

## Project Annual Report

**Project title:** Integrating Disease Forecasting, Cultivar Selection, and Timely Fungicide Application for Effective Wheat Disease Management.

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### Summary:

A web-based Small Grains Disease Forecasting System initiated by this project was viewed over 700 times when wheat was around flowering. This indicates a few hundreds of crop managers were assisted in making wheat disease management decisions. Fungicide applied at flowering reduced Fusarium head blight (FHB) index compared to 2, 4 or 6 days after flowering in the susceptible cultivar. Samson and Velva were the most susceptible spring wheat cultivars to FHB among the 19 commonly planted cultivars in South Dakota that were evaluated. These findings indicate that the integration of cultivar resistance, disease forecasting system, and timely fungicide application is effective in the management of fungal diseases in wheat.

### Description of the study and accomplishments

Study objectives:

- I. To avail a reliable small grains disease prediction system readily accessible on the internet.
- II. To availed growers, crop consultants, agronomists information on disease alerts, updates, and disease management.

### Objective 1:

The South Dakota Small Grains Disease Forecasting tool was hosted for the second year (<http://climate.sdstate.edu/smallgrains/>). This tool was up and running starting in April, 2015. The tool provided the likelihood of foliar fungal diseases on wheat to develop by accumulating days with favorable weather for diseases to develop. The tool also had indication for Fusarium head blight (scab) risk. Total web page views were 741. Peak web visits were when wheat was flowering, an indication that producers and crop consultants referred to this tool when most of the fungicide applications are made. The most viewership was north east SD, an area that receives high amounts of rainfall, therefore an area most likely to apply fungicides in wheat. **The web viewership data is an indication that possibly 741 individuals benefited from this tool.** This data demonstrates the potential for this tool to aid farmers in making disease management decisions. As more people get know and get used to the tool, it is likely that it will benefit many.

### Objective 2:

Wheat is susceptible to several fungal diseases throughout the season. Timing of fungicide application is very crucial if effective management of these fungal diseases is to be achieved. Because some of the diseases that infect wheat come from southern states, disease alerts on what is on the horizon and the likely impact of such diseases on wheat yield is important. The 2015 wheat growing season was characterized by several wheat diseases, notably stripe rust. Because of the cooler early part of summer, stripe rust developed early in the season and affected both winter wheat and spring wheat.

A field trial evaluating the efficacy of foliar fungicides was established at the Northeast Research Farm, near South Shower. We evaluated effect of Prosaro fungicide applied at flowering, 2 days after flowering (DAF), 4, and 6 days after flowering (DAF) to three spring wheat cultivars with varying levels of FHB resistance.

We found that Prosaro fungicide applied at flowering reduced FHB index the most in the susceptible cultivar Samson compared to other timings (Fig. 1). For FHB moderately resistant cultivars Brick and Prevail, reduction in FHB index by fungicide application was not as pronounced as in the susceptible cultivar, indicating that **integration of cultivar resistance and timely fungicide application** is more effective.

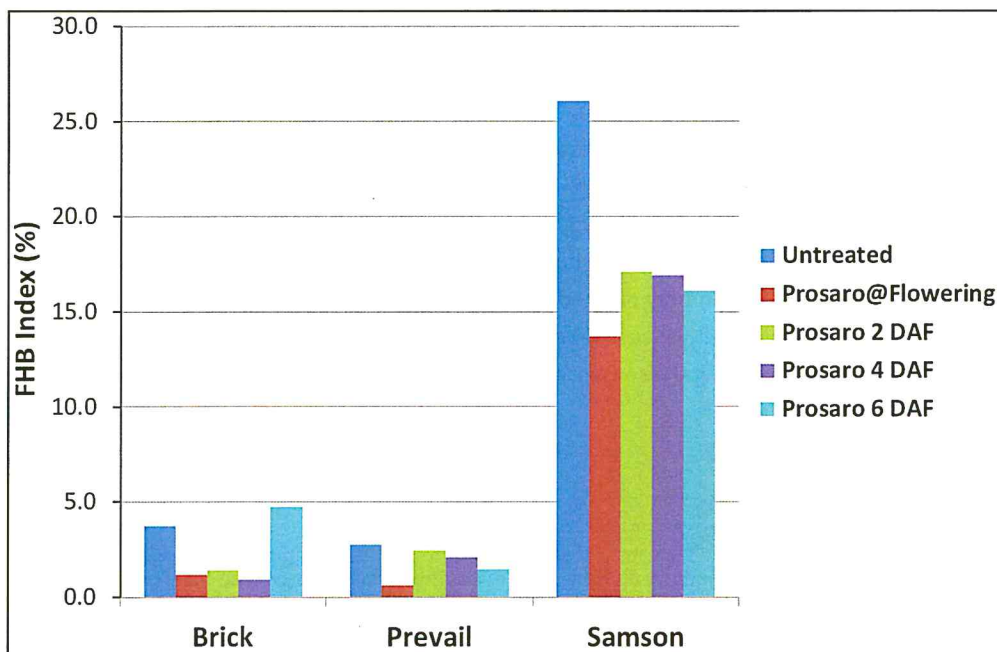


Fig. 1. Effect of fungicide Prosaro applied at flowering, 2, 4 or 6 days after flowering on Fusarium head blight (FHB) index for the three spring wheat cultivars during the 2015 wheat growing season.

We also evaluated the performance of 19 commonly planted spring wheat cultivars in South Dakota for FHB resistance/susceptibility. The majority of the evaluated cultivars had low levels of FHB (Table1). Samson and Velva were the most FHB susceptible cultivars.

Producers, crop consultants, agronomists and other stake holders were availed information on diseases that were or were likely to develop on wheat. This information also included management options for various diseases. Information was disseminated through various channels including, wheat walks, iGrow articles, newsletter articles, radio interviews, tweets, and wheat plot tours.

Table 1. Fusarium head blight (FHB) index, yield, and test weight of commonly planted spring wheat cultivars evaluated during the 2015 wheat growing season.

Cultivar	FHB index	Yield (bu/ac)	Test weight (lb/bu)
Brick	1.03 C	56.22 Bc	59.55 a
Forefront	1.54 C	53.73 Bc	59.60 a
Sabin	2.09 Bc	64.02 Ab	58.33 abc
Prevail	2.99 Bc	62.18 Abc	58.42 abc
Norden	4.13 Bc	68.46 A	59.35 a
SY Soren	4.35 Bc	63.90 Ab	58.51 abc
Select	4.53 Bc	52.99 Bc	58.80 abc
Faller	4.72 Bc	50.70 C	54.94 gh

Cultivar	FHB index		Yield (bu/ac)		Test weight (lb/bu)	
Barlow	5.12	Bc	54.36	Bc	59.32	a
SY Ingmar	5.12	Bc	60.42	Abc	57.82	bcd
Prosper	5.35	Bc	53.07	Bc	55.42	fg
Breaker	6.42	B	56.29	Bc	58.91	ab
LCS Albany	6.86	B	55.32	Bc	56.07	ef
LCS Iguacu	6.90	B	56.96	Bc	57.43	cd
Elgin-ND	7.06	B	53.39	Bc	57.87	bcd
Advance	8.83	B	51.42	C	56.87	de
Samson	21.67	A	57.65	Bc	54.29	h
Velva	23.53	A	39.92	D	50.89	i
LSD	0.321		6.827		0.936	
CV	28.46t		8.75		1.16	
P-value	0.0001		0.0001		0.0001	

### Future projections

Because wheat is susceptible to several fungal diseases, fungicides are still a big component for wheat production. Disease forecasting in wheat plays a crucial role in providing crop managers the likely risk for these diseases on wheat. An integrated approach (resistant cultivars, rotation, and timely fungicide application) is recommended for effective and sustainable management of wheat diseases.

### Publications associated with the project

Byamukama, E. and Beck, R. Disease or Injury? How to tell the two apart. Published on 5/22/2015.

<http://igrow.org/agronomy/corn/disease-or-injury-how-to-tell-the-two-apart/>

Byamukama, E., and Strunk C. Predicting Fusarium head blight in small grains. Published 5/28/2015.

<http://igrow.org/agronomy/wheat/predicting-fusarium-head-blight-in-small-grains/>

Byamukama, E., and Strunk, C. Stripe rust and viral diseases developing in wheat. Published on 6/1/2015.

<http://igrow.org/agronomy/wheat/stripe-rust-and-viral-diseases-developing-in-wheat/>

Byamukama, E. Stripe rust continues to develop in winter wheat fields. Published on 6/5/2015.

<http://igrow.org/agronomy/wheat/stripe-rust-continues-to-develop-in-winter-wheat-fields/>

Byamukama, E., and Strunk, C. Wheat Diseases Update. Published on 6/19/2015.

<http://igrow.org/agronomy/wheat/wheat-diseases-update/>

Byamukama, E. Leaf rust and scab developing in wheat. Pushed on 6/26/2015.

<http://igrow.org/agronomy/wheat/leaf-rust-and-scab-developing-in-wheat/>

Byamukama E. Assess for Fusarium Head Blight (Scab) in winter wheat Published on 7/9/2015

<http://igrow.org/agronomy/wheat/assess-for-fusarium-head-blight-scab-in-winter-wheat/>

Byamukama, E., Back, R., Strunk, C. and Graham, C. Ergot reported in grain at grain elevators. Published on 8/6/2015.

<http://igrow.org/agronomy/wheat/ergot-reported-in-grain-at-grain-elevators/>