

**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>	59-0206-7-157
<b>USDA-ARS Agreement Title:</b>	Genetic Characterization and Selection for Fusarium Head Blight Resistance in Durum Wheat.
<b>FY17 USDA-ARS Award Amount:</b>	\$ 33,915
<b>Recipient Organization:</b>	North Dakota State University Office of Grant & Contract Accounting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
<b>DUNS Number:</b>	80-388-2299
<b>EIN:</b>	45-6002439
<b>Recipient Identifying Number or Account Number:</b>	FAR0028453
<b>Project/Grant Reporting Period:</b>	8/1/17 - 7/31/18
<b>Reporting Period End Date:</b>	07/31/18

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
DUR-CP	Genomics-Assisted Recurrent Selection to Enhance FHB Resistance in Durum Wheat	\$ 33,915
	<b>FY17 Total ARS Award Amount</b>	<b>\$ 33,915</b>

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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

**Project 1:** *Genomics-Assisted Recurrent Selection to Enhance FHB Resistance in Durum Wheat*

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

The major goal of this project is to develop durum wheat germplasm/lines with improved Fhb resistance adapted to Northern Great Plain in US. The specific objectives are to

- 1) improve Fhb resistance of a durum wheat population through recurrent selection
- 2) utilize genomics-assisted selection to enhance efficiency of recurrent selection
- 3) develop source of new inbred lines with improved Fhb resistance
- 4) characterize genetic basis of Fhb resistance in tetraploid wheat

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

1) major activities

A base population was developed for recurrent selection

2) specific objectives

Objective 1: We developed a male sterile durum line (Ms3-Carpio) by introgressing a dominant male sterile gene (Ms3) into a durum cultivar 'Carpio'. Further, another four male sterile durum lines including Ms3-Carpio/Strongfield, Ms3-Carpio/D09690, Ms3-Carpio/D13761, and Ms3-Carpio/13671, were developed by crossing Ms3-Carpio and four elite breeding lines. The four elite breeding lines and cultivar were also crossed to 10 advanced Fhb resistant durum lines (derived from crosses between durum wheat cultivars and other tetraploid and bread wheat relatives) and generate 10 F1s. Then, the four male-sterile durum lines and the 10 F1s were randomly intercrossed to obtain a base population for half-sib recurrent selection.

Objective 4: we evaluated Fhb resistance of about 250 cultivated emmer wheat accessions in greenhouse. Those cultivated emmer wheat accessions were genotyped by genotyping-by-sequencing. Association analysis will be performed to identify major QTL.

3) significant results

We evaluated Fhb resistance of 250 cultivated emmer wheat accessions in greenhouse in 2017 Winter and confirmed that PI41025 and PI277527 have medium to good Fhb resistance. A few additional lines with medium resistance were identified for the first time, and need to be verified by testing at multiple environments.

4) key outcomes or other achievements

NA

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

All graduate students and supporting staffs from our group have been engaged in making crosses and development of the base population. All members were also involved in inoculation and scoring of Fhb resistance of cultivated emmer wheat. This has equipped everyone involved with essential techniques on making crosses in wheat, crossing block management, and Fhb resistance evaluation.

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

The results of Fhb resistance of cultivated emmer wheat accessions were reported to local durum wheat breeder and scientist.

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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?**

None.

**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?**

None.

**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?**

None.

**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?**

None.

**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 (8/1/17 - 7/31/18). 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.**