

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY14 Final Performance Report
July 15, 2015**

Cover Page

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Fiscal Year:	FY14
USDA-ARS Agreement ID:	59-0206-4-042
USDA-ARS Agreement Title:	Integrated Approaches to Reduce FHB and DON in Irrigated Grain Production of the Arid West.
FY14 USDA-ARS Award Amount:	\$ 29,183

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
WES-CP	Determining FHB Susceptibility in Barley and Wheat Cultivars in the Western US.	\$ 29,183
	FY14 Total ARS Award Amount	\$ 29,183

Principal Investigator

Date

* MGMT – FHB Management

FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain

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

WES-CP – Western 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 major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

FHB is an emerging issue in the west, with significant incidence that started in 2009. This disease is new to the PNW and growers now have to learn to manage FHB and DON accumulation. Correlating with increases in corn acreage and dairies, FHB is now causing significant losses in durum and wheat in irrigated production systems that were previously considered unfavorable to scab disease development. Incidence in barley has also been increasing, but detectable DON levels in commercial production prior to 2015 have remained below 0.5 PPM in Idaho. Montana, Washington, Colorado and Idaho are now consistently addressing FHB in irrigated grain production, with Dr. Tim Murray reporting FHB in dryland wheat production in eastern Washington in 2014.

Growers use locally adapted varieties that were developed without screening for FHB susceptibility or accumulation of DON. Most winter and spring wheat varieties adapted for high elevation, arid production systems are very susceptible to FHB. Spring varieties are the most susceptible due to timing of spore release and favorable temperatures that occur at flowering of spring wheat and barley. Screening of currently grown varieties and advanced breeding lines will enable growers to choose the best varieties for their production systems, especially if corn is included in the rotation. Irrigated producers must be made aware of the risks associated with production of susceptible varieties. We are resolving the issue by screening all currently grown varieties of wheat and barley for susceptibility to FHB and degree of DON accumulation under irrigation. We have identified those varieties that have the highest susceptibility to FHB as well as those that are more resistant and are educating consultants and growers in those best management practices that reduce disease development. Fungicides are also being tested under irrigation to test efficacy under inoculated and irrigated conditions.

2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:

Accomplishment:

The collaborating researchers at the University of Idaho and the USDA-ARS developed a screening nursery at the Aberdeen R&E Center. Special irrigation capabilities were established to promote environmental conditions that favor infection. Spores suspensions using macroconidia of *Fusarium culmorum* were developed by Dr. Jianli Chen's program for inoculating headrows of wheat and barley. The headrows included all entries from the Extension Variety Trials of spring wheat and barley (coordinated by Dr. Juliet Marshall, University of Idaho), advanced breeding lines from the spring wheat breeding program (Dr. Jianli Chen), and advanced lines from the barley breeding program (Dr. Gongshe Hu, USDA-ARS). The nursery was planted early in the spring of 2014, and heading occurred during cool, windy weather, which was not favorable for infection. FHB incidence and

severity were rated successfully for the wheat nurseries, but not for the barley nurseries. Results from the wheat screening trial were used to assess susceptibility of currently grown lines to FHB and samples were sent to Dr. Yanhong Dong (University of Minnesota) for DON analyses. Data were presented during multiple meetings, including the University of Idaho's Cereal School in February of 2015 and at many other grower meetings. Practices to reduce FHB in the field were discussed extensively, and growers were taught how to recognize early symptom development. Harvest practices to reduce FDK were also discussed and have been successfully used to reduce DON in harvested spring wheat.

Impact:

The establishment of FHB as a regularly occurring problem necessitates screening of current breeding material and incorporation of resistance of critical importance under irrigation. Growers are becoming aware of the increasing incidence of FHB and DON under irrigated production, especially in the hard white spring wheat varieties. We are promoting utilization of varieties that less susceptible, IPM, fungicide applications, and production practices that will reduce DON levels. We emphasize rotation to minimize risk, and specifically do not recommend hard white wheat production following corn. Grower education is extremely critical for the implementation of practices to reduce risk. Consultants are now recommending the application of fungicides at flowering to reduce FHB as a standard practice, which never occurred prior to 2013. FHB is the most highly requested topic at grower and industry meetings.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY14 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 FY14 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 FY14 award period? No**

If yes, how many?

- 3. Have any post docs who worked for you during the FY14 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 FY14 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?

Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY14 award period. List the release notice or publication. Briefly describe the level of FHB resistance. *If not applicable because your grant did NOT include any VDHR-related projects, enter N/A below.*

N/A

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the FY14 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Marshall, J.M., Arcibal, S.M.S, Jackson, C.A., and Chen, J. 2014. Screening for FHB Susceptibility in Barley and Wheat Cultivars in the Western U.S. Proceedings of the 2014 USWBSI Meeting, St. Louis, MO, Dec 6-9, 2014.

Marshall, J.M., Jackson, C.A., Shelman, T., Beck, L., and O'Brien, K. 2015. Hard Spring Wheat Stripe Rust and Fusarium Head Blight Ratings, 2014 *in* 2014 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. Idaho Agricultural Experiment Station. UI Research Bulletin 186. Page 122.

Presentations:

Marshall, J.M. 2014. General Mills 2014 Spring Seed Kickoff “Head Blight: Is it Hype, or a Real Threat? Participate in and lead speaker of panel discussion. Idaho Falls, ID. March 17, 2014.

Jackson, C. and Marshall, J.M. 2014. Fungicide use for control of FHB and Stripe rust in small grains. Bingham Coop Blackfoot Grower meeting. Blackfoot, ID. March 11, 2014

Marshall, J.M. 2015. Cereal diseases in 2014. University of Idaho Cereal School. Pocatello, ID. February 4, 2015.

Marshall, J.M. 2015. Cereal diseases in 2014. University of Idaho Cereal School. Idaho Falls, ID. February 5, 2015.

Marshall, J.M. 2015. Cereal diseases in 2014. University of Idaho Cereal School. Ashton, ID. February 5, 2015.

Marshall, J.M. 2015. Cereal diseases in 2014. University of Idaho Cereal School. Soda Springs, ID. February 6, 2015.

Marshall, J.M. 2015. FHB in Wheat and Barley. CPS grower meeting, Idaho Falls, ID. February 25, 2015.

FY14 (approx. May 14 – May 15)
PI: Marshall, Juliet
USDA-ARS Agreement #: 59-0206-4-042

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Marshall, J.M. 2015. Cereal diseases in 2014. University of Idaho Cereal School. Burley, ID.
February 3, 2015.