

**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:	59-0206-4-040
USDA-ARS Agreement Title:	Integrated Approaches to Reduce FHB and DON in Irrigated Grain Production of the Arid West.
FY15 USDA-ARS Award Amount:	\$ 29,155
Recipient Organization:	University of Idaho Moscow, ID 83844-3020
DUNS Number:	075746271
EIN:	82-6000945
Recipient Identifying Number or Account Number:	BJKN14
Project/Grant Reporting Period:	06/01/15-05/31/16
Reporting Period End Date:	05/31/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Determining FHB Susceptibility in Barley and Wheat Cultivars in the Western US.	\$ 29,155
	FY15 Total ARS Award Amount	\$ 29,155

Juliet Marshall

7/14/16

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: *Determining FHB Susceptibility in Barley and Wheat Cultivars in the Western US.*

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

The overall goal of this project was to identify and develop FHB resistant wheat and barley cultivars through interdisciplinary cooperation and management practices under irrigation.

2. What was accomplished under these goals?

1) Major activities - The screening nursery was established at the Aberdeen Research and Extension Center in Aberdeen, ID. Planting was accomplished with collaboration between the USDA-ARS researchers and University of Idaho researchers. USDA employees planted the screening nursery that was organized and coordinated by our program. Plots included entries from the extension variety trial program, the barley breeding program, the wheat breeding program, Anheuser-Busch, and Montana State University. USDA-ARS employees applied herbicides for weed control, and we developed inoculum of *Fusarium graminearum* using both corn spawn and macroconidia. In addition, the UI cereals program planted a fungicide trial. Irrigation equipment was installed and an irrigation schedule established to facilitate infection.

The UI program organized an inoculation schedule based on heading dates of wheat and barley cultivars that were planted in rows. Wheat inoculation consisted only of spreading corn spawn in the rows three weeks prior to heading, while barley was additionally treated with a macroconidial suspension at the appropriate growth stage. Fungicides were applied prior to inoculation of plots using conidial spore suspensions.

Trials were planted May 8, 2015, one month later than the 2014 planting date. The 2014 results were poor, due to cold, windy conditions during April and May of 2014. Triticale was planted around the 2015 nursery to establish a tall border to reduce wind effects and (hopefully) increase humidity to facilitate infection. May and June of 2015 were very hot, and perithecia rapidly developed in the corn spawn.

2) Specific Objectives The specific objectives are: 1) Establish a field screening nursery; 2) Characterize FHB resistance in currently grown spring barley and wheat cultivars; 3) Determine the effectiveness of fungicide application in reducing symptoms and DON levels under irrigation. The field nursery was established in collaboration with barley breeder Dr. Hu and pathologist Dr. J. Bonman at USDA-ARS, and wheat breeder Dr. J. Chen at University of Idaho, Aberdeen, ID.

3) Significant Results. Infection was successful in both the wheat and barley nurseries. Data analysis indicated significant differences between cultivars and between fungicide treatments for FHB indices and deoxynivalenol (DON) accumulation in the harvested grain.

4) Key outcomes. The results of these trials were presented at several scientific meetings (the Annual National Head Blight Forum in St. Louis, MO, the Idaho Association of Plant Protections) and at many extension and grower meetings. The analyses has allowed us to identify those varieties that have the highest degree of susceptibility and resistance and to develop recommendations for best management practices under irrigation for both variety selection and fungicide application.

While results in the wheat screening nursery were excellent, barley results were not as good as we had hoped. Results were still statistically valid, however, it would have been better if disease pressure had been higher.

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

Training of all our permanent staff occurred in FHB inoculum development, nursery management for FHB disease development, and scoring infection. Professional development for one staff member (Suzette Arcibal) was enhanced with collaboration and guidance from Dr. Ruth Dill-Macky, University of Minnesota, as Suzette analyzed data, interpreted results and developed posters for presentation at meetings. Suzette and I were able to discuss results and solicit input on techniques and protocols from experienced FHB researchers at the National FHB Forum.

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

The results are constantly referenced at grower meetings, during phone calls, at extension presentations, during media interviews, field days and at professional meetings. Results were published in multiple formats (FHB meeting proceedings, Plant Disease Management Reports, the 2015 Small Grains Report), and presentations were given not only in the state of Idaho, but in neighboring Pacific Northwest and Intermountain states.

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? None**

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? NA**

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.

Marshall, J.M., Arcibal, S.M., Jackson, C.A., Shelman, T. 2016. "Foliar fungicides for control of Fusarium head blight in irrigated Klasic hard white spring wheat, Bingham Co., ID." March, 2016. Plant Disease Management Report CF006.

Status: Published

Acknowledgement of Federal Support: No

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

Other publications, conference papers and presentations.

Marshall, J.M., Jackson, C.A., Shelman, T., Beck, L., and O'Brien, K. 2016. 2015 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. Idaho Agricultural Experiment Station. UI Research Bulletin 188. 133 pp.
<http://www.cals.uidaho.edu/edComm/pdf/RES/RES188.pdf>

Status: Research Bulletin Published

Acknowledgement of Federal Support: YES

Arcibal, S.M., Baldwin, T.T., Jackson, C.A., Shelman, T., and Marshall, J.M. 2015. Screening for FHB Susceptibility in Barley Cultivars in the Western U.S. In: S. Canty, Clark, S. Vukasovich and D. Van Sanford (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum*. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 45.

Status: Abstract Published and poster presented

Acknowledgement of Federal Support: YES

Arcibal, S.M., Baldwin, T.T., Jackson, C.A., Shelman, T., and Marshall, J.M. 2015. Screening for FHB Susceptibility in Wheat Cultivars in the Western U.S. In: S. Canty, Clark, S. Vukasovich and D. Van Sanford (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum*. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 45.

Status: Abstract Published and poster presented

Acknowledgement of Federal Support: YES

Hu, G., Satterfield, K., Evans, C., Brueggeman, R., Schwarz, P., and **Marshall, J.M.** 2015. *Fusarium Head Blight Resistance of USDA-ARS Breeding Materials in Idaho*. In: S. Canty, Clark, S. Vukasovich and D. Van Sanford (Eds.), *Proceedings of the 2015*

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National Fusarium Head Blight Forum. East Lansing, MI/Lexington, KY: U.S. Wheat
& Barley Scab Initiative. p. 45.

Status: Abstract Published and poster presented

Acknowledgement of Federal Support: YES

Marshall, J.M. 2016 (recorded 1/19/16). Managing Fusarium Head Blight Webinar (Updated for
the Idaho Wheat Commission). 187 views as of May 31, 2016. Invited.

<https://vimeo.com/152646122>

Status: Published on-line

Acknowledgement of Federal Support: YES