USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY18 Performance Report
Due date: July 12, 2019

Cover Page

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Fiscal Year:	2018
USDA-ARS Agreement ID:	59-0206-8-199
USDA-ARS Agreement Title:	Integrated Management Strategies and Fungicide Testing for FHB and DON in Small Grains in ND.
FY18 USDA-ARS Award Amount:	$ 63,624
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
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0030036
Project/Grant Reporting Period:	5/5/18 - 5/4/19
Reporting Period End Date:	05/04/19

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management Strategies and Fungicide Testing for FHB and DON in Small Grains in ND.	$ 63,624
	FY18 Total ARS Award Amount	$ 63,624

Principal Investigator 7-12-19 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 Strategies and Fungicide Testing for FHB and DON in Small Grains in ND.*

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

The primary objectives are to (1) evaluate adepidyn+propiconazole (Miravis Ace), prothioconazole+tebuconazole, metconazole and/or tebuconazole on suppressing FHB and DON – fungicide efficacy trials (2) Evaluate integrated management strategies in small grain market classes (hard red spring wheat, hard red winter wheat, spring durum and spring barley) to suppress FHB and DON – integrated management trials.

2. What was accomplished under these goals?

1) major activities

Fungicide efficacy and integrated management trials were conducted at five locations in North Dakota (Carrington, Fargo, Langdon, Prosper and Williston). A total of five fungicide efficacy fungicide trials were conducted on spring barley, spring durum or hard red spring wheat and a total of eight integrated management trials were conducted on spring barley, spring durum, hard red spring wheat or hard red winter wheat.

2) specific objectives

Evaluate the efficacy of the "new" fungicide Miravis Ace (adepidyn+propiconazole) at different timings on FHB and DON and compare it to industry standards. Integrated management trials evaluated the role of host resistance and different fungicide timings in suppressing FHB and DON.

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 when Miravis Ace was applied at early-flowering in wheat or at full head in barley, the level of efficacy was comparable to both Prosaro and Caramba. However, when Miravis Ace was applied at half-head in both wheat and barley, results were inconsistent in reducing the level of DON in grain. The most DON reduction in the integrated management trials was achieved when a moderately resistant variety was used and when a fungicide was applied early flowering (or 4 to 7 days later) in wheat and at full head (or 4 to 7 days later) in spring barley.

4) key outcomes or other achievements

When combined with other USWBSI IM-CP research, the efficacy of Miravis Ace is suggested to be the same as Prosaro and Caramba when applied at early-flowering in wheat or full head in barley. Also, good DON suppression was achieved when Miravis Ace, Prosaro

and Caramba were applied at early-flowering or 4 to 7 days after early flowering in wheat. Similar trends were observed in barley.

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 o plant pathology.

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

Data was 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.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY18 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 FY18 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 FY18 award period?**

   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY18 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 FY18 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 FY18 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations.

NOTE: 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

Paul, P.A., Salgado, J.D., Bergstrom, G., Bradley, C., Byamukama, E., Byrne, A.M., Chapara, V., Cummings, J.A., Chilvers, M.I., Dill-Macky, R., Friskop, A., Kleczewski, N., Madden, L.V., Nagelkirk, M., Stevens, J., Smith, M., Wegulo, S., Wise, K., and Yabwalo, D. 2019. Integrated effects of genetic resistance and prothioconazole + tebuconazole application timing on Fusarium head blight in wheat. Plant Dis 1003:223-237.
Status: Published.
Acknowledgement of Federal Support: Yes.

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

Other publications, conference papers and presentations.

Conference

Green, A., Leier, J., Lin Y., Zhong, S., Li, X., Friskop, A., Xu, S., Cai, X., Frohberg, R., Stack, R., and Mergoum, M. 2018. Breeding for FHB Resistance in North Dakota: More questions than answers. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. 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.L., Bauske, E., Halvorson, J., Meyer, S., Schuh, C., Chapara, V., Hanson, B., Henry, L., Hakanson, T., Arens, A., Brueggeman, R., and **Friskop, A**. 2018. Evaluating adepidyn and host resistance to reduce Fusarium head blight and deoxynivalenol in spring barley. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. 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., Schuh, C., Chapara, V., Hanson, B., Henry, L., Hakanson, T., Arens, A., and **Friskop, A**. 2018. Evaluation of fungicide efficacy and timing for management of Fusarium head blight in spring barley and hard red spring wheat. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Kalil, A., Fonseka, D., Tjelde, T., Ransom, J., Deplazes, C., Eisinger, D., Schatz, B., Bausek, E., Halvorson, J., Meyer, S, Schuh, C. and **Friskop, A**. 2018. Evaluation of fungicides individually or as part of an integrated approach for management of Fusarium head blight in durum. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.

Acknowledgement of Federal Support: Yes.

Ransom, J., Friskop, A. and Buetow, R. 2018. Variation in spike emergence timing in spring wheat varieties sown at different densities. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Salgado, J.D., Bergstrom, G., Bradley, C., Bowen, K., Byamukama, E., Byrne, A., Collins, A., Cowger, C., Cummings, J., Chapara, V., Chilvers, M.I., DeWolf, E., Dill-Macky, R., Darby, H.M., Esker, P.D., Friskop, A., Halvorson, J., Kleczewski, N., Madden, L.V., Marshall, J., Mehl, H., Nagelkirk, M., Starr, J., Stevens, J., Smith, D., Smith, M., Wegulo, S., Wise, K., Yabwalo, H.M., Young-Kelly, H., and Paul, P.A. 2018. Efficacy of Miravis Ace® for FHB and DON management across environments and grain market classes: A progress report. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY.
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Salgado, J.D., Bergstrom, G., Bradley, C., Bowen, K., Byamukama, E., Byrne, A., Collins, A., Cowger, C., Cummings, J., Chapara, V., Chilvers, M.I., Dill-Macky, R., Darby, H.M., Friskop, A., Kleczewski, N., Madden, L.V., Marshall, J., Mehl, H., Nagelkirk, M., Stevens, J., Smith, D., Smith, M., Wegulo, S., Wise, K., Yabwalo, H.M., Young-Kelly, H., and Paul, P.A. 2018. Efficacy of two-treatment fungicide programs for FHB management: a multi-state coordinated project. Proceedings of the 2018 National FHB Forum, Dec 2-4, 2018, St. Louis, MO. 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. Management of Cereal Crop Diseases. Dickinson Research Extension Center – Dickinson, ND. June 2018.
Status: Oral and hands-on presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Cereal Disease Update. Hettinger Research Extension Center Field Day– Hettinger, ND. July 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Plant Disease Clinic. North Central Research Extension Center Field Day – Minot, ND. July 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: No.

Friskop, A. Cereal Disease Update. Langdon Research Extension Center Field Day– Langdon, ND. July 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Wheat Disease Update. Grand Forks County Field Day – Grand Forks, ND. July 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fusarium Head Blight Management Update. Arthur Companies Ag Day – Pilsbury, ND. September 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Ergot and a Fungicide Update on Scab. International Durum Forum – Minot, ND. November 2018.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Update on Scab and Ergot. Lake Region Roundup – Devils Lake, ND. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Management of FHB and Update on Ergot. Hefty Ag Day – New Rockford, ND. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Keeping Diseases at Bay in Wheat. Wheat University – Bismarck, ND. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Management of FHB – State Side. Manitoba Ag Day – Brandon, Manitoba Canada. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fungicide update on Scab. Best of the Best in Wheat Research – Minot. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fungicide update on Scab. Best of the Best in Wheat Research – Minot. January 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.

Friskop, A. Cereal Disease Management Update. Nelson County Crop Improvement Meeting – Tolna, ND. February 2019.
Status: Oral presentation.
Acknowledgement of Federal Support: Yes.