USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY15 Final Performance Report
Due date: July 15, 2016

Cover Page

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Fiscal Year:	2015
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.
FY15 USDA-ARS Award Amount:	$ 50,890
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:	05/05/15-05/04/16
Reporting Period End Date:	05/04/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management Coordinated Project, ND.	$ 38,873
MGMT	Uniform Fungicide Trials in ND.	$ 12,017
	FY15 Total ARS Award Amount	**$ 50,890**

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: *Integrated Management Coordinated Project, ND.*

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

No single management tool has been fully effective against FHB and DON. Therefore, implementing an integrated strategy utilizing numerous management tools is necessary. The goal of this research project is to look at the role host resistance and a post-anthesis fungicide application (Feekes 10.51 + 4-5 days) serve in reducing FHB and DON levels in multiple market classes of wheat and spring barley.

2. What was accomplished under these goals?

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

2) specific objectives
Research trials examined the role of host resistance and fungicide timings (anthesis and post-anthesis) on FHB and DON in all major small grain market classes in North Dakota.

3) significant results
Different levels of disease development occurred at each location and on each small grain market class. This was advantageous as the performance of varieties and fungicides was evaluated under conditions that were either conducive or non-conducive for disease development. Results moderate to high disease environments demonstrated that the combination of a fungicide and a less susceptible variety lowered both FHB and DON levels under different scab epidemics.

4) key outcomes or other achievements
Some of the research trials demonstrated that a fungicide application at post-anthesis (4 to 5 days past flowering) was just as effective as the recommended fungicide timing (early-anthesis). Future studies on post-anthesis applications are needed to strengthen in-season management recommendations.

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 how to conduct field research. Although no formal course was designed, students gained valuable insight and awareness on a very important disease in North Dakota.

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

Pertaining to the plant pathology community, data will be included in a meta-analysis (submitted to Pierce Paul – Ohio State University). The meta-analysis will provide a robust summary of the collaborative work of the MGMT team and be used in future presentations. Growers, Extension agents and other agriculture professionals were able to access information from the internet, interviews (radio, tv and print), Extension meetings, agricultural expo shows, CCA trainings and field days.

Project 2: *Uniform Fungicide Trials in ND.*

1. **What are the major goals and objectives of the project?**
   The use of fungicides to suppress FHB and DON is an important management tool for small grain growers in the USA. As an effort to update information on fungicide management, field trials are developed to assess the efficacy of fungicides. The results of the trials will provide the necessary information on efficacy of recently labeled chemicals and form a comparison against the best available options. In order to do this, the effect of fungicides on Fusarium head blight (FHB) and deoxynivalenol (DON) levels will be evaluated across multiple locations and small grain classes.

2. **What was accomplished under these goals?**

   1) major activities
      Uniform fungicide trials were established at three locations in North Dakota; Carrington, Fargo and Langdon. The uniform fungicide protocol was evaluated on hard red spring wheat at three locations, on spring barley at two locations and on spring durum at one location.

   2) specific objectives
      Research trials evaluated fungicide efficacy and timing of fungicide applications on suppressing both FHB and DON in small grain crops grown in North Dakota.

   3) significant results
      Differing levels of disease development occurred at each location allowing fungicide efficacy observations to be made in different environments. Both triazole and strobilurin chemistries were evaluated at multiple locations. The results reinforced that triazole chemistries effectively reduced FHB and DON levels. With few exceptions, strobilurin chemistries had FHB and DON levels similar to the non-treated control.

   4) key outcomes or other achievements
      A few locations evaluated additional treatments that are often asked by growers. One of these treatments was a double application of fungicides during anthesis (ie: metconazole at early-anthesis followed by tebuconazole 4-5 days later). None of the studies demonstrated an advantage of applying fungicides twice and the ND data suggests a onetime triazole fungicide application was just as effective as a double application of a triazole fungicide. More research on double applications of fungicide in different environments (i.e. uneven emergence and heading) would be beneficial to growers.

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 how to conduct field research. Although no

formal course was designed, students gained valuable insight and awareness on a very important disease in North Dakota.

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

Pertaining to the plant pathology community, data was sent to Madeleine Smith (University Minnesota Crookston) and will be included in a summary report. The summary data from the uniform trials will help provide information that is necessary for grower inquiries. Results of the trials were communicated to growers, Extension agents and other agriculture professionals through the internet, interviews (radio, tv and print), Extension meetings, agricultural expo shows, CCA trainings and field days.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY15 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 FY15 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 FY15 award period?**

   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY15 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 FY15 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 FY15 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

Refer to the FY15-FPR_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications. Nothing to Report.

Books or other non-periodical, one-time publications. Nothing to Report.

Other publications, conference papers and presentations.

Conference Paper

Smith, M.J., Friskop, A., Arends, A., Chapara, V., Meyer, S., Schatz, B., Bergstrom, G.C., Cummings, J.A., Byamukama, E., Yabwalo, D., Bleakley, B., Murthey, N., Ruden, K., Bradley, C.A., Ames, K., Pike, J., and Bellm, R. 2015. Uniform Fungicide Trial Results for Management of FHB and DON, 2015. Proceedings of the 2015 National Fusarium Head Blight Forum, Dec. 4-6, 2015, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Abstract Published and poster presented.
Acknowledgement of Federal Support: Yes

Salgado, J.D., Ames, K., Bergstrom, G., Bradley, C., Byamukama, E., Cummings, J., Chapara, V., Chilvers, M., Dill-Macky, R., Friskop, A., Gautam, P., Kleczewski, N., Madden, L.V., Milus, E., Nagelkirk, M., Ransom, J., Ruden, K., Stevens, J., Wegulo, S., Wise, K., Yabwalo, D., and Paul, P.A. 2015. Robust Management Programs to Minimize Losses Due to FHB and DON: A Multi-state Coordinated Project. Proceedings of the 2015 National Fusarium Head Blight Forum, Dec. 4-6, 2015, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Abstract Published and poster presented.
Acknowledgement of Federal Support: Yes

Friskop, A., Meyer, S., Crane, E., Chapara, V., Arends, A., Gautam, P., and Schatz, B. 2015. Evaluating Fungicide Efficacy and Timing for Management of Fusarium Head Blight in Spring Barley in North Dakota. Proceedings of the 2015 National Fusarium Head Blight Forum, Dec. 4-6, 2015, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Abstract Published and poster presented.
Acknowledgement of Federal Support: Yes

Extension Presentations

Friskop, A. Crop Production Issues – Plant Pathology. Centrol Roundtable. Fargo, ND
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Fungicide Timing. Western Crop and Pest Management School. Minot, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Spray or Not to Spray: Scout-Based Fungicide Decisions in Wheat. Logan County Crop Production Meeting. Napoleon, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Cereal Disease Update. West Central Spring Agronomy Meeting. Fargo, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Spray or Not to Spray: Scout-Based Fungicide Decisions in Wheat. Best of the Best in Wheat and Soybean Research. Fargo, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Spray or Not to Spray: Scout-Based Fungicide Decisions in Wheat. Best of the Best in Wheat and Soybean Research. Grand Forks, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. 2015 Wheat Disease Review. Emmons County Crop Improvement Meeting. Linton, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Fungicide Performance. 2016 Lake Region Roundup. Devils Lake, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Preventative Measures to Avoid Failures in Wheat. Diversity, Direction and Dollars. Dickinson, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Wheat Disease Management for 2016. 2015 Western Dakota Crops Day. Hettinger, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Lessons Learned on Fungicide Timing for Wheat. NDSU/University of Minnesota Commercial Pesticide Applicator Training. Fargo, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Crop Disease Management. Soil Health Day. Wyndmere, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. 2015 Wheat Disease Review. Wheat Quality Council Tour. Casselton, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Disease Problems in Cereal Crops of ND. Grand Forks County Plot Tour. Grand Forks, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Cereal Disease Update. NDSU Agronomy Seed Farm Field Day. Casselton, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Cereal Disease Update. Carrington Research and Extension Center Field Day. Carrington, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Cereal Disease Problems in Irrigated Systems. Williston Research and Extension Center – Irrigated Field Day. Nesson Valley, ND
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. 2015 North Dakota Cereal Disease Update. Williston Research and Extension Center – Dryland Field Day. Williston, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. Western North Dakota Cereal Disease Update. Dickinson Research and Extension Center Field Day. Dickinson, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.

Friskop, A. North Dakota Cereal Disease Update. Tri-County Field Day. Wishek, ND.
Status: Oral presentation given.
Acknowledgement of Federal Support: Not applicable for this venue.