					8.324	0.992	0.907
Treatment Prob(F)					0.0001	0.4666	0.5266

Means followed by same letter do not significantly differ (P=.10, LSD)

9/19/2011 (2011 BASF FKS 8-9 WHEAT)

## North Dakota State University

**2011 BASF Fks 8-9 Wheat: Alsen spring wheat**  
 Location: Fargo      Study Director: Chris Wharam      Investigator: Marcia McMullen

Measurement Name					Flag	Yield	Twt
Measurement Type					% sev	bu/acre	lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage	1	2	3
1	Untreated				15.23 a	47.12 b	56.76 a
2	Twinline	EC	9 fl oz/a	FKS 8-9	6.58 cd	52.17 a	56.69 a
	NIS	XL	0.125 % v/v	FKS 8-9			
3	Headline AMP	SC	10 fl oz/a	FKS 8-9	4.58 d	50.78 a	57.44 a
	NIS	XL	0.125 % v/v	FKS 8-9			
4	Priaxor	SC	4 fl oz/a	FKS 8-9	5.23 d	51.99 a	57.71 a
	NIS	XL	0.125 % v/v	FKS 8-9			
5	Quilt Xcel	SC	10.5 fl oz/a	FKS 8-9	6.35 cd	50.43 a	57.06 a
	NIS	XL	0.125 % v/v	FKS 8-9			
6	Folicur	EC	4 fl oz/a	FKS 8-9	7.43 bc	52.97 a	56.50 a
	NIS	XL	0.125 % v/v	FKS 8-9			
7	Evito	SC	4 fl oz/a	FKS 8-9	8.68 b	51.02 a	56.56 a
	NIS	XL	0.125 % v/v	FKS 8-9			
8	Stratego Yld	SC	4 fl oz/a	FKS 8-9	5.85 cd	51.24 a	57.18 a
	NIS	XL	0.125 % v/v	FKS 8-9			
LSD (P=.05)					2.083	2.670	1.263
Standard Deviation					1.416	1.815	0.859
CV					18.92	3.56	1.51
Replicate F					2.944	3.771	3.666
Replicate Prob(F)					0.0566	0.0261	0.0287
Treatment F					22.700	3.763	1.032
Treatment Prob(F)					0.0001	0.0085	0.4385

Means followed by same letter do not significantly differ (P=.05, LSD)



9/19/2011 (2011 BASF PROGRAM WHEAT)

## North Dakota State University

**2011 BASF Program Wheat: SteeleND HRSW variety**

Location: Fargo Study Director: Chris Wharam  
Investigator: Marcia McMullen

Measurement Name					Stand	% sev	DON	Yield	Twt
Measurement Type					Per 2'	Flag lf	ppm	bu/acre	lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth. Stage	1	2	3	4	5
1	Untreated				25.00 Ab	13.07 a	0.20 a	51.43 b	57.55 bc
2	Headline	Sc	3 FI Oz/A	Fks 2	22.38 B	7.43 b	0.18 ab	53.08 ab	57.45 bc
3	Priaxor NIS	Sc XI	4 FI Oz/A 0.125 % V/V	Fks 10 Fks 10	23.63 Ab	3.07 c	0.13 bc	56.63 a	58.88 a
4	Caramba NIS	F XI	13.5 FI Oz/A 0.125 % V/V	Fk 10.51 Fk 10.51	26.00 A	1.50 c	0.10 c	55.98 a	57.23 c
5	Headline Headline NIS	Sc Sc XI	3 FI Oz/A 6 FI Oz/A 0.125 % V/V	Fks 2 Fks 10 Fks 10	24.50 Ab	3.27 c	0.10 c	55.78 ab	58.15 abc
6	Headline Priaxor NIS	Sc Sc XI	3 FI Oz/A 4 FI Oz/A 0.125 % V/V	Fks 2 Fks 10 Fks 10	25.38 Ab	3.50 c	0.13 bc	53.05 ab	58.40 ab
7	Headline Priaxor Priaxor Caramba NIS	Sc Sc Sc F XI	3 FI Oz/A 4 FI Oz/A 4 FI Oz/A 13.5 FI Oz/A 0.125 % V/V	Fks 2 Fks 10 Fks 10 Fk 10.51 Fk 10.51	25.75 A	3.03 c	0.10 c	54.53 ab	58.43 ab
8	Stamina F3 Headline Priaxor Caramba NIS	Sc Sc F XI	5.4 FI Oz/Cwt 3 FI Oz/A 4 FI Oz/A 13.5 FI Oz/A 0.125 % V/V	Fks 2 Fks 10 Fk 10.51 Fk 10.51	25.75 A	1.90 c	0.10 c	56.20 a	57.88 abc
LSD (P=.10)					3.301	2.017	0.052	4.465	1.042
Standard Deviation					2.713	1.403	0.043	3.669	0.856
CV					10.94	30.53	33.66	6.72	1.48
Replicate F					5.799	5.459	0.616	7.914	1.955
Replicate Prob(F)					0.0047	0.0177	0.6122	0.0010	0.1517
Treatment F					0.852	22.730	3.240	1.050	1.749
Treatment Prob(F)					0.5587	0.0001	0.0171	0.4278	0.1515

Means followed by same letter do not significantly differ (P=.10, LSD)

NIS = Induce at 0.125% v/v

# North Dakota State University

2011BayerWheat : Study on Samson HRSW

FP11NARFJI

Location: Fargo

Study Director: Kevin Thorsness

Investigator: Marcia McMullen

Parameter measured					Injury	FHB I	FHB HS	FHB FS	DON	Yield	Twt
Type of measure					%	%	%	%	ppm	bu/acre	lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acrea	Growth Stage	1	2	3	4	5	6	7
1	Untreated				1.00 c	71.25 ab	15.25 ab	11.05 a	0.55 a	57.33 c	58.60 a
2	Bay Exp. Wolverine	SC EC	1.5 oz/a 27.4 oz/a	FKS 2 FKS 2	3.00 abc	80.00 a	12.43 b	10.05 a	0.50 a	60.55 b	58.30 a
3	Bay Exp. Wolverine	SC EC	2.0 oz/a 27.4 oz/a	FKS 2 FKS 2	4.00 ab	61.25 b	19.15 a	11.85 a	0.58 a	58.53 bc	58.85 a
4	Prosaro NIS	SC XL	6.5 oz/a 0.125 % v/v	Fk 10.51 Fk 10.51	2.00 bc	37.50 c	5.03 c	2.05 b	0.33 b	63.91 a	58.78 a
5	Bay Exp. Wolverine Prosaro NIS	SC EC SC XL	1.5 oz/a 27.4 oz/a 6.5 oz/a 0.125 % v/v	FKS 2 FKS 2 Fk 10.51 Fk 10.51	5.25 a	40.00 c	7.93 c	3.90 b	0.30 b	64.56 a	58.98 a
6	Bay Exp. Wolverine Prosaro NIS	SC EC SC XL	2.0 oz/a 27.4 oz/a 6.5 oz/a 0.125 % v/v	FKS 2 FKS 2 Fk 10.51 Fk 10.51	4.75 a	32.50 c	5.05 c	1.73 b	0.23 b	64.99 a	59.53 a
LSD (P=.05)					2.672	12.097	4.445	3.955	0.170	3.105	1.744
Standard Deviation					1.773	8.028	2.950	2.625	0.113	2.061	1.158
CV					53.2	14.94	27.3	38.77	27.37	3.34	1.97
Replicate F					0.883	13.556	5.470	10.570	1.078	10.510	5.964
Replicate Prob(F)					0.4720	0.0002	0.0096	0.0005	0.3881	0.0006	0.0069
Treatment F					3.424	24.284	15.339	12.872	6.804	10.230	0.502
Treatment Prob(F)					0.0291	0.0001	0.0001	0.0001	0.0017	0.0002	0.7699

Means followed by same letter do not significantly differ (P=.05, LSD)  
Injury ratings on June 10, Wolverine + Bay Exp. applied on June 6

Some damage to Samson from Bacterial Leaf Streak infection, too, an infection not managed with fungicides.

## North Dakota State University

### 2011 DuPont Wheat - Samson Hard Red Spring Wheat

Location: Fargo

Study Director: Keith Johnson

Investigator: Marcia McMullen

Measurement Name Measurement Type					FHB I %	FHB HS %	FHB FS %	DON ppm	Yield bu/acre	Twt lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage	1	2	3	4	5	6
1	Untreated				83.75 a	23.20 a	18.90 a	0.55 ab	59.36 b	58.53 b
2	Approach	SC	6 oz/a	FKS 6	76.25 ab	19.15 ab	14.78 ab	0.53 ab	65.16 ab	58.95 ab
	Surfactant	XL	0.25 % v/v	FKS 6						
	Vertisan	EC	1.5 pt/a	FKS 10						
	Surfactant	XL	0.25 % v/v	FKS 10						
3	DuPont Exp.	SC	19.2 fl oz/a	FKS 10.5	67.50 bc	15.38 bc	9.88 cd	0.50 abc	62.74 ab	59.43 a
	Surfactant	XL	0.25 % v/v	FKS 10.5						
4	DuPont Exp.	SC	6.25 fl oz/a	FKS 10.5	65.00 bc	14.28 bc	8.68 cde	0.48 abc	63.13 ab	58.93 ab
	Surfactant	XL	0.25 % v/v	FKS 10.5						
5	Vertisan	EC	1.5 pt/a	FK 10.51	67.50 bc	17.08 ab	10.60 bc	0.55 ab	65.10 ab	58.90 ab
	Surfactant	XL	0.25 % v/v	FK 10.51						
6	Vertisan	EC	12 fl oz/a	FK 10.51	48.75 d	9.10 c	4.70 e	0.33 bc	66.11 a	59.20 ab
	Folicur	SC	4 fl oz/a	FK 10.51						
	Surfactant	XL	0.25 % v/v	FK 10.51						
7	Headline	EC	6 fl oz/a	FK 10.5	65.00 bc	9.20 c	6.38 cde	0.58 a	65.08 ab	58.78 ab
	Surfactant	XL	0.25 % v/v	Fks 10.5						
8	Proline	SC	4.3 fl oz/a	FKS10.51	55.00 cd	8.73 c	5.43 de	0.28 c	66.85 a	59.48 a
	Surfactant	XL	0.25 % v/v	FKS10.51						
LSD (P=.05)					15.258	6.839	4.671	0.231	6.397	0.865
Standard Deviation					10.374	4.650	3.176	0.157	4.349	0.588
CV					15.7	32.04	32.03	33.32	6.77	1.0
Replicate F					4.014	1.024	0.731	0.518	0.925	2.825
Replicate Prob(F)					0.0210	0.4021	0.5451	0.6742	0.4460	0.0635
Treatment F					4.487	5.163	9.420	2.007	1.238	1.214
Treatment Prob(F)					0.0034	0.0016	0.0001	0.1025	0.3268	0.3385

Means followed by same letter do not significantly differ (P=.05, LSD)

9/21/2011 (2011 SCIESENT WHEAT)

## North Dakota State University

### 2011 Sciessent products on Samson Hard Red Spring Wheat

Location: Fargo

Study Director: Naseem Khan  
Investigator: Marcia McMullen

Measurement Name					FHB I	FHB HS	FHB FS	DON	Yield	Twt
Measurement Type					%	%	%	ppm	bu/acre	lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth. Stage	1	2	3	4	5	6
1	Untreated				86.25 a	25.58 ab	22.00 ab	0.53 a	61.56 b	59.43 a
2	Prosaro INDUCE	SC XL	6.5 oz/a 0.125 % v/v	FK 10.51 FK 10.51	50.00 b	9.33 c	5.50 c	0.30 b	66.30 a	59.73 a
3	Agion A	XL	6.25 % v/v	FK 10.51	90.00 a	19.75 b	17.58 b	0.55 a	61.88 b	58.85 a
4	Agion B	XL	6.25 % v/v	FK 10.51	91.25 a	27.70 a	24.85 a	0.65 a	59.85 b	59.03 a
5	Agion C	XL	6.25 % v/v	FK 10.51	85.00 a	24.28 ab	20.13 ab	0.63 a	60.63 b	58.55 a
6	Agion D	XL	6.25 % v/v	FK 10.51	86.25 a	20.95 ab	17.63 b	0.65 a	61.10 b	59.05 a
LSD (P=.05)					16.521	7.899	5.503	0.214	3.876	1.278
Standard Deviation					10.964	5.242	3.652	0.142	2.572	0.848
CV					13.46	24.65	20.35	25.78	4.16	1.44
Replicate F					1.534	4.236	8.468	0.718	0.221	0.138
Replicate Prob(F)					0.2467	0.0235	0.0016	0.5564	0.8806	0.9357
Treatment F					8.099	6.230	13.437	3.530	3.137	0.966
Treatment Prob(F)					0.0007	0.0026	0.0001	0.0262	0.0390	0.4689

Means followed by same letter do not significantly differ (P=.05, LSD)

**Agion is a microbial product**

# North Dakota State University

## 2011 TESSEDERLO K MAGTHIO WHEAT (Samson)

Location: FARGO

Study Director: TOM FAIRWEATHER  
Investigator: Marcia McMullen

Measurement					DON	Yield	Twt
Measurement Type					ppm	bu/acre	lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage	1	2	3
1	Proline	SC	5.7 fl oz/a	FK 10.51	0.30 a	64.71 ab	58.73 ab
2	Proline	SC	5.7 fl oz/a	FK 10.51	0.33 a	64.80 ab	58.70 ab
	MAGTHIO	XL	1 gal/a	FK 10.51			
3	Proline	SC	5.7 fl oz/a	FK 10.51	0.35 a	62.60 bc	58.20 b
	MAGTHIO	XL	2 gal/a	FK 10.51			
4	CARAMBA	F	13.5 fl oz/a	FK 10.51	0.35 a	66.35 a	59.38 a
5	CARAMBA	F	13.5 fl oz/a	FK 10.51	0.30 a	64.35 ab	58.55 ab
	MAGTIO	XL	1 gal/a	FK 10.51			
6	CARAMBA	F	13.5 fl oz/a	FK 10.51	0.30 a	62.65 bc	58.33 ab
	MAGTHIO	XL	2 gal/a	FK 10.51			
7	PROSARO	SC	6.5 fl oz/a	FK 10.51	0.30 a	63.64 ab	57.95 b
8	PROSARO	SC	6.5 fl oz/a	FK 10.51	0.35 a	63.79 ab	58.33 ab
	MAGTHIO	XL	1 gal/a	FK 10.51			
9	PROSARO	SC	6.5 fl oz/a	FK 10.51	0.43 a	60.15 c	58.18 b
	MAGTHIO	XL	2 gal/a	FK 10.51			
<b>Average of Untreated in Adjacent plots</b>					<b>0.55 b</b>	<b>59.36 c</b>	<b>58.53 ab</b>
LSD (P=.05)					0.127	3.332	1.172
Standard Deviation					0.087	2.283	0.803
CV					26.02	3.59	1.37
Replicate F					0.197	9.322	6.415
Replicate Prob(F)					0.8974	0.0003	0.0024
Treatment F					0.914	2.365	1.096
Treatment Prob(F)					0.5219	0.0492	0.3997

Means followed by same letter do not significantly differ (P=.05, LSD)

MagThio (0-0-0-10S+4Mg) is a neutral to slightly acidic, chlorine free, clear solution, containing 4% magnesium and 10% thiosulfate sulfur. Each gallon of MagThio contains 0.40 pounds of magnesium (Mg) and 1.00 pound of thiosulfate sulfur(S).

## North Dakota State University

2011 Uniform Trial - Wheat "Samson" spring wheat

Protocol: USWBSI 2011  
 Location: Fargo

Study Director: Carl Bradley, Univ. of Illinois  
 Investigator: Marcia McMullen, NDSU

Measurement Name Measurement Type					FHB I %	FHB HS %	FHB FS %	DON ppm	FDK %	Twt lbs/bu	Yield bu/acre
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth. Stage	1	2	3	4	5	6	7
1	UNTREATED				63.8 a	26.4 a	16.5 a	0.65 abc	4.5 a	58.9 a	62.4 d
2	A9232D	SC	7 fl oz/a	FK 10.51	36.3 de	8.6 cde	3.0 de	0.53 bc	2.3 b	59.1 a	67.3 bc
3	CARAMBA INDUCE	F XL	13.5 fl oz/a 0.125 % v/v	FK 10.51 FK 10.51	26.3 ef	4.2 e	1.2 e	0.43 cde	1.8 b	59.8 a	69.6 ab
4	PROSARO INDUCE	SC XL	6.5 fl oz/a 0.125 % v/v	FK 10.51 FK 10.51	20.0 f	4.6 e	1.1 e	0.28 de	2.5 b	59.1 a	68.0 abc
5	HEADLINE INDUCE	SC XL	6 fl oz/a 0.125 % v/v	FKS 9 FKS 9	47.5 bcd	11.5 b-e	6.0 cd	0.68 ab	3.0 b	59.1 a	67.0 bc
6	HEADLINE INDUCE PROSARO INDUCE	SC XL SC XL	6 fl oz/a 0.125 % v/v 6.5 fl oz/a 0.125 % v/v	FKS 9 FKS 9 FK 10.51 FK 10.51	30.0 ef	6.1 de	1.8 e	0.23 e	3.0 b	59.2 a	67.8 abc
7	EVITO INDUCE	SC XL	4 fl oz/a 0.125 % v/v	FK 10.51 FK 10.51	46.3 cd	16.4 bc	7.6 bc	0.78 a	4.5 a	59.1 a	69.2 abc
8	STRATEGO YLD INDUCE	SC XL	4 fl oz/a 0.125 % v/v	FKS 10.5 FKS 10.5	55.0 abc	13.9 bcd	7.3 bc	0.50 bcd	5.5 a	59.1 a	69.6 ab
9	QUILT INDUCE	SC XL	10.5 fl oz/a 0.125 % v/v	FKS 10.5 FKS 10.5	55.0 abc	15.9 bc	8.9 bc	0.83 a	5.5a	58.4 a	66.1 c
10	TWINLINE INDUCE	SC XL	9 fl oz/a 0.125 % v/v	FKS 10.5 FKS 10.5	60.0 ab	19.2 ab	10.6 b	0.70 ab	5.5 a	58.9 a	70.8 a
LSD (P=.05)					12.98	8.03	3.90	0.236	1.46	1.390	3.37
Standard Deviation					8.94	5.54	2.69	0.163	1.01	0.958	2.32
CV					20.3	43.7	42.0	29.2	26.6	1.62	3.4

Means followed by same letter do not significantly differ (P=.05, LSD)

Samson spring wheat is Susceptible to FHB

Spray inoculum of *Fusarium graminearum* spores delivered at mid-anthesis, 100,000 spores/ml, 30 gal/acre

## North Dakota State University

### 2011 Winfield Solutions Adjuvant Protocol on Samson spring wheat

Location: Fargo

 Study Director: Greg Dahl  
 Investigator: Marcia McMullen

Measurement Name					DON	Twt	Yield
Measurement Type					ppm	lbs/bu	bu/acre
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage	1	2	3
1	Untreated				0.55 a	58.77 a	61.61 c
2	Prosaro Preference	SC XL	6.5 oz/a 0.25 % v/v	10.51 10.51	0.23 b	58.88 a	67.75 a
3	Prosaro AG06011	SC XL	6.5 oz/a 6 oz/a	10.51 10.51	0.25 b	59.21 a	63.82 bc
4	Prosaro AG08050	SC XL	6.5 oz/a 0.5 % v/v	10.51 10.51	0.33 b	59.21 a	67.00 ab
5	Prosaro AG10055	SC XL	6.5 oz/a 1 pt/a	10.51 10.51	0.28 b	59.20 a	66.88 ab
LSD (P=.05)					0.167	0.839	3.318
Standard Deviation					0.108	0.544	2.154
CV					33.35	0.92	3.29
Replicate F					1.177	2.549	1.109
Replicate Prob(F)					0.3592	0.1048	0.3835
Treatment F					5.851	0.620	5.849
Treatment Prob(F)					0.0075	0.6571	0.0075

Means followed by same letter do not significantly differ (P=.05, LSD)  
 DON = deoxynivalenol (mycotoxin formed with scab [FHB] infections)

## North Dakota State University

Fargo Cropping System Study - 2011: Hard Red Spring Wheat

Protocol: USWBSI

Location: Fargo, ND

Study Director: Marcia McMullen

Previous Crop					wheat head	wheat head	wheat head	wheat grain	wheat grain	wheat grain	dry bean head
Plant Part					7/27/2011	7/27/2011	7/27/2011				7/27/2011
Planting Date					Incidence	severity	I x S	DON	Yield	Twt	Incidence
Measurement Taken					%	%	%	ppm	bu/a	lbs/bu	%
Measurement Parameter											
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage							
1	Glenn-untrt				29.2 d	5.2 cd	1.6 c	0.65 b	59.1 abc	59.9 ab	20.0 bc
2	Sampson-untrt				52.5 ab	9.4 bcd	4.8 bc	2.13 a	58.1 bc	56.7 c	31.7 ab
3	SteeleND-untrt				51.7 ab	9.8 bc	5.0 bc	0.95 ab	57.0 c	57.4 bc	34.2 a
4	Briggs-Untrt				54.2 a	16.6 a	9.4 a	0.73 b	60.7 abc	59.5 ab	30.0 ab
5	Glenn-Prosaro	SC	6.5 fl oz/a	10.51	40.0 bcd	4.1 d	1.6 c	0.43 b	63.4 a	59.3 abc	13.4 c
6	Sampson-Prosaro	SC	6.5 fl oz/a	10.51	40.0 bcd	7.1 bcd	2.9 bc	0.58 b	62.2 ab	57.9 abc	20.0 bc
7	SteeleND-Prosaro	SC	6.5 fl oz/a	10.51	37.8 cd	8.3 bcd	3.4 bc	0.70 b	59.6 abc	59.1 abc	20.0 bc
8	Briggs-Prosaro	SC	6.5 fl oz/a	10.51	42.1 abc	11.9 ab	6.3 ab	0.43 b	62.3 ab	60.4 a	27.5 ab
LSD (P=.05)					12.54	5.33	3.80	1.26	5.069	2.82	13.28
Standard Deviation					8.52	3.62	2.58	0.86	3.44	1.92	9.03
CV					19.6	40.0	59.0	104.5	5.7	3.3	36.7

Means followed by same letter do not significantly differ (P=.05, LSD)

Glenn = MR to FHB

Samson = S to FHB

Steele ND = MS to FHB

Briggs = MS to FHB

Continued on next page: See note about bacterial leaf streak on next page



## North Dakota State University

Previous Crop Plant Part Rating Date Measurement Taken Measurement Parameter					dry bean head 7/27/2011 severity %	dry bean head 7/27/2011 I x S %	dry bean grain DON ppm	dry bean grain Yield bu/a	drybean Grain Twt lbs/bu
Trt. Nr.	Trt. Name	Form Typ	Rate/acre	Growth Stage					
1	Glenn-untrt				6.3 bc	1.4 bc	0.55 cd	57.3 c	55.6 abc
2	Sampson-untrt				8.1 bc	2.6 b	1.43 a	58.2 bc	54.3 c
3	SteeleND-untrt				8.5 abc	2.7 b	0.95 b	60.4 abc	54.6 bc
4	Briggs-Untrt				17.0 a	4.7 a	0.65 cd	59.6 abc	57.1 a
5	Glenn-Prosaro	SC	6.5 fl oz/a	10.51	2.9 c	0.6 c	0.45 de	62.3 ab	56.7 ab
6	Sampson-Prosaro	SC	6.5 fl oz/a	10.51	5.8 bc	1.3 bc	0.70 c	64.2 a	56.4 abc
7	SteeleND-Prosaro	SC	6.5 fl oz/a	10.51	8.7 abc	1.5 bc	0.63 cd	64.0 a	55.9 abc
8	Briggs-Prosaro	SC	6.5 fl oz/a	10.51	14.0 ab	3.0 ab	0.30 e	63.4 a	57.6 a
LSD (P=.05)					8.70	1.70	0.231	4.84	2.32
Standard Deviation					5.91	1.16	0.157	3.29	1.58
CV					66.4	52.3	22.25	5.4	2.8

Means followed by same letter do not significantly differ (P=.05, LSD)

**Bacterial Leaf Streak was fairly severe in most plots, more so in Samson, and was more severe in crop planted on last year's dry bean ground than in wheat residue.**

**So yields on dry bean ground not better than on wheat ground, even though FHB levels and DON were lower on dry bean ground in the untreated plots.**

Performance of spring wheat varieties, with and without fungicide<sup>1</sup> on yield and agronomic traits, Forman, 2011.

Varieties	Heading Date		Protein		Test Weight		Yield	
	No Fung	Fung	No Fung	Fung	No fung	Fung	No Fung	Fung
	Date		(% )		(lb/bu)		(bu/a)	
Albany	7/4	7/4	15.9	15.0	57.2	58.2	18.7	28.0
Barlow	7/1	6/30	16.5	16.2	56.8	57.9	15.9	14.5
Breaker	7/4	7/5	16.3	15.4	56.5	57.8	9.8	12.8
Brennan	6/30	7/3	17.2	16.6	55.0	56.6	11.2	14.2
Brick	6/27	6/24	15.6	15.8	57.8	57.1	11.3	10.3
Brogan	7/4	7/3	16.5	16.4	56.3	57.3	14.9	15.7
Faller	7/4	7/5	15.9	16.0	56.6	56.9	11.1	15.7
Glenn	7/1	7/2	17.1	16.7	56.9	55.5	10.6	12.1
Jenna	7/5	7/4	17.0	16.8	56.2	56.5	19.5	19.3
Kelby	7/2	7/2	17.0	16.4	56.7	57.2	12.3	13.8
Prosper	7/4	7/4	15.8	16.6	57.4	57.4	13.7	16.3
RB07	7/3	7/2	16.5	15.6	57.0	58.5	10.8	18.0
Rollag	7/4	7/3	18.3	17.8	57.4	57.4	13.3	13.3
SY Soren	7/3	7/3	16.7	15.5	56.0	56.7	11.1	11.5
Sabin	7/5	7/4	17.5	16.0	57.0	58.1	14.2	15.3
Samson	7/3	7/3	15.9	15.3	55.3	55.4	17.1	17.5
Select	6/29	6/28	15.1	16.3	58.0	57.8	9.9	10.4
Vantage	7/5	7/5	18.5	18.0	56.6	56.0	11.0	16.0
Velva	7/5	7/5	16.0	16.1	54.3	54.6	10.9	9.6
WB Mayville	7/3	7/3	16.5	16.6	55.1	54.9	15.6	15.4
Mean	7/2	7/2	16.6	16.3	56.5	56.9	13.1	15.0
c.v.	0.0		3.8		1.8		17.8	
LSD 0.05	2.4		1.0		1.6		4.0	

1-Fungicides consisted of Stratego at 4 fl oz/acre at the 4 if stage and Prostaro at 6.5 fl oz/acre at Feekes 10.51

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Disease development of spring wheat varieties, with and without fungicides<sup>1</sup>, Forman, 2011.

Varieties	FHB Severity <sup>2</sup>		DON <sup>3</sup>	
	No Fung (%)	Fung (%)	No Fung (ppm)	Fung (ppm)
Albany	16.6	4.1	0.3	0.9
Barlow	1.1	0.0	0.0	0.5
Breaker	6.7	0.0	0.6	0.8
Brennan	0.0	0.0	0.3	0.0
Brick	0.0	0.0	0.0	0.0
Brogan	17.2	15.9	0.5	0.8
Faller	2.3	0.2	0.0	0.9
Glenn	0.0	0.0	1.2	0.4
Jenna	0.0	0.0	0.9	0.9
Kelby	0.0	0.0	0.0	0.0
Prosper	7.1	5.0	0.6	0.7
RB07	0.0	1.5	0.3	0.3
Rollag	0.0	0.0	0.3	0.0
SY Soren	0.0	0.0	0.0	0.0
Sabin	0.0	0.0	0.0	0.0
Samson	5.8	6.7	1.0	0.8
Select	0.0	0.0	0.3	0.0
Vantage	18.0	12.2	1.2	1.6
Velva	0.5	0.0	1.4	0.9
WB Mayville	8.3	5.0	0.6	0.9
Mean	4.2	2.5	0.5	0.5
c.v.	201.0		84.0	
LSD 0.05	10.8		0.6	

1-Fungicides consisted of Stratego at 4 fl oz/acre at the 4 lf stage and Prosoaro at 6.5 fl oz/acre at Feekes 10.51  
 2- FHB Field Severity = Fusarium Head Blight severity (percent heads infected by the percent of spikelets infected).  
 3- DON = deoxynivalenol or Vomitoxin which is produced by the Fusarium fungus that causes FHB.

**2011 Evaluation of Diseases on Hard Red Spring Wheat Varieties at Hettinger**

Evaluations by Brandi Herauf, IPM Crops Scout, Dickinson Res. Ext. Center

Variety	Tan Spot		Septoria		Fusarium (scab)		Leaf Rust		Untreated		---- Treated** ----	
	Inc*	Sev*	Inc	Sev	Inc	Sev	Inc	Sev	Test wt.	Yield	Test wt.	Yield
	%	%	%	%	%	%	%	%	lbs/bu	bu/A	lbs/bu	bu/A
RB07	60	1	100	2	0	0	0	0	53.5	30.0	55.2	35.8
Sabin	40	1	100	5	0	0	0	0	59.2	29.9	57.9	47.5
Faller	80	5	100	10	0	0	0	0	56.7	31.9	55.9	38.0
Prosper	50	2	60	10	0	0	0	0	57.5	23.2	55.7	40.0
Velva	40	1	100	5	0	0	40	2	55.1	42.4	55.8	49.0
Barlow	100	2	70	5	0	0	30	1	57.6	41.8	56.7	45.5
Steele-ND	70	3	100	3	0	0	30	1	56.1	35.9	55.5	38.6
Glenn	60	5	100	50	0	0	20	1	60.6	32.3	59.2	39.5
Select	40	5	90	60	0	0	0	0	57.1	43.3	55.5	44.7
SY Tyra	100	5	100	10	0	0	0	0	53.9	32.7	52.7	39.0
Mott	50	1	60	5	10	50	100	3	58.7	34.6	58.0	39.3
WB Gunnison	0	0	100	90	0	0	0	0	55.9	26.7	53.2	30.3
Brick	10	1	100	80	0	0	0	0	58.9	40.3	59.0	46.7
Briggs	20	1	100	5	0	0	0	0	56.6	39.7	55.3	43.3
Rollag	60	3	100	20	0	0	0	0	57.3	31.6	56.5	35.2
Howard	90	3	100	60	0	0	20	1	55.8	43.1	55.4	46.1
Alsen	70	3	100	90	10	2	0	0	56.2	27.3	55.4	32.1
Jenna	70	2	100	10	0	0	0	0	57.7	41.1	56.5	48.9
Brennan	80	2	100	5	0	0	10	1	57.3	44.5	57.1	49.9
Choteau	30	2	100	30	0	0	0	0	52.9	26.0	51.4	27.9
Kelby	40	1	100	10	0	0	0	0	58.1	46.4	57.3	49.9
Kuntz	80	2	100	10	40	50	20	1	54.2	37.5	54.3	39.4
Fryer	60	1	100	2	0	0	40	2	55.3	31.9	54.8	35.8
Vantage	70	1	100	5	20	60	60	1	60.3	36.3	60.3	37.8
ND901CL	70	4	100	5	0	0	60	1	56.9	34.5	56.3	38.9
AP605CL	70	5	100	4	0	0	0	0	56.3	47.3	55.5	51.7
Reeder	100	5	100	80	0	0	100	5	55.1	43.7	55.9	49.4
Tom	100	3	100	5	0	0	0	0	56.7	40.8	56.9	44.7
Breaker	90	5	100	10	0	0	20	1	59.1	45.2	57.8	44.2
Blade	90	3	100	5	0	0	0	0	58.2	41.8	57.3	40.5
Samson	80	3	100	5	0	0	40	1	55.3	47.6	56.3	53.2
Brogan	80	3	100	10	0	0	0	0	55.9	41.5	55.8	44.6
WB Digger	30	5	90	20	0	0	20	4	52.7	37.2	52.0	38.6
WB Mayville	0	0	100	98	0	0	0	0	51.6	36.6	51.6	41.6
Edge	60	2	100	5	0	0	60	5	56.4	44.7	55.8	48.5
SY Soren	60	1	100	5	0	0	0	0	55.5	43.9	55.4	48.8
O'Neal	10	1	100	95	0	0	80	3	53.2	35.6	53.1	36.0
<b>Trial Mean</b>									56.3	38.8	55.8	42.1

\*Incidence = percentage of plants with disease.

\*Severity = percentage of flag leaf surface or seed head with disease.

\*\*Fungicide Treatments: 8 oz/A Pyraclostrobin (Headline) on June 7 (3 leaf) & 4 oz/A Tebuconazole (Onset) on July 6 (heading).

Date of Observation: July 28

Planting Date: May 2

Previous Crop: HRSW

## **Managing Fusarium Head Blight with Hard Red Spring Wheat Cultivar Resistance and Fungicides, Langdon, 2011**

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### **Objectives**

The study objectives were to determine the effect of integrating fungicide treatment and cultivar resistance for managing the negative effects of fusarium head blight in hard red spring wheat.

### **Materials and Methods**

A field experiment was planted on 18 May at the North Dakota State University Langdon Research Extension Center located at Langdon in NE North Dakota. The trial was conducted using best management practices for hard red spring wheat including seeding date and rate, fertility, weed control and harvest management. The experiment was a randomized complete block design with a split plot arrangement with four replications. The previous crop was canola. The soil type was Svea-Barnes loam. Four hard red spring wheat cultivars were selected for their different relative resistance to fusarium head blight (FHB), their potential use by growers in the region and their high yield and protein levels. The cultivars were seeded at a rate of 1.5 million pure live seeds/acre. Plots seven rows wide by 20 ft. long with 6-in row spacing were sown with an Almaco plot planter equipped with double disk openers and press wheels. A border plot was planted between treated plots to minimize interference from spray drift. Fusarium inoculum, consisting of several isolates, were hand-broadcast at a rate of 150 grams /plot three and two weeks prior to anthesis growth stage (GS) to encourage development of FHB. An overhead irrigation system was installed to provide supplemental water, after herbicide application was completed, to wet the inoculum and the grain heads to encourage the development of FHB. Fungicide treatments and application timings are listed in Table 1. The primary active ingredients for the treatments were tebuconazole (Folicur 4 fl. oz. /acre rate) and metconazole (Caramba 14 fl. oz. /acre rate). Induce adjuvant was included with both fungicides at 0.125% v/v rate. The fungicides were applied with a CO<sub>2</sub>-pressurized backpack sprayer operated at 40 psi delivering 18.4 GPA. The sprayer was equipped with a three-nozzle boom with nozzles spaced 20 inches on center. The flowering treatments (Feekes GS 10.51) were made using Spraying Systems XR8001 nozzles mounted on a double swivel and oriented to spray forward and backward 30 degrees downward from horizontal. The fungicide applications were made by maturity at GS 10.51 on 15 July; Glenn (wind SE speed 3 MPH, temperature 71° F at 8:30 a.m.), 18 July; Prosper and Samson (wind none, temperature 75° F at 8:15 a.m.) or 21 July; Vantage (wind west,

speed 4 MPH, temperature 78° F at 3:00 p.m.). The sequential timings were made on 21 July Glenn; 25 July Prosper and Samson (no wind, temperature 67° F at 9:00 a.m.) and 29 July Vantage (no wind, temperature 68° F at 9:00 a.m.). Fusarium head blight incidence (I), head severity (HS) and index (FS) were determined from a twenty grain head sample collected at Feekes 11.2 GS. Leaf severity was determined from a sample of ten leaves at the same growth stage. Plots were harvested 18 Sept with a small plot combine and yield, test weight and protein were determined. Deoxynivalenol accumulation (DON) was determined by the NDSU Toxicology Lab. Data were analyzed with the general linear model (GLM) in SAS. Least significant (LSD) were used to compare means at the  $P \leq 0.05$  level.

## Results

**Cultivar.** Yield was affected by cultivar selection, Table 1. Samson and Prosper had similar yield to Prosper and Vantage but Vantage yielded less than Prosper. Surplus early season soil water levels resulted in shallow root systems causing reduced yield potentials, compared to previous years, when later season soil moisture stress occurred. Test weight was also affected by cultivar. Test weight of Glenn > Vantage > Prosper and Samson. Fusarium head blight levels were generally less than expected for an inoculated and misted study and no differences among cultivars were determined. Vantage had less foliar disease than Samson. Foliar disease levels were quite low.

**Fungicide treatment.** The Follicur fungicide treatment did not increase yield compared to the non-treated, Table 1. Yields were not different for the three treatments that included Caramba but were much greater than the non-treated and Follicur. The sequential application treatment Follicur (10.51) + Caramba (7DA 10.51) increased test weight compared to other treatments. The Caramba treatment at GS 10.51 had greater test weight than Follicur but was not different from the later timing of Caramba. All fungicide treatments increased test weight compared to the non-treated. Follicur and Caramba early timing were equally effective for reducing FHB severity and index. Sequential treatments were as effective as early Caramba timing but not more effective for reducing severity and index. Follicur or Caramba late was not as effective as the sequential treatment for incidence but as effective for severity and index. There were no significant differences between treatments for foliar disease.

## Cultivar x Fungicide Treatment Interactions.

**Protein.** Main effect comparisons indicate that Vantage had greater protein than all other cultivars while Glenn and Samson did not differ from each other. Samson protein was not different from Prosper, Table 1. Differences did occur between fungicide treatments within each cultivar, Table 2. The Follicur treatment reduced protein compared to the non-treated and sequential treatment in Prosper. In contrast all fungicide treatments reduced protein for Glenn while the late timing Caramba treatment had increased protein compared to the sequential treatment in Vantage. Fungicide treatments had no effect on Samson.

**DON.** Deoxynivalenol accumulation in seed was much greater in Samson but not different among other cultivars, Table 1. Deoxynivalenol accumulations varied between cultivars, Table 2. For Prosper and Samson, the early timing Caramba and the sequential timing treatments were improved and equally effective compared to the Follicur treatment. For Glenn only the sequential treatment was better than the Follicur treatment. All the fungicide treatments were equally effective for Vantage.

### **Summary**

Yields were reduced by the environment compared to previous growing seasons. Distinct differences were measured between cultivars for yield test weight, protein, resistance to DON and foliar disease but not visual symptoms of FHB. Fungicide treatment had positive effect for all main effects except protein and foliar disease. Follicur was not as effective as Caramba. The late application timing of Caramba was as effective as the anthesis timing for reducing DON. The sequential timing was only equally effective as the anthesis timing for reducing negative effects of FHB. Cultivar selection and fungicide treatment can affect protein and DON differently.

Table 1. Hard red spring wheat yield, test weight, protein, deoxynivalenol accumulation in seed (DON), Fusarium head blight incidence, severity and index and foliar disease by cultivar averaged across treatments and treatment averaged across cultivars and confidence interval by source of variation, 2011.

Cultivar	Test			Fusarium Head Blight <sup>z</sup>				Foliar
	Yield (bu./acre)	Weight (lb./bu.)	Protein (%)	DON (ppm)	Incidence (%)	Severity (%)	Index (0-100)	Disease (%)
Prosper	65.5	58.9	16.0	1.27	89.5	14.3	17.5	11.8
Glenn	62.3	62.4	16.3	0.92				
Vantage	58.9	61.4	17.5	1.02	88.8	11.8	15.7	5.2
Samson	68.3	58.5	16.2	3.37	87.5	12.4	14.2	15.3
LSD (0.05)	3.8	0.4	0.3	0.43	NS	NS	NS	7.2
<u>Treatment (Timing)<sup>y</sup></u>								
Non-treated	60.3	59.7	16.6	3.0	96.7	18.1	19.2	13.7
Folicur (10.51)	62.5	60.2	16.5	1.8	90.4	12.5	15.1	8.1
Caramba (10.51)	66.4	60.5	16.4	1.1	84.2	10.3	14.1	10.5
Caramba (7DA 10.51)	67.0	60.3	16.5	1.4	91.7	13.7	16.1	10.6
Folicur (10.51) + Caramba 7DA 10.51)	67.0	60.8	16.5	1.0	80.0	9.5	14.3	11.1
LSD (0.05)	2.9	0.3	NS	0.3	6.8	3.4	2.9	NS
<u>Source of Variation</u>								
Replicate	0.0069	<0.0001	0.0014	0.0010	0.9159	0.5652	0.2318	0.0789
Cultivar	0.0018	<0.0001	<0.0001	<0.0001	0.6546	0.1312	0.1098	0.0365
Replicate*Cultivar	0.1329	0.0152	0.0002	0.1109	0.6806	0.6638	0.2793	0.1474
Treatment	<0.0001	<0.0001	0.0960	<0.0001	0.0002	<0.0001	0.0066	0.4518
Cultivar*Treatment	0.6092	0.0822	0.0324	0.0017	0.9169	0.4704	0.3116	0.9854
%C.V.	6.5	0.6	1.1	28.1	9.3	32.1	22.4	66.2

<sup>z</sup> A sampling error for Glenn cultivar made making the disease data unusable and the data was omitted from the analysis.

<sup>y</sup> DA= days after Feekes' growth stage.



Table 2. Hard red spring wheat seed protein and deoxynivalenol accumulation in seed (DON) by cultivar and fungicide treatment, 2011.

Cultivar	Treatment (Timing) <sup>x</sup>	Protein		DON (ppm)
		(%)		
Prosper	Non-treated	16.1		2.50
	Folicur (10.51)	16.0		1.48
	Caramba (10.51)	15.8		0.73
	Caramba (7DA 10.51)	16.0		0.93
	Folicur (10.51) + Caramba 7DA 10.51)	16.1		0.73
Glenn	Non-treated	16.6		2.00
	Folicur (10.51)	16.3		1.13
	Caramba (10.51)	16.2		0.48
	Caramba (7DA 10.51)	16.1		0.58
	Folicur (10.51) + Caramba 7DA 10.51)	16.3		0.43
Vantage	Non-treated	17.6		1.80
	Folicur (10.51)	17.4		0.93
	Caramba (10.51)	17.4		0.78
	Caramba (7DA 10.51)	17.6		1.00
	Folicur (10.51) + Caramba 7DA 10.51)	17.3		0.58
Samson	Non-treated	16.1		5.56
	Folicur (10.51)	16.2		3.60
	Caramba (10.51)	16.2		2.30
	Caramba (7DA 10.51)	16.3		3.28
	Folicur (10.51) + Caramba 7DA 10.51)	16.3		2.10

<sup>x</sup> DA= days after Feekes' growth stage.

LSD (0.05) = 0.28 Protein and 0.68 DON for comparing treatments within cultivars. 0.38 Protein and 0.74 DON for comparing treatments across cultivars.

## **Evaluation of Fungicide and Fungicide + Additive to Hard Red Spring Wheat for Control of Head and Foliar Disease, Langdon 2011**

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### **Materials and Methods**

A study was conducted in 2011 at the North Dakota State University Langdon Research Extension Center, Langdon North Dakota. The principle objective of the study was to determine the effect of fungicide and fungicide/additive combination for control of foliar and Fusarium head blight (FHB) diseases in hard red spring wheat (HRSW). The evaluated treatments included Caramba (90SL) fungicide BASF Corporation (14 fl. oz./acre) and Caramba fungicide + Preference @ 0.25%v/v + InterLock 3 fl. oz. /acre, Winfield Solutions, LLC. Preference is labeled a nonionic surfactant and antifoaming agent and Interlock a deposition aid, canopy penetrating and drift control agent. The second factor was applications made nozzle that create very coarse, coarse and fine drop size. Prior to the study the sprayer nozzle output was determined by collection of output timed with a stop watch and the pressures adjusted so that nozzle outputs were equal. Nozzle differences were determined by applying the spray solution to water and oil sensitive cards on stands placed in the plots. The cards were obtained from Spraying Systems Co. Wheaton, IL and measured 26 x 76 mm. The study was designed as a randomized complete block in a factorial arrangement with six replicates for the fungicide efficacy part of the study and three replicates for the nozzle comparison. The previous crop was dry bean. The soil type was a Barnes/Svea complex (fine-loamy, mixed superactive Frigid, Calcic Hapludoll/mixed superactive Frigid, Pachic Hapludoll). Vantage, an awned HRSW type, was planted with an Almaco double-disk type plot drill, twenty rows spaced 6-inches on 9 May. Vantage is a high protein cultivar moderately susceptible to FHB. After the application of herbicides to control weeds, the planting block was divided into grids to establish plots by traveling with the sprayer tractor east west and north south directions with use of GPS system. Each plot was 12 x 30 ft. long. Alleys were mowed between the blocks of plots that reduced the length of the plots and provide turning space for the sprayer tractor. Fusarium inoculum was hand-broadcast on 15 June, 27 June, 1 July, and 5 July to encourage development of disease at a rate of 300 grams per plot. Ascospores were also applied by backpack spray system on 26 July at rate of 5000 spores per ml at 9.2 GPA. The backpack sprayer used a similar pressurized distribution system as the tractor sprayer and the solution was delivered through a three nozzle boom operated at 40 psi. Fungicide treatments were applied on 12 Jul at Feekes growth stage (GS) 10.51. At time of fungicide application, 8:30 a.m., wind direction was SE at 3 MPH and air temperature was 63° F. Fungicide treatments are listed in Table 1. The treatments were applied with a tractor sprayer with boom extending to the right of the rear wheel. The spray solution was

distributed to the boom and nozzles with a CO<sub>2</sub>-pressurized system instead of a pump. The system was operated at variable pressures delivering 7.4 GPA with the tractor traveling 7.4 MPH. The tractor sprayer was equipped with a four-nozzle boom, nozzles spaced 20 inches on center. The anthesis treatments were made using Spraying Systems AI 11002, AIXR11002 and XR8002 nozzles oriented to spray forward and 30 degrees downward from horizontal. The drop size generated for the aforementioned nozzles are very coarse, coarse and fine. After the fungicide was applied an impact type sprinkler irrigation system was installed (nozzles spaced on 30 x 40 ft. centers) to modify the environment as needed and encourage the development of FHB disease. North Dakota State University Extension recommended production practices for hard red spring wheat in Northeast North Dakota were followed. A visual disease evaluation of disease presence and intensity was made from 10 leaf samples and 20 head samples per plot collected 20 days after the 10.51 GS fungicide applications. The estimate of (FHB) incidence (number of spikes infected) and FHB index (number of infected kernels per head divided by total kernels per individual spike). Head severity is the average severity of infected heads. The leaves were visually evaluated to estimate leaf necrosis and are reported as percent severity. Each plot was harvested on 27 Sept with an Almaco plot combine and the grain sample cleaned and processed for yield and test weight. A sub sample was ground and analyzed for Type B Mycotoxins DON (deoxynivalenol) by North Dakota State University Toxicology Lab. Data was analyzed with the general linear model (GLM) in SAS. Fisher's protected least significant differences (LSD) were used to compare means at the 95% probability level.

## Results

The calibrated operating pressures that delivered equal volume of spray solutions for water only, Caramba and Caramba + adjuvant for the XR8002, AI 8002 and AIXR8002 nozzles were 40, 40, 38; 40, 40, 38; and 45, 40, 38 psi, respectively. Foliar disease control was improved by the addition of adjuvant to the Caramba, Table 1. Interactions were measured for yield, test weight and DON, Table 2. A coarse drop increased yield compared to a very coarse drop when adjuvant was included with Caramba. Test weight was also affected when a nozzle that created a very coarse drop was used to spray Caramba + adjuvant reducing test weight compared to all other treatments. Deoxynivalenol accumulation in the seed was greater for the Caramba + adjuvant when a nozzle that created a very coarse drop was used compared to all other treatments. However, when Caramba was applied alone with a nozzle that created a very coarse drop DON was DON decreased compared to a fine drop. This is in contrast to previous studies that found Prosaro fungicide applied with drops in the large fine to small medium drop size category had the smallest DON accumulation.

The performance of the treatments measured on the oil and water sensitive cards differentiated between some spray parameters, Table 3. The VMD (volume median diameter) was smaller with water only compared to Caramba + adjuvant with the forward facing card (F). Statistically the VMD determined from the forward facing card was smaller with the coarse drop than the very coarse drop. The coarse drop was not different from the fine drop. Coverage measured on the F

card was greater when the solutions were applied with fine drop compared to the other drop sizes. Horizontal (H) coverage, coverage most effective for controlling leaf diseases, was greater with Caramba > Caramba + adjuvant > water only. This H coverage was in contrast to the F facing nozzle coverage where the very coarse drop > coarse drop = fine drop size. Some coverage differences were measured for the right and left facing cards but may have been affected by a variable wind. The coverage from the cards measuring the back coverage was insignificant. Two interactions were measured. Applying Caramba + adjuvant with a fine drop produce a VMD of 407 which was significantly smaller than the coarse (561) and very coarse (637) drop. For the water only treatment the coarse drop (446 VMD) was smaller than the fine drop. The spray volume was limited to 7.4 GPA which is approaching the measurement limits of the cards and the cards ability differentiate between two drops deposited side by side and multiple drops collecting on top of each other. The second measured interaction for coverage on the left facing card had similar results.

Table 1. Yield, test weight, Fusarium head blight incidence, severity and index, deoxynivalenol accumulation in the grain and foliar disease by treatment and nozzle type and confidence levels by factor in hard red spring wheat, Langdon, 2011.

	Yield (bu./acre)	Test Weight (lb. /bu.)	Fusarium Head Blight			DON (ppm)	Foliar Disease (%)
			Incidence	Severity (%)	Index		
Non-treated	61.6	62.1	99.2	40.6	40.1	4.1	59.0
<u>Treatment</u>							
Caramba + adjuvant	64.5	62.5	96.9	22.6	21.4	1.63	50.8
Caramba only	64.2	62.6	97.2	22.3	21.1	1.31	64.1
<u>Nozzle</u>							
AI11002	63.5	62.3	96.2	24.0	22.6	1.70	61.3
AIXR11002	65.3	62.7	97.5	23.1	22.0	1.34	55.1
XR11002	64.3	62.6	97.5	20.3	19.1	1.37	56.0
<u>Factor</u>							
Fungicide	0.8062	0.7887	0.7951	0.9082	0.9178	0.1972	0.0146
Nozzle	0.4023	0.1373	0.5824	0.4340	0.4755	0.4305	0.5603
Fungicide*nozzle	0.0198	0.0104	0.4489	0.5639	0.6909	0.0278	0.0933
% C.V.	5.2	0.9	3.5	31.6	34.5	50.5	26.3

Adjuvant = Preference @ 0.25%v/v + InterLock 3 fl. oz. /acre.

Shaded cells = statistically different @ P=0.05

Table 2. Yield, test weight and deoxynivalenol accumulation in the grain by fungicide treatment and nozzle type in hard red spring wheat, Langdon 2011.

Treatment	Nozzle	Yield	Test Weight	DON
		(bu./acre)	(lb. /bu.)	(ppm)
Caramba + adjuvant	AI11002	61.3	61.8	2.37
	AIXR11002	67.1	62.9	1.28
	XR11002	65.1	62.8	1.25
Caramba only	AI11002	65.6	62.7	1.03
	AIXR11002	63.6	62.5	1.40
	XR11002	63.4	62.4	1.48
LSD <sub>(0.05)</sub>		4.0	0.7	0.38

Adjuvant =Preference @ 0.25%v/v + InterLock 3 fl. oz. /acre.

Table 3. Volume median diameter drop size and percent coverage determined by deposition on water and oil sensitive cards by fungicide treatment and nozzle type in hard red spring wheat with forward facing nozzles oriented to spray grain spikes and control Fusarium head blight and confidence levels by factor Langdon 2011.

<u>Fungicide</u>	F VMD	F Cov.	B VMD	B Cov.	H VMD	H. Cov.	R VMD	R Cov.	L VMD	L Cov.
Caramba + adj.	535	28.6	176	1.8	437	17.2	325	7.8	489	7.0
Caramba	520	30.3	116	1.0	376	23.0	319	4.1	430	5.9
Water only	495	22.2	146	0.3	378	13.8	257	1.3	461	8.5
LSD <sub>(0.05)</sub>	30.8	NS	NS	NS	NS	4.1	NS	4.9	NS	NS
<u>Nozzle</u>										
AI11002	552	24.6	167	0.4	418	23.1	326	1.4	550	8.6
AIXR1100 2	512	19.6	150	1.9	405	16.5	311	3.7	459	4.6
XR11002	487	36.9	117	0.8	367	14.4	265	8.1	370	8.1
LSD <sub>(0.05)</sub>	31	11.0	NS	NS	NS	5.1	NS	NS	62.1	NS
<u>Factor</u>										
Fungicide	0.0426	0.283	0.242	0.190	0.156	0.005	0.556	0.039	0.1569	0.671
		2	3	5	5	5	0	7		0
Nozzle	0.0013	0.012	0.319	0.275	0.323	0.006	0.650	0.033	<0.000	0.328
		2	5	3	7	3	1	5	1	7
Fung.*Noz	<0.000	0.418	0.358	0.444	0.581	0.068	0.579	0.284	0.0850	0.049
	1	1	4	4	7	5	4	0		6
% C.V.	6.0	40.7	47.4	164.9	18.2	28.6	48.2	111.7	13.5	84.4

F = forward facing, B = backward facing, H = horizontal, R = right, L = left.

Cov. = % coverage

VMD = Volume Median Diameter

Adjuvant = Preference @ 0.25%v/v + InterLock 3 fl. oz. /acre

9-29-2011 (11BASFHRSWFung)

## NDSU North Central Research Extension

### 2011 BASF HRSW Fungicide

Trial ID: 11BASFHRSWFung      Protocol ID: 11BASFHRSWFung  
 Location: NCREC      Study Director: Kent  
 Project ID: BASFWF8      Investigator: Jeremy Pederson  
 Sponsor Contact:

Description	Stand	Stand	Leaf Disease	Leaf Disease	Vigor	Leaf Disease	Flag Leaf		
Part Rated	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -		
Rating Date	6-8-2011	6-15-2011	6-23-2011	7-3-2011		7-29-2011	7-29-2011		
Rating Type	Count	Count	Visual	Visual	Visual	Visual	Visual		
Rating Unit	pl/acre	pl/acre	%	%	0-10	%	%		
Number of Subsamples	3	3	1	1	1	1	1		
Days After First/Last Applic.	22 22	29 29	37 7	47 17		73 14	73 14		
Trt-Eval Interval	53 DA-B	60 DA-B	68 DA-B	78 DA-B		104 DA-B	104 DA-B		
Plant-Eval Interval	22 DP-1	29 DP-1	37 DP-1	47 DP-1		73 DP-1	73 DP-1		
Trt Treatment	Rate	Appl							
No. Name	Rate Unit	Code							
1 Untreated			1038180.1a	1052216.1a	25.0a	18.3a	6.3a	61.3a	45.0a
2 Headline SC	3OZ/A	B	885720.1bcd		10.0c	11.7bc	6.3a	53.8a	36.3a
NIS	0.125% V/V	B							
3 Priaxor	4OZ/A	C	788436.1d		20.0ab	11.7bc	6.7a	19.4b	8.8b
NIS	0.125% V/V	C							
4 Caramba	13.5OZ/A	D	907500.1bc		21.7a	15.0ab	6.0a	21.3b	8.8b
NIS	0.125% V/V	D							
5 Headline SC	3OZ/A	B	916212.1bc		13.3c	10.0c	7.7a	16.3b	6.3b
Headline SC	6OZ/A	C							
NIS	0.125% V/V	C							
NIS	0.125% V/V	B							
6 Headline SC	3OZ/A	B	879912.1bcd		15.0bc	11.7bc	6.7a	16.9b	8.3b
Priaxor	4OZ/A	C							
NIS	0.125% V/V	C							
NIS	0.125% V/V	B							
7 Priaxor	4OZ/A	C	831996.1cd		13.3c	13.3bc	7.0a	12.5b	4.6b
Headline SC	3OZ/A	B							
Caramba	13.5OZ/A	D							
NIS	0.125% V/V	C							
NIS	0.125% V/V	D							
NIS	0.125% V/V	B							
8 Priaxor	4OZ/A	C	972840.1ab	1115136.1a	11.7c	10.0c	8.0a	16.3b	5.8b
Headline SC	3OZ/A	B							
Caramba	13.5OZ/A	D							
Stamina F3	4.6OZ/Cwt	A							
NIS	0.125% V/V	C							
NIS	0.125% V/V	D							
NIS	0.125% V/V	B							
LSD (P=.05)			97791.67	380061.79	6.04	4.22	1.34	14.04	12.97
Standard Deviation			66489.58	168915.33	3.45	2.41	0.77	9.54	8.82
CV			7.37	15.59	21.23	18.96	11.23	35.1	57.08
Grand Mean			902599.59	1083676.11	16.25	12.71	6.83	27.19	15.45

Means followed by same letter do not significantly differ (P=.05, LSD)  
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

## NDSU North Central Research Extension

Description				FHB Incidence	FHB Severity	FHB Field Severity	Grain Yield	Test Weight
Part Rated	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -
Rating Date	8-9-2011	8-9-2011	8-9-2011	8-24-2011	8-24-2011	8-24-2011	8-24-2011	8-24-2011
Rating Type	Count (40)	Count (40)	Count (40)	YIELD	Weight	Weight	Weight	Weight
Rating Unit	%	%	%	BU/acre	lb/bu	lb/bu	lb/bu	lb/bu
Number of Subsamples	1	1	1	1	1	1	1	1
Days After First/Last Applic.	84 25	84 25	84 25	99 40	99 40	99 40	99 40	99 40
Trt-Eval Interval	115 DA-B	115 DA-B	115 DA-B	99 DP-1	99 DP-1	99 DP-1	99 DP-1	99 DP-1
Plant-Eval Interval	84 DP-1	84 DP-1	84 DP-1	99 DP-1	99 DP-1	99 DP-1	99 DP-1	99 DP-1
Trt No.	Treatment Name	Rate	Appl Unit					
1	Untreated			61.9a	21.8ab	13.6ab	30.2d	57.4d
2	Headline SC	3OZ/A	B	50.0bcd	27.1a	14.6ab	32.0d	58.0cd
	NIS	0.125% V/V	B					
3	Priaxor	4OZ/A	C	64.4a	26.0a	16.8a	38.4c	59.1b
	NIS	0.125% V/V	C					
4	Caramba	13.5OZ/A	D	47.5cd	14.3c	6.8c	41.7abc	59.3ab
	NIS	0.125% V/V	D					
5	Headline SC	3OZ/A	B	56.9abc	24.7ab	14.2ab	37.6c	58.9bc
	Headline SC	6OZ/A	C					
	NIS	0.125% V/V	C					
	NIS	0.125% V/V	B					
6	Headline SC	3OZ/A	B	58.8ab	24.6ab	15.2ab	40.6bc	59.3ab
	Priaxor	4OZ/A	C					
	NIS	0.125% V/V	C					
	NIS	0.125% V/V	B					
7	Priaxor	4OZ/A	C	43.8d	17.9bc	7.8c	45.3a	60.3a
	Headline SC	3OZ/A	B					
	Caramba	13.5OZ/A	D					
	NIS	0.125% V/V	C					
	NIS	0.125% V/V	D					
	NIS	0.125% V/V	B					
8	Priaxor	4OZ/A	C	43.1d	24.2ab	10.7bc	43.3ab	59.5ab
	Headline SC	3OZ/A	B					
	Caramba	13.5OZ/A	D					
	Stamina F3	4.6OZ/Cwt	A					
	NIS	0.125% V/V	C					
	NIS	0.125% V/V	D					
	NIS	0.125% V/V	B					
LSD (P=.05)				10.87	7.02	5.52	4.08	1.06
Standard Deviation				7.39	4.78	3.75	2.78	0.72
CV				13.87	21.17	30.15	7.19	1.22
Grand Mean				53.28	22.56	12.44	38.64	58.96



10-4-2011 (11BASFHerbFung)

## NDSU North Central Research Extension

### 2011 BASF Herbicide Timing Fungicide Trial

Trial ID: 11BASFHerbFun      Protocol ID: 11BASFHerbFung  
 Location: Ray                      Study Director: Kent  
 Project ID:                              Investigator: Jeremy Pederson  
     Sponsor Contact:

Description	Phyto	Leaf Disease	Leaf Disease	Leaf Disease	Test Weight	Plot Weight	
Part Rated	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	
Rating Date	7-9-2011	7-9-2011	7-17-2011	7-27-2011	9-26-2011	9-26-2011	
Rating Type	Visual	Visual	Visual	Visual	Weight	YIELD	
Rating Unit	%	%	%	%	lb/bu	BU	
Number of Subsamples	1	1	1	1	1	1	
Days After First/Last Applic.	6 6	6 6	14 14	24 24	85 85	85 85	
Trt-Eval Interval	6 DA-A	6 DA-A	14 DA-A	24 DA-A	85 DA-A	85 DA-A	
Plant-Eval Interval	34 DP-1	34 DP-1	42 DP-1	52 DP-1	113 DP-1	113 DP-1	
Trt Treatment	Rate						
No. Name	Rate Unit						
1 Vendetta	2PT/A	0.0b	11.3a	28.8b	40.0bcd	56.7a	21.8cd
Axial XL	16.4OZ/A						
2 Wolverine	1.7PT/A	0.0b	11.3a	33.8a	42.5ab	56.8a	24.4bc
3 Rimfire Max	3OZ/A	2.5a	10.0ab	26.3b	45.0a	56.5a	21.2d
MSO	1.25PT/A						
Vendetta	2PT/A						
4 Vendetta	2PT/A	0.0b	5.0d	10.0e	27.5e	56.1a	26.3ab
Axial XL	16.4OZ/A						
Headline SC	3OZ/A						
5 Vendetta	2PT/A	0.0b	7.5bcd	11.3e	27.5e	56.1a	25.8ab
Axial XL	16.4OZ/A						
Twinline	6OZ/A						
6 Tilt	2OZ/A	0.0b	8.8abc	18.8c	36.3d	56.6a	24.0bcd
Vendetta	2PT/A						
Axial XL	16.4OZ/A						
7 Wolverine	1.7PT/A	0.0b	5.0d	11.3e	28.8e	56.9a	26.8ab
Headline SC	3OZ/A						
8 Wolverine	1.7PT/A	0.0b	6.3cd	12.5e	27.5e	57.1a	27.7a
Twinline	6OZ/A						
9 Wolverine	1.7PT/A	0.0b	8.8abc	17.5cd	37.5cd	56.3a	24.2bcd
Tilt	2OZ/A						
10 Rimfire Max	3OZ/A	3.8a	8.8abc	11.3e	28.8e	57.0a	25.0abc
MSO	1.25PT/A						
Vendetta	2PT/A						
Headline SC	3OZ/A						
11 Rimfire Max	3OZ/A	4.4a	6.3cd	11.3e	30.0e	56.7a	24.9abc
MSO	1.25PT/A						
Vendetta	2PT/A						
Twinline	6OZ/A						
12 Rimfire Max	3OZ/A	2.5a	8.8abc	13.8de	41.3abc	56.4a	24.5abc
MSO	1.25PT/A						
Vendetta	2PT/A						
Tilt	2OZ/A						
LSD (P=.05)	2.31	3.54	4.27	4.91	0.99	3.24	
Standard Deviation	1.60	2.45	2.95	3.40	0.68	2.24	
CV	146.31	30.14	17.19	9.89	1.21	9.08	
Grand Mean	1.09	8.13	17.19	34.38	56.58	24.72	

Means followed by same letter do not significantly differ (P=.05, LSD)  
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Summary across treatments: Pederson, 11BASFHerbFung protocol

TREATMENT	Plot Yield	Test Weight	Phyto 6 DAT	Leaf Disease 6 DAT	Leaf Disease 14 DAT	Leaf Disease 24 DAT
Vendetta + Axial	21.8	56.7	0	11.3	28.8	40
Wolverine	24.4	56.8	0	11.3	33.8	42.5
Rimfire Max + MSO + Vendetta	21.2	56.5	2.5	10	26.3	45
Vendetta + Axial + Headline	26.3	56.1	0	5	10	27.5
Vendetta + Axial + Twinline	25.8	56.1	0	7.5	11.3	27.5
Vendetta + Axial + Tilt	24	56.6	0	8.8	18.8	36.3
Wolverine + Headline	26.8	56.9	0	5	11.3	28.8
Wolverine + Twinline	27.7	57.1	0	6.3	12.5	27.5
Wolverine + Tilt	24.2	56.3	0	8.8	17.5	37.5
Rimfire Max + MSO + Vendetta + Headline	25	57	3.8	8.8	11.3	28.8
Rimfire Max + MSO + Vendetta + Twinline	24.9	56.7	4.4	6.3	11.3	30
Rimfire Max + MSO + Vendetta + Tilt	24.5	56.4	2.5	8.8	13.8	41.3

Sub Treatment	Plot Yield	Test Weight	Phyto 6 DAT	Leaf Disease 6 DAT	Leaf Disease 14 DAT	Leaf Disease 24 DAT
No Fung	22.5	56.7	0.8	10.9	29.6	42.5
All Fung	25.5	56.6	1.2	7.3	13.1	31.7
Headline	26	56.7	1.3	6.3	10.9	28.4
Twinline	26.1	56.6	1.5	6.7	11.7	28.3
Tilt	24.2	56.4	0.8	8.8	16.7	38.4
Axial	24.5		0			
Wolverine	25.8		0			
Rimfire	23.9		3.3			

**2011 Bayer Crop Science HRSW Fungicide Trial**

Jeremy Pederson, NDSU Area Extension Specialist – Cropping Systems

Site Description: The trial was conducted at the NDSU North Central Research Extension Center on hard red spring wheat residue that had not been tilled. 'RB07' hard red spring wheat was sown on May 18 at 1.3 M PLS/acre using a plot-seeder equipped with six Bourgault 3710 disc openers on 7.5 inch spacing. Plots were trimmed to a length of 19 feet after emergence. A blend of Urea, Ammonium Sulfate, and Potassium Chloride (132 + 42 + 26 lb/acre) was applied at time of seeding in a mid-row band. Herbicides applied included GlyStar Plus + AMS (32 fl oz/acre + 4 lb/100 gal) applied PRE on May 19, Wolverine (27.2 fl oz/acre) applied June 16, and Everest 2.0 + Affinity TM + MCPA (1.0 fl oz/acre + 0.6 oz/acre + 0.75 pt/acre) applied on June 17. Fungicide treatments were applied to 4 leaf wheat on June 16 and early flower wheat on July 15 using a CO<sub>2</sub> pressurized hand-held boom with 3 nozzles on 20 inch spacing. Four-leaf treatments were applied with 10 gallons of water/acre through flat fan nozzles and early-flower treatments were applied with 20 gallons of water/acre through twin fan nozzles. The trial was harvested with a plot combine on August 24.

<sup>1</sup> Fungicide Treatment	Rate (fl oz/acre)	Crop Stage	<sup>2</sup> Leaf Disease		<sup>2</sup> Leaf Disease (7/29)	<sup>3</sup> FHB Incidence	<sup>3</sup> FHB Head		<sup>3</sup> FHB Field Severity	Yield Bu/a	Test Weight Lb/bu
			(6/24)	(7/3)			Severity	Severity			
Untreated	--	--	26.3	15.0	65.0	74.4	30.0	22.4	29.1	56.0	
Bay Exp.	2.0	4 leaf	17.5	13.8	75.0	78.1	30.0	23.4	30.1	56.9	
Bay Exp.	4.0	4 leaf	15.0	11.3	70.0	66.3	29.6	19.5	31.7	56.9	
Prosaro	6.5	Early flower	26.3	16.3	25.0	50.6	18.5	9.4	41.2	58.7	
Bay Exp. +	2.0	4 leaf									
Prosaro +	6.5	Early flower	13.8	11.3	27.5	57.5	20.6	11.9	41.3	58.3	
Bay Exp. +	4.0	4 leaf									
Prosaro +	6.5	Early flower	16.3	13.8	17.5	56.9	25.0	14.1	44.1	59.0	
LSD (0.05)			5.3	3.7	14.3	12.0	8.9	5.9	5.0	1.25	
CV (%)			18.2	18.2	20.4	12.4	23.2	23.5	9.2	1.4	

Soil Test Report for site: N(0-6)=17, N(0-24)=60, P=39, K=560, pH=5.3, OM = 3.7, S=10, Zn=2.0, Mn=96.3, Cu=0.61, Cl=7.4, Mg=717.1, CEC=27

1. Each treatment included Wolverine herbicide (27.2 fl oz/acre) either alone or tank mixed with 4-leaf fungicide treatment.
2. Recorded as percentage of plot area visually affected by fungal leaf disease.
3. Fusarium head blight (FHB): Incidence = percent of heads affected, Head severity = average percent of head affected in symptomatic heads, Field severity = Incidence x head severity.

## NDSU North Central Research Extension

2011 Bayer Crop Science Bay Exp. & Prosaro HRSW

Trial ID: 11BCSFungHRSW      Protocol ID: 11BCSFungHRSW  
 Location: NCREC      Study Director: KT  
 Project ID: FP11NARFJK      Investigator: Jeremy Pederson  
 Sponsor Contact:

Description	Phyto	Leaf Disease	Leaf Disease	Leaf Disease	Flag Leaf Disease	FHB I	FHB Severity	FHB Field Severity
Part Rated	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -	Plot -
Rating Date	6-24-2011	6-24-2011	7-3-2011	7-29-2011	7-29-2011	8-9-2011	8-9-2011	8-9-2011
Rating Type	Visual	Visual	Visual	Visual	Visual	Count (40)	Count (40)	Count (40)
Rating Unit	%	%	%	%	%	%	%	%
Trt Treatment								
No. Name								
Rate								
Rate Unit								
1 Untreated	7.5 a	26.3 a	15.0 a	65.0 a	46.3 a	74.4 a	30.0 a	22.4 a
Wolverine								
27.4OZ/A								
2 Wolverine	10.0 a	17.5 b	13.8 a	75.0 a	57.5 a	78.1 a	30.0 a	23.4 a
Bay Exp.								
1.5OZ/A								
3 Wolverine	11.3 a	15.0 b	11.3 a	70.0 a	60.0 a	66.3 ab	29.6 a	19.5 ab
Bay Exp.								
2OZ/A								
4 Wolverine	5.0 a	26.3 a	16.3 a	25.0 b	11.3 b	50.6 c	18.5 b	9.4 c
Prosaro 421								
6.5OZ/A								
SC								
NIS								
0.125% V/V								
5 Wolverine	8.8 a	13.8 b	11.3 a	27.5 b	11.3 b	57.5 bc	20.6 b	11.9 c
Bay Exp.								
1.5OZ/A								
Prosaro 421								
6.5OZ/A								
SC								
NIS								
0.125% V/V								
6 Wolverine	11.3 a	16.3 b	13.8 a	17.5 b	6.3 b	56.9 bc	25.0 ab	14.1 bc
Bay Exp.								
2OZ/A								
Prosaro 421								
6.5OZ/A								
SC								
NIS								
0.125% V/V								
LSD (P=.05)	4.68	5.27	3.70	14.34	17.24	11.96	8.93	5.93
Standard Deviation	3.11	3.50	2.46	9.52	11.44	7.94	5.92	3.93
CV	34.68	18.24	18.15	20.39	35.65	12.41	23.16	23.46
Grand Mean	8.96	19.17	13.54	46.67	32.08	63.96	25.58	16.77

Means followed by same letter do not significantly differ (P=.05, LSD)  
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

### NDSU North Central Research Extension

Description	Plot Weight	Test Weight
Part Rated	Plot -	Plot -
Rating Date	8-24-2011	8-24-2011
Rating Type	YIELD	Weight
Rating Unit	BU	lb/bu
Number of Subsamples	1	1
Trt Treatment	Rate	
No. Name	Rate Unit	
1 Untreated		29.1b
Wolverine	27.4 OZ/A	56.0b
2 Wolverine	27.4 OZ/A	30.1b
Bay Exp.	1.5 OZ/A	56.9b
3 Wolverine	27.4 OZ/A	31.7b
Bay Exp.	2 OZ/A	56.9b
4 Wolverine	27.4 OZ/A	41.2a
Prosaro 421	6.5 OZ/A	58.7a
SC		
NIS	0.125% V/V	
5 Wolverine	27.4 OZ/A	41.3a
Bay Exp.	1.5 OZ/A	58.3a
Prosaro 421	6.5 OZ/A	
SC		
NIS	0.125% V/V	
6 Wolverine	27.4 OZ/A	44.1a
Bay Exp.	2 OZ/A	59.0a
Prosaro 421	6.5 OZ/A	
SC		
NIS	0.125% V/V	
LSD (P=.05)	5.03	1.25
Standard Deviation	3.34	0.83
CV	9.21	1.44
Grand Mean	36.24	57.61