

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY14 Final Performance Report
July 15, 2015**

Cover Page

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Fiscal Year:	FY14
USDA-ARS Agreement ID:	59-0206-1-116
USDA-ARS Agreement Title:	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in WW in ND.
FY14 USDA-ARS Award Amount:	\$ 13,619

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
DUR-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in North Dakota.	\$ 5,837
HWW-CP	Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.	\$ 7,782
	FY14 Total ARS Award Amount	\$ 13,619

Principal Investigator

Date

* MGMT – FHB Management
 FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
 GDER – Gene Discovery & Engineering Resistance
 PBG – Pathogen Biology & Genetics
 EC-HQ – Executive Committee-Headquarters
 BAR-CP – Barley Coordinated Project
 DUR-CP – Durum Coordinated Project
 HWW-CP – Hard Winter Wheat Coordinated Project
 WES-CP – Western Coordinated Project
 VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
 SPR – Spring Wheat Region
 NWW – Northern Soft Winter Wheat Region
 SWW – Southern Soft Red Winter Wheat Region

Project 1: *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in North Dakota.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

FHB has been a serious constraint to quality durum production these last two years in a number of locations in North Dakota. At the farm level, the challenge of controlling DON levels and FHB is more problematic than in spring wheat due to the lack of high levels of genetic resistance in currently available durum cultivars. The work that we are undertaking with this project is to quantify the effect of currently available durum cultivars when combined with the best fungicide practice on the control of FHB and DON. This research was done under misted and inoculate conditions to ensure high levels of FHB development.

2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:

Accomplishment: The planned experiment was successfully completed in 2014. We were able to confirm differences in the amount of FHB resistance in currently grown durum cultivars. We were also able to demonstrate a nearly 50% reduction in the amount of DON accumulation across cultivars with the use of a fungicide. We have successfully established a trial this spring so that the results from 2014 can be verified.

Impact: This is the first such data developed with current cultivars. The results of this research were disseminated widely in grower meetings during the winter and were also published on the web. It is likely that these data have been used by growers in adjusting their management of durum in North Dakota in order to reduce FHB related losses, but it is too early to quantify impacts.

Project 2: *Verification of the Value of Genetic Resistance and Fungicides on the Control of FHB in Winter Wheat in North Dakota.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

The problem that we are confronting is how to most effectively combine genetic resistance with recommended fungicides in order to minimize yield and quality losses in winter wheat to FHB. Prior to this season there were no released varieties that were known to be highly resistant to FHB within the hard winter class of wheat. We are evaluating released varieties that are known to be among the best available under misting conditions in order to test their performance with and without a recommended fungicide. We are also including some of the most promising new lines under these same conditions including a few lines that were developed by backcrossing FHB1 into a popular released variety in order to determine the value of this gene in a winter wheat background.

2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:

Accomplishment: This past year we were able to identify Emerson, a winter wheat variety developed in Canada, as a relatively highly FHB resistant cultivar. The level of resistance in Emerson may be as good as that of some of the FHB-1 containing spring wheat cultivars. Though developed in Canada, we found this spring (2015) that the winter hardiness of Emerson is only moderate, which may constrain its widespread adoption in North Dakota. The trial planted in the fall of 2014 in general had poor winter survival and had to be abandoned this spring due to insufficient stands of most cultivars. The data we have generated have help to provide information to farmers as to the value of genetic resistance and fungicide use for the control of FHB. This information is made available in circulars and on ScabSmart.

Impact: Though it is not clear as to how this information has impacted variety choice, we have been able to verify through variety use surveys that the use of varieties that are highly susceptible FHB has been reduced in recent years. Fungicide use has also increased and with the use of the most effective fungicides applied at the optimum timing, DON levels have no doubt been reduced in winter wheat that has been produced in environments when FHB has been problematic.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY14 award period. The term “support” below includes any level of benefit to the student, ranging from full stipend plus tuition to the situation where the student’s stipend was paid from other funds, but who learned how to rate scab in a misted nursery paid for by the USWBSI, and anything in between.

1. Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY14 award period? Yes

If yes, how many? 2

2. Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY14 award period? No.

3. Have any post docs who worked for you during the FY14 award period and were supported by funding from your USWBSI grant taken faculty positions with universities? No.

4. Have any post docs who worked for you during the FY14 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies? No.

Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY14 award period. List the release notice or publication. Briefly describe the level of FHB resistance. *If not applicable because your grant did NOT include any VDHR-related projects, enter N/A below.*

None

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the FY14 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Bockus, W.W., P. S. Baenziger, W. Berzonsky, M. Caffè, M. A. Davis, K. Fritz, G. Marais, J. Ransom, S. N. Wegulo, G. Zhang. 2014. Hard Winter Wheat Scab Nurseries — 2006 to the Present. *Fusarium Focus* 14:7.

Friskop, A., R. Brueggeman, M. McMullen, P. Gross, J. Ransom, S. Halley, P. Gautam, R. Dill-Macky, L. Osborne, K. Ruden and P.A. Paul. 2014. The effectiveness of an integrated strategy to manage Fusarium Head Blight in barley production using a meta-analysis approach. In: S. Canty, A. Clark, N. Turcott and D. Van Sanford (Eds.), *Proceedings of the*

2014 National Fusarium Head Blight Forum. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. pp. 15.

Gross, P.L., A. Friskop, J. Ransom and R. Brueggeman. 2014. The use of integrated management strategies to lower FHB DON in barley. In: S. Canty, A. Clark, N. Turcott and D. Van Sanford (Eds.), Proceedings of the 2014 National Fusarium Head Blight Forum. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. pp. 16.

Ransom, J., S. Pederson, G. Mehring, and C. Deplazes. 2014. Control of FHB with resistant genotypes and fungicides: 2014 results. In: S. Canty, A. Clark, N. Turcott and D. Van Sanford (Eds.), Proceedings of the 2014 National Fusarium Head Blight Forum. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. pp. 29.

Salgado, J.K., K. Ames, G. Bergstrom, C. Bradley, E. Byamukama, J. Cummings, R. Dill-Macky, A. Friskop, P. Gautam, N. Kleczewski, L. Madden, E. Milus, M. Nagelkirk, J. Ransom, K. Ruden, S. Wegulo, K. Wise and P.A. Paul. 2014. Best FHB management practices: A 2014 multi-state project update. In: S. Canty, A. Clark, N. Turcott and D. Van Sanford (Eds.), Proceedings of the 2014 National Fusarium Head Blight Forum. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. pp. 31.