

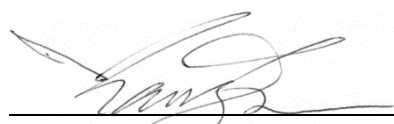
**USDA-ARS**  
**U.S. Wheat and Barley Scab Initiative**  
**FY17 Preliminary Final Performance Report**  
**Due date: July 31, 2018**

**Cover Page**

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<b>Fiscal Year:</b>	2017
<b>USDA-ARS Agreement ID:</b>	59-0206-4-039
<b>USDA-ARS Agreement Title:</b>	Improving FHB resistance in Hard Winter Wheat by Molecular Breeding/ Manipulation.
<b>FY17 USDA-ARS Award Amount:</b>	\$ 19,849
<b>Recipient Organization:</b>	South Dakota State University SAD 133, Box 2201 Brookings, SD 57007
<b>DUNS Number:</b>	929929743
<b>EIN:</b>	46-6000364
<b>Recipient Identifying Number or Account Number:</b>	3F4679
<b>Project/Grant Reporting Period:</b>	6/1/17 - 5/31/18
<b>Reporting Period End Date:</b>	5/31/2018

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
HWW-CP	Improving FHB Resistance in Hard Winter Wheat by Molecular Breeding/Manipulation.	\$ 19,849
<b>FY17 Total ARS Award Amount</b>		<b>\$ 19,849</b>



Principal Investigator

July 31, 2018

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: *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: Training graduate students, identify SNPs/indels in the coding and regulatory sequence of *Fhb1-1* and test their effectiveness as the gene-specific marker for *FHB1-1*.

2) Specific objectives:

a. Identify key SNPs/indels in the coding and promotor region

b. Design PCR markers for the SNPs/indel and test their effectiveness as the gene-specific marker.

3) Significant results:

Work to achieve this objective is currently going on. PCR primer sets have been designed based on the representative polymorphic sequences and are being testing.

Those PCR markers that have been tested so far all can distinguish the two *Fhb* near-isogenic lines 260-1-1-2 (*Fhb1+*) and 260-1-1-4 (*Fhb1-*) but none of them has 100%

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effectiveness in identifying FHB resistance among a panel of winter wheat lines. We test more markers and are expanding our search range to include the 5' UTR, the 3' UTR and the promotor region.

4) Key outcomes or other achievements: We will report it in our final report.

**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. 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 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?**

### 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
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 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 (6/1/17 - 5/31/18). 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.**