

**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:	59-0206-5-004
USDA-ARS Agreement Title:	Fusarium Head Blight Resistance for Montana Spring Wheat.
FY15 USDA-ARS Award Amount:	\$ 14,577
Recipient Organization:	Montana State University Office of Sponsored Programs Montana State University PO Box 172470 Bozeman, MT 59717-2470
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Project/Grant Reporting Period:	05/06/15-05/05/16
Reporting Period End Date:	05/05/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-SPR	Fusarium Head Blight Resistance for Montana Spring Wheat.	\$ 14,577
	FY15 Total ARS Award Amount	\$ 14,577

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: *Fusarium Head Blight Resistance for Montana Spring Wheat.*

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

The primary goals of the project are two-fold. The first goal is to conduct a traditional breeding program to incorporate scab resistance into a large array of elite lines suitable for production in Montana. The second goal is to screen advanced lines from previous crosses to identify lines possessing resistance gene *Fhb1* or other forms of resistance.

2. What was accomplished under these goals?

1) major activities

Major activities included incorporation of lines with FHB resistance into crossing programs over the past few years, and including progeny from the crosses into our standard selection nurseries. In addition, later generation materials have been entered into FHB-screening nurseries and assessed with molecular markers for *Fhb1*.

2) specific objectives

Specific objectives included evaluation of earlier generation materials derived from crosses with FHB-resistant lines (such as SD3997 (released as Forefront), SD4181, MN03358-4 (released as Sabin), and Rollag) as either F₄ or F₅ head rows for evaluation. Moderately resistant line BW499 was used as a parent in several crosses with adapted Montana parents to generate F₁ progeny currently growing in the field. Our strategy will be to select lines up to the point of an initial statewide yield trial based on standard agronomic traits for Montana, including resistance to the wheat stem sawfly. At the point of entry into advanced trials, potentially resistant lines are entered into a regional FHB-trial conducted by Juliet Marshall (Idaho), as well as screened with PCR markers for *Fhb1*.

3) significant results

Four advanced lines with FHB-resistant parents in their pedigrees were tested in an inoculated nursery in Idaho in 2015. None showed resistance. Additional lines with FHB-resistant parentage were tested in breeding trials and advanced as appropriate. Twenty-three advanced lines were sent for FHB screening for 2016. These primarily derived from crosses with MN0813-2, Select and RB07. The lines have marker alleles indicating presence of *Fhb1*. These lines are also being evaluated in yield trials in Montana. Agronomic performance and FHB-resistance will determine whether the lines are advanced for potential release.

4) key outcomes or other achievements

The PCR marker for *Fhb1* established for use on our program is SSR *gwm533*. Initial screening of lines in advanced yield trials showed that four lines had the marker allele indicating resistance. In the past year, additional PCR markers have been obtained which are closer to *Fhb1*, and can be monitored using Kasp assays. These assays require no gel electrophoresis and are more efficient to conduct than SSR marker assays. One objective this year was to transition from use of SSR marker *gwm533* to the more efficient Kasp system. This system also provides markers more closely-linked to *Fhb1* than the SSR markers. The

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most reliable marker has been the ‘Fargo *Fhb1* Kasp marker’ developed based on the sequence near the *Fhb1* gene.

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

One undergraduate female student conducted an independent study project involving screening our most advanced materials with markers for several diseases, including *Fhb1*. Her results were the basis for identification of lines descended from MT0858 as potentially having *Fhb1*. Based on her experience, this student has commenced an M.S. program under my advisement.

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

The primary venue for reporting results in field day talks to growers around Montana.

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? No.**

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? No.**

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

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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.

Nothing to Report.

Journal publications.

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

Other publications, conference papers and presentations.