

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

Cover Page

Principle Investigator (PI):	Jamie Sherman
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Fiscal Year:	2017
USDA-ARS Agreement ID:	59-0206-5-003
USDA-ARS Agreement Title:	Fusarium Head Blight Resistance for Montana Barley.
FY17 USDA-ARS Award Amount:	\$ 21,364
Recipient Organization:	Montana State University Office of Sponsored Programs Montana State University PO Box 172470 Bozeman, MT 59717-2470
DUNS Number:	625447982
EIN:	816010045
Recipient Identifying Number or Account Number:	W5477
Project/Grant Reporting Period:	5/6/17 - 5/5/18
Reporting Period End Date:	05/05/18

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Fusarium Head Blight Resistance for Montana Barley.	\$ 21,364
	FY17 Total ARS Award Amount	\$ 21,364

Jamie Sherman

Principal Investigator

7/28/18

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 Barley.*

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

The primary goal of this grant was to improve Montana lines for Fusarium head blight resistance.

The objectives met in 2017:

- A. Lines created in previous years were screened in 3 locations (Fargo, Langdon, and Sydney).
- B. Nurseries with successful infestation were submitted for DON screening to Schwartz (Fargo and Langdon).
- C. New crosses to pyramid resistance were made and lines with FHB resistance from TCAP NAM were advanced.
- D. A new screening nursery was created for eastern MT in 2017.
- E. Developed screening capabilities for DON for the MSU malt quality lab.

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

1) major activities

The major activities included screening lines for resistance and DON levels, making new crosses, creating an new screening location and developing new DON screening in Montana.

2) specific objectives

- a. Lines created in previous years were screened in 3 locations (Fargo, Langdon, and Sydney). This year we learned of a fourth site available to us (Osnabrock) and Horsley has graciously agreed to screen material for us in 2019.
- b. Nurseries with successful infestation were submitted for DON screening to Schwartz (Fargo and Langdon).
- c. New crosses to pyramid resistance were made. Also Conlon by FHB resistant lines that were part of the TCAP NAM were advanced. This work provides more than 2,500 lines to screen. Lines with transgressive segregation for FHB resistance will be looped back into crossing block for continued improvement.

PINNACLE	PI639343
PINNACLE	PI573611
CHEVRON	PINNACLE
PINNACLE	PI412946
MT124112	DIAMANT
BEARPAW	DIAMANT
MT124112	HAISA
X0626-T229	PI573611
BEARPAW	<u>PI 412946</u>
BEARPAW	PI436136
Bearpaw	PI592173
Bearpaw	clho13135

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LAVINA	PI573611
Conlon	PI412946
Conlon	PI357314
Conlon	PI436136
Conlon	PI234846
Conlon	PI506295
Conlon	PI327969
Conlon	CIho13135
Conlon	PI573611
Conlon	PI330397
Conlon	PI447137
Conlon	PI384986
Conlon	PI371056

- d. Although good infestation was not achieved in Sydney in 2018 this was likely due to the drought. However, much was learned from the experience, including the necessity of a dedicated misting system. Good infestation has been achieved in 2018.
- e. We have achieved reproducible DON screening in the MSU malt quality lab. This is necessary to the program not only to supplement the 400 data points available to us through Schwartz, but it also is a necessary component to ensure that the craft maltsters using our facility understand the DON status of their barley/malt.

3) significant results

The Table on the following page reports the data from 2017 screening in two locations. Since this is the first year these experimental lines were we resubmitted in 2018.

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	Langdon					Fargo				
	Line	Avg severity	DON AVG	Avg Severity	DON	Line	Avg severity	DON AVG	Avg Severity	DON
	39-1	21	20.4	12	7.7	44-10	21	15.5	3	5.0
	39-3	30	28.4	3	9.6	44-11	21	27.8	30	9.0
	39-7	30	43.9	3	8.0	44-12	30	24.2	12	4.6
	39-9	30	16.4	21	9.2	44-13	12	28.1	21	27.1
	39-12	30	37.2	3	13.3	44-14	30	41.2	21	14.1
	39-14	30	22.3	3	16.3	44-17	30	36.0	12	11.5
	39-15	12	21.8	30	12.9	44-18	12	14.1	12	9.9
	40-1	30	27.1	12	5.3	44-19	21	20.4	21	15.9
	40-5	21	28.8	3	6.1	44-21	30	37.3	12	15.5
	40-6	12	36.3	21	9.3	44-22	21	17.7	12	7.4
	40-8	21	14.3	12	9.6	44-23	3	14.3	12	8.5
	40-14	30	26.8	21	5.3	45-2	12	21.5	30	16.5
	40-15	30	25.4	21	6.0	45-4	12	19.3	12	7.0
	41-5	10	33.4	21	6.0	45-6	12	23.3	12	7.0
	41-7	11	33.4	21	6.0	45-7	11	23.3	12	7.0
	41-8	11	33.4	21	6.0	45-8	11	23.3	12	7.0
	41-9	11	33.4	21	6.0	45-9	11	23.3	12	7.0
	41-10	11	33.4	21	6.0	45-10	11	23.3	12	7.0
	41-11	11	33.4	21	6.0	45-11	11	23.3	12	7.0
	41-12	11	33.4	21	6.0	45-12	11	23.3	12	7.0
	41-13	11	33.4	21	6.0	45-13	11	23.3	12	7.0
	41-14	11	33.4	21	6.0	45-14	11	23.3	12	7.0
	41-15	11	33.4	21	6.0	45-15	11	23.3	12	7.0
	41-16	11	33.4	21	6.0	45-16	11	23.3	12	7.0
	41-17	11	33.4	21	6.0	45-17	11	23.3	12	7.0
	41-18	11	33.4	21	6.0	45-18	11	23.3	12	7.0
	41-19	11	33.4	21	6.0	45-19	11	23.3	12	7.0
	41-20	11	33.4	21	6.0	45-20	11	23.3	12	7.0
	41-21	11	33.4	21	6.0	45-21	11	23.3	12	7.0
	41-22	11	33.4	21	6.0	45-22	11	23.3	12	7.0
	41-23	11	33.4	21	6.0	45-23	11	23.3	12	7.0
	41-24	11	33.4	21	6.0	45-24	11	23.3	12	7.0
	41-25	11	33.4	21	6.0	45-25	11	23.3	12	7.0
	41-26	11	33.4	21	6.0	45-26	11	23.3	12	7.0
	41-27	11	33.4	21	6.0	45-27	11	23.3	12	7.0
	41-28	11	33.4	21	6.0	45-28	11	23.3	12	7.0
	41-29	11	33.4	21	6.0	45-29	11	23.3	12	7.0
	41-30	11	33.4	21	6.0	45-30	11	23.3	12	7.0
	41-31	11	33.4	21	6.0	45-31	11	23.3	12	7.0
	41-32	11	33.4	21	6.0	45-32	11	23.3	12	7.0
	41-33	11	33.4	21	6.0	45-33	11	23.3	12	7.0
	41-34	11	33.4	21	6.0	45-34	11	23.3	12	7.0
	41-35	11	33.4	21	6.0	45-35	11	23.3	12	7.0
	41-36	11	33.4	21	6.0	45-36	11	23.3	12	7.0
	41-37	11	33.4	21	6.0	45-37	11	23.3	12	7.0
	41-38	11	33.4	21	6.0	45-38	11	23.3	12	7.0
	41-39	11	33.4	21	6.0	45-39	11	23.3	12	7.0
	41-40	11	33.4	21	6.0	45-40	11	23.3	12	7.0
	41-41	11	33.4	21	6.0	45-41	11	23.3	12	7.0
	41-42	11	33.4	21	6.0	45-42	11	23.3	12	7.0
	41-43	11	33.4	21	6.0	45-43	11	23.3	12	7.0
	41-44	11	33.4	21	6.0	45-44	11	23.3	12	7.0
	41-45	11	33.4	21	6.0	45-45	11	23.3	12	7.0
	41-46	11	33.4	21	6.0	45-46	11	23.3	12	7.0
	41-47	11	33.4	21	6.0	45-47	11	23.3	12	7.0
	41-48	11	33.4	21	6.0	45-48	11	23.3	12	7.0
	41-49	11	33.4	21	6.0	45-49	11	23.3	12	7.0
	41-50	11	33.4	21	6.0	45-50	11	23.3	12	7.0
	41-51	11	33.4	21	6.0	45-51	11	23.3	12	7.0
	41-52	11	33.4	21	6.0	45-52	11	23.3	12	7.0
	41-53	11	33.4	21	6.0	45-53	11	23.3	12	7.0
	41-54	11	33.4	21	6.0	45-54	11	23.3	12	7.0
	41-55	11	33.4	21	6.0	45-55	11	23.3	12	7.0
	41-56	11	33.4	21	6.0	45-56	11	23.3	12	7.0
	41-57	11	33.4	21	6.0	45-57	11	23.3	12	7.0
	41-58	11	33.4	21	6.0	45-58	11	23.3	12	7.0
	41-59	11	33.4	21	6.0	45-59	11	23.3	12	7.0
	41-60	11	33.4	21	6.0	45-60	11	23.3	12	7.0
	41-61	11	33.4	21	6.0	45-61	11	23.3	12	7.0
	41-62	11	33.4	21	6.0	45-62	11	23.3	12	7.0
	41-63	11	33.4	21	6.0	45-63	11	23.3	12	7.0
	41-64	11	33.4	21	6.0	45-64	11	23.3	12	7.0
	41-65	11	33.4	21	6.0	45-65	11	23.3	12	7.0
	41-66	11	33.4	21	6.0	45-66	11	23.3	12	7.0
	41-67	11	33.4	21	6.0	45-67	11	23.3	12	7.0
	41-68	11	33.4	21	6.0	45-68	11	23.3	12	7.0
	41-69	11	33.4	21	6.0	45-69	11	23.3	12	7.0
	41-70	11	33.4	21	6.0	45-70	11	23.3	12	7.0
	41-71	11	33.4	21	6.0	45-71	11	23.3	12	7.0
	41-72	11	33.4	21	6.0	45-72	11	23.3	12	7.0
	41-73	11	33.4	21	6.0	45-73	11	23.3	12	7.0
	41-74	11	33.4	21	6.0	45-74	11	23.3	12	7.0
	41-75	11	33.4	21	6.0	45-75	11	23.3	12	7.0
	41-76	11	33.4	21	6.0	45-76	11	23.3	12	7.0
	41-77	11	33.4	21	6.0	45-77	11	23.3	12	7.0
	41-78	11	33.4	21	6.0	45-78	11	23.3	12	7.0
	41-79	11	33.4	21	6.0	45-79	11	23.3	12	7.0
	41-80	11	33.4	21	6.0	45-80	11	23.3	12	7.0
	41-81	11	33.4	21	6.0	45-81	11	23.3	12	7.0
	41-82	11	33.4	21	6.0	45-82	11	23.3	12	7.0
	41-83	11	33.4	21	6.0	45-83	11	23.3	12	7.0
	41-84	11	33.4	21	6.0	45-84	11	23.3	12	7.0
	41-85	11	33.4	21	6.0	45-85	11	23.3	12	7.0
	41-86	11	33.4	21	6.0	45-86	11	23.3	12	7.0
	41-87	11	33.4	21	6.0	45-87	11	23.3	12	7.0
	41-88	11	33.4	21	6.0	45-88	11	23.3	12	7.0
	41-89	11	33.4	21	6.0	45-89	11	23.3	12	7.0
	41-90	11	33.4	21	6.0	45-90	11	23.3	12	7.0
	41-91	11	33.4	21	6.0	45-91	11	23.3	12	7.0
	41-92	11	33.4	21	6.0	45-92	11	23.3	12	7.0
	41-93	11	33.4	21	6.0	45-93	11	23.3	12	7.0
	41-94	11	33.4	21	6.0	45-94	11	23.3	12	7.0
	41-95	11	33.4	21	6.0	45-95	11	23.3	12	7.0
	41-96	11	33.4	21	6.0	45-96	11	23.3	12	7.0
	41-97	11	33.4	21	6.0	45-97	11	23.3	12	7.0
	41-98	11	33.4	21	6.0	45-98	11	23.3	12	7.0
	41-99	11	33.4	21	6.0	45-99	11	23.3	12	7.0
	41-100	11	33.4	21	6.0	45-100	11	23.3	12	7.0

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4) key outcomes or other achievements

The key outcomes are a better understanding of the level of scab resistance in Montana lines, the initiation of the development of a set of material that should give us information about the effectiveness of pyrimiding resistance, increased capacity to screen for scab resistance, and increased capacity to give our grower and malt stakeholders important information about DON levels.

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

The project has provided the PI Sherman and coPI Crutcher with opportunities for professional development through workshops and meetings. Members with more experience in FHB screening were particularly helpful in giving Crutcher advice for the new screening nursery in eastern MT. Steffenson and Horsley have been integral in sharing germplasm with the breeding program.

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

Successful screenings must be repeated over several years to ensure true understanding of resistance. Once verified results have been achieved they will be shared through reports, papers and presentations with the hope of eventual release of germplasm.

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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 students supported

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 postdocs supported

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.

None to report

Journal publications.

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

Other publications, conference papers and presentations.