USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: July 29, 2021

Cover Page

Principle Investigator (PI):	Andrew Friskop
Institution:	North Dakota State University
E-mail:	andrew.j.friskop@ndsu.edu
Phone:	701-231-7627
Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-122
USDA-ARS Agreement Title:	Integrated Management Strategies and Fungicide Testing for FHB and DON in Small Grains in ND
FY20 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:	FAR0031972
Project/Grant Reporting Period:	5/5/20 - 5/4/21
Reporting Period End Date:	5/4/2021

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	$ 63,624
	FY20 Total ARS Award Amount	**$ 63,624**

7/28/21

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
R- Research
S – Service (DON Testing Labs)
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*

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

1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in major grain classes, with emphasis on a new fungicide, Miravis Ace (IM Trials).
2) Compare the efficacy of Miravis Ace® when applied at early heading or at anthesis to that of standard anthesis application of Prosaro® or Caramba® (UFT).

2. What was accomplished under these goals or objectives? *(For each major goal/objective, address these three items below.)*

a) What were the major activities?

The IM and UFT field experiments were established at five locations in North Dakota; Carrington, Fargo, Langdon, Prosper and Williston. Across the field locations, eight IM experiments and five UFT experiments were conducted on either spring barley, spring durum, hard red spring wheat or hard red winter wheat. A low to moderate level of disease was observed at each location providing fungicide efficacy and timing information across diverse environments.

b) What were the significant results?

Summarized 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 at early flowering or 4 to 7 days later in wheat and at full head or 4 to 7 days later in spring barley. Regardless of market class, sequential applications of Miravis Ace followed by Prosaro or Caramba resulted in the lowest DON and highest yield.

c) List 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. Additionally, good DON suppression was achieved when Miravis Ace, Prosaro and Caramba were applied at 3-7 days after the onset of flowering in wheat or 3-7 days after full-head in barley. This strongly supports that the application window has widened.

3. **Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns and/or restrictions, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.**

   Yes, the research was slightly impacted by COVID-19. Travel costs were higher (ie: one person per vehicle), and it often required more people to complete research tasks. For example, the processing of harvest bags took longer due to social distancing guidelines.

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

   Using COVID guidelines, research trials were used to teach graduate students 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

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

   Data was included in a national meta-analysis and submitted to Pierce Paul (Ohio State University). Summary slides were created that highlighted the collaborative work of the MGMT team and were used presentations. Spring barley data was also included in an invited presentation given at the 2020 USWBSI virtual research forum The national results and results from ND trials were communicated and disseminated to growers, Extension agents and other agriculture professionals through virtual Extension meetings, Crop and Pest Reports, interviews (radio, tv and print), and virtual field days.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/5/20 - 5/4/21). 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 FY20 award period?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY20 award period?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

3. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

4. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

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 FY20 award period (5/5/20 - 5/4/21). 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	FHB Rating (0-9)	Year Released
Not applicable to this project.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year

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

Publications, Conference Papers, and Presentations

Instructions: Refer to the PR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY20 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (5/5/20 - 5/4/21**) should be included. If you did not publish/submit or present anything, state 'Nothing to Report' directly above the Journal publications section.

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

Z.J. Winn, R. Acharya, J. Lyerly, G. Brown-Guedira, C. Cowger, C. Griffey, J. Fitzgerald, R.E. Mason and J.P. Murphy. 2020. "Mapping of Fusarium Head Blight Resistance in NC13-20076 Soft Red Winter Wheat." In: S. Canty, A. Hoffstetter, and R. Dill-Macky (Eds.), *Proceedings of the 2020 National Fusarium Head Blight Forum (*p. 12.), Virtual; December 7-11. Online: https://scabusa.org/pdfs/NFHBF20_Proceedings.pdf.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Nothing to report.

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

Nothing to report.

Other publications, conference papers and presentations.

Conference

Luis, J.M., Ng, S.J., Bergstrom, G., Bissonnette, K., Bowe, K., Bradley, C., Byamukama, E., Chilvers, M., Collins, A., Cowger, C., Darby, H., DeWolf, E., Dill-Macky, R., Esker, P., Friskop, A., Kleczewski, N., Koehler, A., Langston, D.B., Madden, L., Marshall, J., Mehl, H., Moraes, W., Nagelkirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P.A. 2020. Fusarium head blight management coordinated project: Uniform fungicide trials 2018-2020. Proceedings of the 202020 National FHB Forum, Dec 7-11, 2020. Virtual. US Wheat and Barley Scab Initiative publishers, East Lansing, MI/Lexington, KY
Status: Poster presentation given by lead author.
Acknowledgement of Federal Support: Yes.

Luis, J.M., Ng, S.J., Bergstrom, G., Bissonnette, K., Bowe, K., Bradley, C., Byamukama, E., Chilvers, M., Collins, A., Cowger, C., Darby, H., DeWolf, E., Dill-Macky, R., Esker, P., Friskop, A., Kleczewski, N., Koehler, A., Langston, D.B., Madden, L., Marshall, J., Mehl, H., Moraes, W., Nagelkirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P.A. 2020. Fusarium head blight management coordinated project: Integrated management trials 2018-2020. Proceedings of the 202020 National FHB Forum, Dec 7-11, 2020. Virtual. 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. 2020 Langdon REC Virtual Field Day. 2020
Status: Video Recorded.
Acknowledgement of Federal Support: Yes.

Friskop, A. ND Spring Wheat Disease Update. 2020 Virtual Hard Red Spring Wheat Pre-Harvest Update. 2020. Fargo, ND.
Status: Presentation delivered virtually.
Acknowledgement of Federal Support: Yes.

Friskop, A. ND Durum Disease Update. 2020 Virtual Durum Crop Update. 2020. Fargo, ND.
Status: Presentation delivered virtually.
Acknowledgement of Federal Support: Yes.

Friskop, A. Small Grain Fungicide Update. 2021.Lake Region Roundup. Fargo, ND.
Status: Presentation delivered virtually.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fusarium Head Blight. Best of the Best East. 2021. Moorhead, MN.
Status: Video Recorded.
Acknowledgement of Federal Support: Yes.

Friskop, A. Fusarium Head Blight. Best of the Best East. 2021. Grand Forks, ND.
Status: Video Recorded.
Acknowledgement of Federal Support: Yes.

Friskop, A. Barley Diseases. District 2 Barley Meeting. 2021. Delivered from Fargo, ND.
Status: Presentation delivered virtually.
Acknowledgement of Federal Support: Yes.

Friskop, A. Small Grain Disease Update. Western Crop and Pest School. 2021. Delivered from Fargo, ND.
Status: Presentation delivered virtually.
Acknowledgement of Federal Support: Yes.