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

Cover Page

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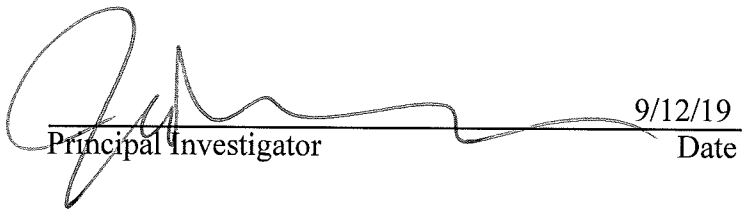
Fiscal Year:	2018
USDA-ARS Agreement ID:	59-0206-7-001
USDA-ARS Agreement Title:	FHB Management in Barley: QTL Deployment and Phenotyping.
FY18 USDA-ARS Award Amount:	$ 13,175
Recipient Organization:	North Dakota State University Office of Grant & Contract Accouting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0028113
Project/Grant Reporting Period:	7/12/18 - 7/11/19
Reporting Period End Date:	07/11/19

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
	FY18 Total ARS Award Amount	$ 13,175



Principal Investigator — 9/12/19 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

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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 project?**
2. Coordinate the 2018 NABSEN by collecting and redistributing seed, establishing and collecting data for two nursery sites in ND and collating all data for the final report.
3. Establish, maintain and evaluate two irrigated and inoculated ND nurseries.
4. Solicit Western participants and establish and evaluate western US barley germplasm in two ND FHB nurseries during the 2018 growing season.

2. **What was accomplished under these goals?** *Address items 1-4) below for each goal or objective.*
3.

1) major activities

The germplasm of advanced barley lines with FHB resistance developed by the cooperating/collaborating barley breeders/pathologists were collected and redistributed for testing to the NABSEN cooperators. We established two mist-irrigated nurseries in Fargo and Langdon, ND. All NABSEN data generated was collected, collated and the final report generated and submitted to the USWBSI NFO on 1/25/2019 has been uploaded to the USWBSI website. Some of the information has been uploaded (The final data will be submitted soon) to "The Triticeae Toolbox" (T3; ttps://triticeaetoolbox.org/barley/.

2) specific objectives

Objective 1. Coordinate the exchange and distribution of advanced FHB resistant barley germplasm between NABSEN collaborators to expedite the development of resistant barley varieties.

The seed was requested from all collaborating scientist in the spring of 2019 received and redistributed to the collaborators for establishment of the NABSEN at other locations. The FHB nurseries established by the other cooperators included Osnabrock, and Casselton, ND, St. Paul and Crookston, MN, and Brandon, Manitoba. In 2018 the NABSEN included breeding lines with putative FHB resistance from the NDSU 2-rowed and 6-rowed (only 2-rowed lines in 2019) and lines from the Univ. of Minnesota, Busch Ag, and Agriculture and Agri-Food Canada. FHB parameters, DON, and agronomic factors were recorded, collated then submitted as the final 2018 NABSEN report and 2019 data was collected.

Objective 2. Establish and evaluate NABSEN nurseries at two North Dakota locations.

The inoculated and mist irrigated nurseries were established in Langdon, and Osnabrock, ND in 2018 and 2019. Over eight hundred pounds of *Fusariun graminearum* corn spawn inoculum was produced in the lab during the spring of 2018. Four hundred pounds was provided to Dr. Rich Horsley's NDSU breeding program, from which the Osnabrock NABSEN location was inoculated.

Two applications of inoculum were applied to the nurseries and approximately 400 pounds of corn inoculum was used to inoculate the NABSEN and western breeding materials. The Langdon and Fargo nurseries were maintained (fertilized, weed control, and tied up to prevent lodging), harvested, threshed, bagged and delivered to Dr. Schwarz's lab (NDSU) for DON analysis.

Objective 3. Coordinate the screening of western US barley germplasm.

Advanced lines and cultivars from two western US barley-breeding programs, Montana State University, and USDA-ARS Aberdeen Idaho universities was evaluated in the NABSEN nurseries established in Fargo and Langdon ND. To accomplish this objective will solicited materials from five western breeding programs including University of Montana, University of Idaho, USDA Aberdeen, ID, Oregon State University, Washington State University, and Miller Coors. We received material for screening from three western US barley breeding programs; University of Montana, USDA Aberdeen, ID, (two programs from USDA Aberdeen in 2019). The seed from each program was included in two mist irrigated and inoculated FHB nurseries in Langdon and Fargo, ND. The data was provided to the breeding programs once we received the DON analyses data from Dr. Schwarz's lab.

3) significant results

There was no FHB disease severity taken at Casselton and Osnabrock dryland nurseries. FHB disease severity levels were moderate to high at all locations in 2018. DON levels were highest in Fargo and Brandon, moderate at Langdon, Crookston and St. Paul and moderately low at Osnabruck and Casselton the two-dryland locations HB635, HB562, 2ND32829, 2ND33710 and BM1004-156 had the lowest DON levels in the misted trials.

4) key outcomes or other achievements

Progress is being made toward developing FHB tolerant and DON accumulation resistant barley cultivars through the USWBSI funding and these lines have been tested within the NABSEN. The cooperating breeders are able to use the relative performance data to make decisions about particular breeding lines. All North American barley breeders have access to the data collected in this project and breeders have: 1) tests of the resistance stability of their breeding lines across a range of environments and disease pressures; 2) a measure of the resistance in their advanced lines compared to those of the other barley breeders in North America; 3) access to unique germplasm with resistance to FHB and DON accumulation. The data was uploaded to "The Triticeae Toolbox" (T3) for better access and use.

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

The project has provided training in the lab and field for undergraduate and graduate students.

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

The data and results of the screening have been reported in the annual NABSEN report which is available on the USWBSI website and available to all interested. The data was also uploaded to "The Triticeae Toolbox" (T3).

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?**

   If yes, how many? No

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?**

   If yes, how many? No

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?** none

   If yes, how many? None

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? No

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

Instructions: Refer to the FY18-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY18 grant. Only include citations for publications submitted or presentations given during your award period (7/12/18 - 7/11/19). 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.

Nothing to report

Journal publications.

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

Other publications, conference papers and presentations.