

**USDA-ARS**  
**U.S. Wheat and Barley Scab Initiative**  
**FY17 Final Performance Report**  
**Due date: July 31, 2018**

**Cover Page**

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<b>Fiscal Year:</b>	2017
<b>USDA-ARS Agreement ID:</b>	59-0206-5-004
<b>USDA-ARS Agreement Title:</b>	Fusarium Head Blight Resistance for Montana Spring Wheat.
<b>FY17 USDA-ARS Award Amount:</b>	\$ 14,535
<b>Recipient Organization:</b>	Montana State University Office of Sponsored Programs Montana State University PO Box 172470 Bozeman, MT 59717-2470
<b>DUNS Number:</b>	625447982
<b>EIN:</b>	816010045
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<b>Project/Grant Reporting Period:</b>	5/6/17 - 5/5/18
<b>Reporting Period End Date:</b>	05/05/18

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
VDHR-SPR	Fusarium Head Blight Resistance for Montana Spring Wheat.	\$ 14,535
	<b>FY17 Total ARS Award Amount</b>	\$ 14,535

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Principal Investigator

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

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

The goal of the project is to develop spring wheat varieties with resistance to FHB for Montana.

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

Two **major activities** were pursued. First, we made crosses yearly with several lines developed by other breeding programs and known to have resistance to FHB. New lines derived from these crosses are at all stages of the breeding program. Selection in early generations, through F5, has been for agronomic traits critical for Montana. One such trait is wheat stem sawfly resistance. Advanced lines have been entered into FHB testing nurseries in Montana in collaboration with Dr. Frankie Crutcher, and in Idaho with Dr. Juliet Marshall. Second, in cooperation with Dr. Jason Cook, we backcrossed Fhb1 and Fhb5A into adapted Montana varieties.

The **specific objective** of the traditional crossing program is to insure that all generations in our breeding pipeline contain material with resistance to FHB. **The specific objective** of the backcrossing program is to introduce FHB resistance into adapted varieties for immediate evaluation.

One **significant result** has been the development of advanced breeding lines with FHB resistance. Several of the lines were tested in 2017 in an FHB nursery in Idaho. The trial also included popular varieties Vida, Duclair and Lanning. Table 1 shows that most of the tested lines were more resistant than our susceptible check, McNeal. Several of the lines from crosses with RB07 showed excellent resistance. MT1716 and MT1731 also performed well in 2017 for agronomic traits and are being tested in our statewide breeding trials in 2018. One useful result was the finding of a high degree of resistance shown by Vida, which is the most widely grown variety in Montana. Thus, there is an innate level of resistance that should be useful for controlling FHB in Montana.

Table 1. Fusarium head blight reaction for several experimental lines and varieties in an inoculated trial conducted in Idaho.

Variety	Source	Severity	Incidence	FHB Index
McNeal		37.2 A	52.5 A	19.7 A
Duclair		18.5 B	32.5 A	6.7 B
MT 1701	MN0813-2	17.6 BC	32.5 A	6.1 B
Lanning		15.7 BCD	30 A	5.3 B
MT 1702	MN0813-2	13.5 B-E	27.5 A	5.2 B
MT 1706	RB07	12.6 B-E	37.5 A	4.9 B
Vida		6.5 B-E	25 A	1.7 B
MT 1752	RB07	6.6 B-E	20 A	1.3 B
MT 1717	RB07	2.9 CDE	20 A	0.7 B
MT 1716	RB07	1.4 DE	12.5 A	0.2 B
MT 1731	RB07	0 E	0 A	0 B
Pr > F		0.0097 *	0.1149 <sup>NS</sup>	0.0244 *

A second **significant result** has been the development of marker-assisted backcross populations containing Fhb1 and Fhb5A in backgrounds of McNeal and Duclair. In addition, Fhb1 backcross lines have been developed for popular varieties Lanning, Vida and NS Presser CLP, as well as for two solid stem experimental lines.

**Key outcomes and achievements** include the saturation of the breeding pipeline with FHB-resistant lines, two of which are included in statewide yield trials, and the development of marker-assisted backcross lines in additional backgrounds.

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

The PI (Talbert) has probably learned as much as anyone in terms of areas of Montana where FHB is likely to be a problem, and the challenges of both field and marker-based screening. In addition, professional staff has become familiar with symptoms of FHB and resources for control.

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

Results have been disseminated through one on one contacts with growers and seed dealers and in statewide field days. Perhaps of most immediate interest to growers is that the widely grown cultivar Vida is relatively resistant.

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### **Training of Next Generation Scientists**

**Instructions:** Please answer the following questions as it pertains to the FY17 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 FY17 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 FY17 award period? No.**

**If yes, how many?**

3. **Have any post docs who worked for you during the FY17 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 FY17 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?**

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### 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 FY17 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**

**Instructions:** Refer to the FY17-FPR\_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY17 grant. Only include citations for publications submitted or presentations given during your award period (5/6/17 - 5/5/18). 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.**