

**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:	59-0206-2-085
USDA-ARS Agreement Title:	Integrated Management and Prediction of Fusarium Head Blight and DON in Winter Wheat.
FY14 USDA-ARS Award Amount:	\$ 11,673

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrating Strategies to Mitigate Fusarium Head Blight and DON in Winter Wheat.	\$ 11,673
	FY14 Total ARS Award Amount	\$ 11,673



Principal Investigator

July 14, 2015

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: *Integrating Strategies to Mitigate Fusarium Head Blight and DON in Winter Wheat.*

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

The major problem being resolved is to more effectively manage Fusarium head blight (FHB, scab) and deoxynivalenol (DON) in winter wheat through integration of management strategies. Resolving this problem is critical because severe FHB epidemics occur in Nebraska and have been more frequent since 2007. In FY14 we addressed this problem thus: Four locally adapted winter wheat cultivars differing in levels of FHB resistance were planted in the fall of 2013 at the Agricultural Research and Development Center (ARDC) near Mead, NE. The cultivars were Overley (susceptible), McGill (moderately susceptible), Overland (moderately resistant) and Everest (moderately resistant). Each cultivar was subjected to the following treatments: 1) Non-fungicide treated, spray-inoculated with spores of *F. graminearum* 24-36 hours after early anthesis, 2) sprayed with the fungicide Prosaro (6.5 fl oz/acre) at early anthesis, spray-inoculated with spores of *F. graminearum* 24-36 hours later; 3) sprayed with Prosaro two days after early anthesis, spray-inoculated with spores of *F. graminearum* 24-36 hours later; 4) sprayed with Prosaro four days after early anthesis, spray-inoculated with spores of *F. graminearum* 24-36 hours later; 5) sprayed with Prosaro six days after early anthesis, spray-inoculated with spores of *F. graminearum* 24-36 hours later; and 6) non-sprayed, non-inoculated check. Weather at the plot site was monitored with a WatchDog 2000 Series weather station (Spectrum Technologies, Paxinos, PA). FHB severity and incidence data were collected and used to calculate FHB index. At and after harvest, data on yield, Fusarium-damaged kernels (FDK), and the mycotoxin deoxynivalenol (DON) were collected.

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 key outcomes of this research were that (i) combining fungicide application with cultivar resistance was most effective in reducing FHB index and DON; therefore, growers will be able to choose the combination of cultivar and fungicide that will be most effective in reducing FHB and DON, (ii) fungicide application timing after anthesis did not significantly reduce FHB index or DON compared to the anthesis timing, but all fungicide timings reduced FHB index compared to the non-treated control; therefore, growers can apply fungicide from anthesis until 6 days after anthesis to control FHB and DON, and (iii) weather data collected will be used to improve the accuracy of FHB and DON forecasting models which will in turn reduce losses and increase grower profits. The overall outcome will be improved economic and social livelihoods for wheat growers in Nebraska.

Impact: Research on integrated management of FHB demonstrated that combining resistance and fungicide application was more effective in controlling FHB and DON than using either management practice alone. Information from the research will enable growers

to choose the combination of cultivar and fungicide application that will be most effective in reducing FHB and DON. Losses due to FHB and DON will be reduced and profits for Nebraska wheat growers will increase by an estimated \$5 million/year.

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?**

No.

- 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?**

N/A.

- 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?**

N/A.

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.

N/A.

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.

Hernandez Nopsa, J. F., Wegulo, S. N., Panthi, A., Hallen-Adams, H. E., Harris, S. D., and Baenziger, P. S. 2014. Characterization of Nebraska isolates of *Fusarium graminearum* causing head blight of wheat. *Crop Sci.* 54:310-317.

Panthi, A., Hallen-Adams, H., Wegulo, S. N., Hernandez Nopsa, J., and Baenziger, P. S. 2014. Chemotype and aggressiveness of isolates of *Fusarium graminearum* causing head blight of wheat in Nebraska. *Can. J. Plant Pathol.* 36:447-455.

Wegulo, S. N., Baenziger, P. S., Hernandez Nopsa, J., Bockus, W. W., and Hallen-Adams, H. 2015. Management of *Fusarium* head blight of wheat. *Crop Prot.* 73:100-107.