USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY17 Preliminary Final Performance Report
Due date: July 31, 2018

Cover Page

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Fiscal Year:	2017
USDA-ARS Agreement ID:	59-0206-4-012
USDA-ARS Agreement Title:	Evaluation of Management Tools for FHB and DON in Multiple Wheat Classes and Barley in ND.
FY17 USDA-ARS Award Amount:	$ 101,479
Recipient Organization:	North Dakota State University Office of Grant & Contract Accouting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
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Recipient Identifying Number or Account Number:	FAR0022045
Project/Grant Reporting Period:	5/5/17 - 5/4/18
Reporting Period End Date:	5/4/2018

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Developing Integrated Management Strategies for FHB and DON in Small Grains.	$ 55,452
MGMT	Development and Distribution of Educational Material on Scab and Mycotoxins.	$ 46,027
	FY17 Total ARS Award Amount	$ 101,479

7-31-18

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

Project 1: *Developing Integrated Management Strategies for FHB and DON in Small Grains.*

1. What are the major goals and objectives of the project?

The goal of this research project is to look at the role host resistance and the use of fungicide applications serve in reducing FHB and DON in spring barley, hard red winter wheat, hard red spring wheat and spring durum. This study will help address grower based questions pertaining to fungicide timing issues when field conditions prevent them from spraying or when scab risk remains high throughout the flowering to grain filling process.

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

1) major activities
Integrated management research experiments were established at five locations in North Dakota; Carrington, Fargo, Langdon, Prosper and Williston. Four locations housed trials for hard red spring wheat, one for hard red winter wheat, three for spring barley and three for spring durum.

2) specific objectives
Research trials examined the role of host resistance and double/split fungicide application (ie: a triazole fungicide applied at anthesis and a different triazole applied 4-7 days later) on reducing FHB and DON in hard red spring wheat, hard red winter wheat, spring barley and spring durum in North Dakota.

3) significant results
Varying levels of scab pressure developed at the research sites. This is advantageous as the varieties and fungicide timings were evaluated under varying levels of disease pressure. Field data showed that a double/split fungicide application reduced both FHB and DON more than a single fungicide application. The field data also corresponded with DON level reductions from the double/split fungicide application. On average, the double/split fungicide application provided anywhere from 10-20% more DON suppression than a fungicide applied at the recommended time of early-anthesis in wheat or full-head in spring barley. More information is needed to test the economic validity of double/split fungicide applications.

4) key outcomes or other achievements
Future studies on double/split applications are needed to strengthen in-season management recommendations. This type of data is heavily needed for spring durum growers, as most varieties are susceptible, and the flowering window (infection window) is longer.

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

Research trials were used as an outside classroom for graduate students and research specialists in the NDSU Extension program. Individuals were taught about *Fusarium graminearum* biology, FHB management and principles of field research. Although no formal course was designed, students gained valuable insight and awareness on a very important disease in North Dakota. The research trials at the Fargo location were used when educating students from Bismarck State College and North Dakota State College of Science of plant pathology.

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

Data will be included in a meta-analysis (submitted to Pierce Paul – Ohio State University). that will provide a robust summary of the collaborative work of the MGMT team and be used in future presentations. The results of the ND trials were communicated and disseminated to growers, Extension agents and other agriculture professionals through Extension meetings, agricultural expo shows, internet, interviews (radio, tv and print), CCA trainings and field days.

Project 2: *Development and Distribution of Educational Material on Scab and Mycotoxins.*

1. What are the major goals and objectives of the project?

A recent USWBSI-funded survey indicated areas of disconnect between research and the dissemination of information on FHB and mycotoxins to producers. Areas of greatest concern were the use of inappropriate fungicides, improper timing of fungicides, and confusion on varietal resistance. To help address these concerns, the goal of this project is to develop and deliver to growers and agricultural professionals using multiple communication medias.

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

1) major activities

A platform to develop hard copy Extension materials was identified (Crop Protection Network - CPN). A list of FHB information topics that could serve as stand-alone hard copy publications was generated. Images and videos that reflect field diagnosis, FHB management and other commonly asked questions on FHB were obtained by Extension plant pathologists during the 2018 growing season.

2) specific objectives

The specific objectives of the project are to (1) generate hard copy Extension materials detailing FHB and mycotoxin information (2) take images and videos highlighting topics pertaining to FHB and mycotoxins (3) compile information, images, and videos into an interactive iBook.

3) significant results

One Extension publication has been created titled “Optimizing Fungicide Use for Fusarium Head Blight (Scab) and Associated Mycotoxins”. This publication is now available on the CPN website and can be placed on ScabSmart when available. Several other publications on fungicide efficacy, fungicide timing, fungicide decision making, and host resistance are being drafted.

Thousands of images and over a hundred videos have been taken and close to a hundred videos detailing fungicide timing and FHB symptoms. These files are currently being edited and will be available soon.

4) key outcomes or other achievements

The CPN publication has been handed out at a few summer Extension events this summer and it is expected the publication will be handed out at several winter Extension meetings.

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

Once the materials and iBook are created, the information can be used by researchers, growers and other agricultural professionals when training interns and students.

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

The CPN publication pertaining to optimizing fungicide use on FHB is available on the website and will be handed out at summer Extension events.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY17 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 FY17 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 FY17 award period?**

   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY17 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 FY17 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?

Release of Germplasm/Cultivars

Instructions: In the table below, list all germplasm and/or cultivars released with full or partial support through the USWBSI during the FY17 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations. *Leave blank if you have nothing to report or if your grant did NOT include any VDHR-related projects.*

Name of Germplasm/Cultivar	**Grain Class**	**FHB Resistance** (S, MS, MR, R, where R represents your most resistant check)	**FHB Rating** (0-9)	**Year Released**

Add rows if needed.

NOTE: List the associated release notice or publication under the appropriate sub-section in the 'Publications' section of the FPR.

Abbreviations for Grain Classes

Barley - BAR
Durum - DUR
Hard Red Winter - HRW
Hard White Winter - HWW
Hard Red Spring - HRS
Soft Red Winter - SRW
Soft White Winter - SWW

Publications, Conference Papers, and Presentations

Instructions: Refer to the FY17-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY17 grant. Only include citations for publications submitted or presentations given during your award period (5/5/17 - 5/4/18). If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each reference/citation, you must indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in publication/ presentation. See example below for a poster presented at the FHB Forum:

Journal publications.

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

Other publications, conference papers and presentations.

Conference Paper

Bauske, E., Halvorson, J., Meyer, S., Chapara, V., Arens, A., Kalil, A., Fonseka, D., and Friskop, A. 2017. Integrated management of Fusarium head blight in durum varieties. 2017 National FHB Forum. Milwaukee, WI. December 3-5, 2017. Proceedings of the 2017 National Fusarium Head Blight Forum, Dec. 3-5, 2017, Milwaukee, WI. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Halvorson, J., Bauske, E., Meyer, S., Chapara, V., Arens, A., Schatz, B., and Friskop, A. 2017. Integrated management of Fusarium head blight in hard red spring wheat varieties. Proceedings of the 2017 National Fusarium Head Blight Forum, Dec. 3-5, 2017, Milwaukee, WI. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Gross, P., Chapara, V., Ransom, J., Brueggeman, R., Schatz, B., Kalil, A., Fonseka, D., Deplazes, C., Arens, A., and Friskop, A. 2017. Integrated Management Strategies to Lower Fusarium Head Blight and Deoxynivalenol in Spring Barley over Multiple Years and Locations. Proceedings of the 2017 National Fusarium Head Blight Forum, Dec. 3-5, 2017, Milwaukee, WI. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Extension Presentations

Friskop, A. Small Grain Disease Update. Hettinger Research Extension Center Field Day – Hettinger, ND. July 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. Small Grain Disease Update. NDSU Agronomy Seed Farm Field Day – Casselton, ND. July 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. Pest Clinic. North Central Research and Extension Center Field Day – Minot, ND. July 2017.
Status: Oral and hands-on presentation given.
Acknowledgement of Federal Support: No.

Friskop, A. Barley Disease Management. NDSU Barley Field School – Extension Talk. Fargo, ND. July 2017.
Status: Oral and hands-on presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fusarium Head Blight Diagnosis and Cereal Disease Update. Wheat Quality Council Tour – Extension Talk – Casselton, ND. July 2017.
Status: Oral and hands-on presentation given.
Acknowledgement of Federal Support: No.

Friskop, A. A New Fungicide for Scab and other Wheat Disease Issues Arising in 2017. Best the Best in Wheat and Soybean – Extension Talk – Grand Forks, ND. January 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. A New Fungicide for Scab and other Wheat Disease Issues Arising in 2017. Best the Best in Wheat and Soybean – Extension Talk – Moorhead, MN. February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. A Fungicide Update on Scab and DON. Best of the Best in Wheat – Dickinson, ND – February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. DON Testing and Impacts of High DON Seed on Seedling Establishment. Best of the Best in Wheat – Dickinson, ND – February 2017.
Status: Oral and hands-on presentation given.
Acknowledgement of Federal Support: No.

Friskop, A. A Fungicide Update on Scab and DON. Best of the Best in Wheat – Williston, ND – February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. A Fungicide Update on Scab and DON. Best of the Best in Wheat – Minot, ND – February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. DON Testing and Impacts of High DON Seed on Seedling Establishment. Best of the Best in Wheat – Minot, ND – February 2017.
Status: Oral and hands-on presentation given.
Acknowledgement of Federal Support: No.

Friskop, A. Wheat Disease Fungicide Update. Advanced Crop Advisers Workshop – Fargo, ND – February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A and Smith, M. Scab Forecasting Models and a Fungicide Update on Scab. International Crop Expo – Grand Forks, ND. February 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. Barley Fungicide Timing for Scab Update. NCERA-184: Small Grain Disease Working Group – Pensacola, FL. March 2017.
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.

Friskop, A. Wheat Fungicide Update. CHS Spring Meeting – Hallock, MN. March 2017
Status: Oral presentation given.
Acknowledgement of Federal Support: Yes.