USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY16 Final Performance Report
Due date: July 28, 2017

Cover Page

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Fiscal Year:	2016
USDA-ARS Agreement ID:	59-0206-4-005
USDA-ARS Agreement Title:	Integrated Management of Fusarium Head Blight in Small Grains for South Dakota.
FY16 USDA-ARS Award Amount:	$ 23,916
Recipient Organization:	South Dakota State University SAD 133, Box 2201 Brookings, SD 57007
DUNS Number:	929929743
EIN:	46-6000364
Recipient Identifying Number or Account Number:	SA1400628
Project/Grant Reporting Period:	4/6/16 - 4/5/17
Reporting Period End Date:	04/05/17

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management of FHB and DON in Wheat in South Dakota.	$ 23,916
	FY16 Total ARS Award Amount	**$ 23,916**

7/27/2017
Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
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
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

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Project 1: *Integrated Management of FHB and DON in Wheat in South Dakota.*

1. **What are the major goals and objectives of the project?**
   The major goal of the project was to improve on the FHB management through integration of cultivar resistance and fungicide application. The objectives of the project were

   i) Develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in production fields of wheat
   ii) Help develop and validate the next generation of management and mitigation tools for FHB and mycotoxins control
   iii) Enhance communication and end-user education/outreach.

2. **What was accomplished under these goals?** *Address items 1-4) below for each goal or objective.*

   i) Develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in production fields of wheat and barley

      1) Major activities - Three winter wheat cultivars with varying levels of FHB resistance (Redfield – moderately resistant – new release, Lyman - moderately resistant, Wesley- susceptible) and three spring wheat cultivars (Brick- moderately resistant, Prevail- moderately resistant, and Samson- susceptible) were planted at two locations: Volga near Brookings and South Shore, near Watertown. Fungicide treatments included untreated, prosaro alone at antheis, prosaro at anthesis + caramba, after 4 days; caramba at anthesis +folicur after 4 days; and proline at anthesis +folicur after 4 days. The plots at the Volga location were misted beginning at heading to increase FHB pressure. The plots at this location additionally had infected corn kernels (100g per plot) scattered within each plot to increase the FHB pressure. The experiment was set up as a randomized complete block design with a split-plot arrangement, where the fungicide was the main plot and cultivar the sub-plot. Treatments were replicated four times and plot size was 5 ft x 15 ft. at all locations. A CO2-pressurized backpack sprayer (40 psi) with three nozzles (Twin Jet TJ- 60 8002) spaced 15" apart on a boom was used to deliver Prosaro fungicide at a spray volume of 18.6 gal/A. Twenty-one days following treatment, plots were evaluated for FHB incidence, FHB head severity, and FHB field severity. Fusarium damaged kernels (FDK), DON content, and grain yield were assessed post-harvest.

      2) Specific objectives- evaluate the integrated effects of a post-anthesis fungicide application and genetic resistance on FHB and DON in winter wheat and spring wheat,

      3) Significant results - The best fungicide timing for FHB and DON management was at anthesis. There was non-significant disease reduction and yield increase as a result of additional fungicide application four days after the anthesis fungicide timing.

      4) Key outcomes or other achievements - Anthesis timing is still the best fungicide timing for effective FHB and DON management.

ii) Help develop and validate the next generation of management and mitigation tools for FHB and mycotoxins control.

1) major activities – Scouted and recorded the incidence and severity of FHB in winter and spring wheat in South Dakota.

2) specific objectives – Report observations made on the occurrence and severity of FHB epidemics in South Dakota.

3) significant results – FHB incidence and severity was very low across South Dakota in 2016 as correctly predicted by FHB prediction tool. This information was communicated back to the FHB model developers. FHB and DON data collected from three hard red winter wheat cultivars and three hard red spring cultivars at two South Dakota locations were sent to the Project Director for inclusion in the model improvement and validation.

4) key outcomes or other achievements – FHB prediction system is a reliable tool to help growers make FHB and DON management decisions.

iii) Enhance communication and end-user education/outreach.

1) major activities- Weekly commentary on the FHB risk for South Dakota was provided throughout the winter wheat and spring wheat FHB risk period. Research results were also communicated to growers, crop consultants and other stakeholders during grower meetings, workshops, field days, and IPM field school.

2) specific objectives - Communicate FHB management research findings to growers, agronomists, crop consultants, and other stake holders.

3) significant results – Growers, crop consultants and other stakeholders are aware of FHB prediction system and timing of a fungicide to manage FHB.

4) key outcomes or other achievements
Outreach to stakeholders was done through extension articles, newsletter articles, grower meetings, and Ag Horizon Workshop. Updates on the scab prediction tool were provided weekly.

3. What opportunities for training and professional development has the project provided?

The project provided training opportunities for a research associate. He attended and presented a poster at the USWBSI National Forum.

4. How have the results been disseminated to communities of interest?

Results were communicated through extension articles, newsletter articles, grower meetings, and during the Ag Horizon Workshop, field days, IPM field school, and pesticide applicator trainings.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY16 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 FY16 award period?** No

   If yes, how many?

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY16 award period?** No

   If yes, how many?

3. **Have any post docs who worked for you during the FY16 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?** No

   If yes, how many?

4. **Have any post docs who worked for you during the FY16 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

   If yes, how many?

Publications, Conference Papers, and Presentations

Instructions: Refer to the FY16-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY16 grant. Only include citations for publications submitted or presentations given during your award period (4/6/16 - 4/5/17). If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications.

None

Books or other non-periodical, one-time publications.

None

Other publications, conference papers and presentations.

Bleakley, B. H., Murthy, N. K. S., Kulkarni, P., Yabwalo, D. N. and Byamukama, E. 2016. 2016 field plot trials for biological control of Fusarium head blight on winter wheat in South Dakota using *Bacillus amyloliquefaciences* strains. In: Proceedings of the National Fusarium Head Blight Forum, St. Louis, MO.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (poster), YES (abstract)

Yabwalo, D. N., Geppert, R., Ali, S., Sehgal, S., and Byamukama, E. 206. Development of Fusarium head blight in the hard red winter wheat during the 2016 season in South Dakota. In: Proceedings of the National Fusarium Head Blight Forum, St. Louis, MO.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (poster), YES (abstract)