

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY16 Final Performance Report
Due date: July 28, 2017**

Cover Page

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Fiscal Year:	2016
USDA-ARS Agreement ID:	59-0206-4-039
USDA-ARS Agreement Title:	Improving FHB resistance in Hard Winter Wheat by Molecular Breeding/ Manipulation.
FY16 USDA-ARS Award Amount:	\$ 19,887
Recipient Organization:	South Dakota State University SAD 133, Box 2201 Brookings, SD 57007
DUNS Number:	929929743
EIN:	46-6000364
Recipient Identifying Number or Account Number:	3F4679
Project/Grant Reporting Period:	6/1/16 - 5/31/17
Reporting Period End Date:	05/31/17

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
HW-CP	Improving FHB Resistance in Hard Winter Wheat by Molecular Breeding/Manipulation.	\$ 19,887
	FY16 Total ARS Award Amount	\$ 19,887



July 14, 2017

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
 HW-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: *Improving FHB Resistance in Hard Winter Wheat by Molecular Breeding/Manipulation.*

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

The goal of this project is to develop a gene-specific marker for *Fhb1-1*, a major genic component of FHB resistant QTL *Qfhb1*. There are two objectives: 1) identify representative DNA polymorphism, such as a SNP or deletion; 2) develop PCR-based marker from the polymorphism for marker-aided selection of this gene.

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

Objective 1: Identify representative DNA polymorphism, such as a SNP or deletion:

1) Major activities:

Training graduate students, clone and analyze *Fhb1-1* sequence between the FHB-resistant and the FHB-susceptible wheat lines.

2) Specific objectives:

- Clone *Fhb1-1* coding sequence from FHB-resistant lines Sumai 3 and NIL260-2 and the FHB-susceptible lines Y1193-6 and NIL260-4.

- Comparing the cloned sequences to identify representative polymorphic sequences between the FHB-resistant and the FHB-susceptible wheat lines.

- Identified a few SNPs and deletions that are polymorphic between the FHB-resistant and the FHB-susceptible lines.

3) Significant results:

Fhb1-1 coding sequence has been cloned from the four wheat lines and Candidate representative polymorphisms between the two groups have been identified by sequencing comparison.

4) Key outcomes or other achievements:

Identified candidate polymorphic sites between the two groups for marker development in FY17.

Objective 2: Develop PCR-based marker from the polymorphism for marker-aided selection of this gene:

1) Major activities:

Work to achieve this objective is currently going on. A few PCR primer sets have been designed based on the representative polymorphic sequences and are being testing. The result will be reported in the FY17 report.

2) Specific objectives

3) Significant results

4) Key outcomes or other achievements

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

This fund enable us to pay salaries for three graduate students either for their summer months or supplementary to their partially funded teaching assistantships during the academic years.

(Form – FPR16)

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The students have obtained training in cloning and analyzing the gene sequence and developing PCR primers from the identified polymorphism. The students also obtained training in culturing the fungus, extracting spores from the culture, inoculating wheat plants with the spores and indexing the FHB symptoms.

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

The progress and results of this project have been reported to the FHB community via posters at the FHB annual forums and HWW-CP meetings.

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Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY16 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 FY16 award period?**

If yes, how many? Yes. One

- 2. Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY16 award period?**

If yes, how many? No.

- 3. Have any post docs who worked for you during the FY16 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**

If yes, how many? No.

- 4. Have any post docs who worked for you during the FY16 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**

If yes, how many? No.

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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 FY16 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
N/A				

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 FY16-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY16 grant. Only include citations for publications submitted or presentations given during your award period (6/1/16 - 5/31/17). 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. See example below for a poster presented at the FHB Forum:

Conley, E.J., and J.A. Anderson. 2016. Accuracy of Genome-Wide Prediction for Fusarium Head Blight Associated Traits in a Spring Wheat Breeding Program. In: Proceedings of the XXIV International Plant & Animal Genome Conference, San Diego, CA.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (poster), NO (abstract)

Journal publications.

Dahal, S., Galla, A., Paudel, B., Ma, A. and Yen, Y. 2016. Elucidating the role of silencing RNA *fg-siR34* in Fusarium head blight pathogenesis in wheat. In: Proceedings of the 2016 National Fusarium Head Blight Forum, St. Louis, MO, USA, December 4-6, 2016, page 57.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (poster), NO (abstract)

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

None.

Other publications, conference papers and presentations.

None.