USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY19 Performance Report
Due date: September 30, 2020

Cover Page

Principle Investigator (PI):	Thomas Baldwin
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Fiscal Year:	2019
USDA-ARS Agreement ID:	59-0206-7-001
USDA-ARS Agreement Title:	FHB Management in Barley: QTL Deployment and Phenotyping
FY19 USDA-ARS Award Amount:	$ 13,175
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:	FAR0028113
Project/Grant Reporting Period:	7/12/19 - 7/11/20
Reporting Period End Date:	7/11/2020

USWBSI Individual Project(s)

USWBSI Research Category*	**Project Title**	**ARS Award Amount**
BAR-CP	Coordination of NABSEN and Collaborative Screening of Western US Barley Germplasm	$ 13,175
	FY19 Total ARS Award Amount	**$ 13,175**

Thomas T Baldwin Digitally signed by Thomas T Baldwin
Date: 2020.10.01 14:00:14 -05'00'

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: *Coordination of NABSEN and Collaborative Screening of Western US Barley Germplasm*

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

The **overall project goal** is to promote collaboration between North American barley breeding programs to advance and distribute elite barley germplasm with resistance to *Fusarium* head blight.

1) Coordinate the exchange and distribution of advanced FHB resistant barley germplasm between NABSEN collaborators to expedite the development of resistant barley varieties.
2) Coordinate the screening of western US barley germplasm.

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

Project Objective 1.

a) What were the major activities?

We coordinated, received and distributed advanced breeding lines seed form the University of Minnesota, Busch Ag, USDA-ARS Canadian breeding Group and NDSU breeding programs in our FHB nurseries in Fargo, and Langdon, ND. These advanced lines were grown across seven locations. The locations in 2019 were: Fargo, Osnabrock, Casselton and Langdon, ND and Crookston and St. Paul Minnesota and Brandon, Manitoba Canada. Plant nurseries were grown to compare FHB severity and incidence, heading date and DON accumulation on misted and dryland plots.

In 2020 locations were Fargo, Casselton and Langdon, ND and Crookston and St. Paul, MN and Brandon, Manitoba Canada.

b) What were the significant results?

We grew, evaluated, and harvested a total of 41 advanced breeding lines planted in short rows and with 3 replications in 2019 in Fargo and Langdon misted nurseries. The misted nurseries were inoculated with infected FHB corn spawn to ensure good infection. Heading date, FHB incidence and severity notes were collected along with DON accumulation. In 2020, 45 advanced lines were planted and evaluated for heading date, FHB severity and incidence and DON in Fargo and Langdon misted nurseries. Disease levels were high, and plants will be threshed, and data will be analyzed this fall and winter.

In 2019 two Canadian advanced lines had DON means lower than the standard two-rowed check Conlon and two lines from the North Dakota Breeding Program had DON means just above the Conlon standard resistant check.

c) List key outcomes or other achievements.
With the data collected form the NABSEN trials the best advanced lines could be used to crossed to other breeding lines to incorporate the FHB resistant's and these lines could also become varieties and be release to growers. Three North Dakota advanced breeding lines are in the process to be released as varieties in the coming year.

Project Objective 2.

a) What were the major activities?
We screened 318 Western lines in 2019 for FHB severity and DON accumulation at Fargo and Langdon, ND in our misting nurseries. These lines came from Montana and USDA-ARS facility in Idaho. Three replications were planted in hill plots for each line at both locations. These lines were evaluated for FHB severity and DON accumulation. The barley lines were all threshed in Fargo and send back to their facility for further evaluation.

In 2020, 248 lines for a Training Population and 100 lines from the USDA-ARS Idaho research facility, were planted in the Fargo and Langdon misted locations to evaluated heading date, FHB severity and DON accumulation.

b) What were the significant results?
Data for these lines are still being evaluated.

c) List key outcomes or other achievements
Data is still being evaluated for these lines.

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

Yes, my field technician tested positive for COVID-19 during the summer and some of the field ratings in Fargo and Langdon had to be delayed, but rating was still able to be done later in the season.

Because of COVID-19 travel was very limited in our state of North Dakota. We agreed to plant barley breeding material from the North Dakota and other Universities in our Fargo and Langdon misting nurseries because travel for these programs were limited. The size of our Fargo and Langdon misting nurseries were significantly increased to provide testing for their material. Cost of travel was significantly increased due to the required

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

In North Dakota an undergraduate student help was trained in preparation for planting, planting, scoring head blight, and harvesting.

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

The NABSEN report for 2019 has been submitted to all NABSEN collaborators and to USWBSI. This information can be accessed online. The data is also uploaded to the T3 data base.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY19 award period (7/12/19 - 7/11/20). 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 FY19 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 FY19 award period?**
   No

   If yes, how many?

3. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   None

   If yes, how many?

4. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   None

   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 FY19 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**
None				

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

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Publications, Conference Papers, and Presentations

Instructions: Refer to the FY19-FPR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY19 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (7/12/19 - 7/11/20**) 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:

De Wolf, E., D. Shah, P. Paul, L. Madden, S. Crawford, D. Hane, S. Canty, R. Dill-Macky, D. Van Sanford, K. Imhoff and D. Miller. 2019. "Impact of Prediction Tools for Fusarium Head Blight in the US, 2009-2019." In: S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Macky (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 12), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

None

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

Other publications, conference papers and presentations.

NABSEN Report 2019 completed in December 2019 and sent to all Cooperators attending the USWBSI conference.
Status: Published
Acknowledgement of Federal Support: NO