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

Cover Page

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Phone:	605-688-6907
Fiscal Year:	2016
USDA-ARS Agreement ID:	59-0200-3-005
USDA-ARS Agreement Title:	Molecular Characterization and Pyramiding of Novel Scab Resistance Sources Adapted to the Northern Plains Growing Region.
FY16 USDA-ARS Award Amount:	No Cost Extension (NCE)
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:	3F4428
Project/Grant Reporting Period:	5/1/16 - 4/30/17
Reporting Period End Date:	04/30/17

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
HWW-CP	Pyramiding Multiple FHB Resistance QTLs in Different Winter Wheat Backgrounds.	NCE
	FY16 Total ARS Award Amount	**NCE**

Jose L. Gonzalez Hernandez July 28, 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
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: *Pyramiding Multiple FHB Resistance QTLs in Different Winter Wheat Backgrounds.*

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

   Currently this project is testing, in field and greenhouse trials, double haploid populations (>200 individuals) from few selected families derived using 3- and 4-way crosses between different sources of resistance to FHB (Ernie, Freedom, Lyman, Overland and NE06546 in addition to existing elite lines with *Fhb1* such us Wesley-*Fhb1* and AL-107-6106). We have also included *AC* Emerson, a recent release from Canterra Seeds (Ag Canada initiative) has shown very good levels of FHB resistance; in our field trial AC Emerson has similar o better levels of resistance than our resistant controls. AC Emerson is not a carrier of the Fhb1 locus.

2. **What was accomplished under these goals?** *Address items 1-4) below for each goal or objective.*
   1) major activities
      - Evaluation of DH lines
      - Population development including AC Emerson
   2) specific objectives
      - Field evaluation of DH lines derived from Overland/WesyleyFHB-BC56//Ernie/NE06545 and AL-107-6106/Overland//Lyman/WesleyFHB-BC06
      - Population development to bring together resistance loci in Ac Emerson with Fhb1 and other loci
   3) significant results.
      - Of the ~200 DH lines evaluated in the previous year 64 lines were selected for advanced evaluation in the 2016-2017 season in two-rows plots. Additionally, the ten lines with superior scab resistance and general agronomic performance were directly advanced to EYTs in 2 locations.
      - AC Emerson populations were developed and have been planted in the 2016-2017 growing season for evaluation.
   4) key outcomes or other achievements
      - Selected DHs lines are being prepared for public released. A release manuscript is being completed.

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

   One PhD student has been trained and is finishing his dissertation in September.

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

   Thru presentations in the Annual Scab Forum.

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?** 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 FY16 award period?** No

   If yes, how many?

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?** No

   If yes, how many?

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?** 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 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**

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

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 (5/1/16 - 4/30/17). 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.

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

Other publications, conference papers and presentations.

Jose L. Gonzalez-Hernandez. 2016. Simultaneous mapping and pyramiding loci in wheat breeding populations: Identity by Descent mapping approaches. In: S. Canty, A. Clark, K. Wolfe and D. Van Sanford (Eds.), Proceedings of the 2016 National Fusarium Head Blight Forum (East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. *Invited talk.*
Status: Invited talk given
Acknowledgement of Federal Support: yes

Yaqoob Thurston, Jonathan T. Eckard, Karl D. Glover, James A. Anderson, Mohamed Mergoum, Shaukat Ali and Jose L. Gonzalez-Hernandez. 2016. Development of fusarium head blight Resistance germplasm in highly Adapted spring wheat background. In: S. Canty, A. Clark, K. Wolfe and D. Van Sanford (Eds.), Proceedings of the 2016 National Fusarium Head Blight Forum (East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
Status: Poster presented
Acknowledgement of Federal Support: yes

Yaqoob Thurston, Jonathan T. Eckard, Melanie Caffe, Shaukat Ali, Sunish K. Sehgal, Francois G. Marais and Jose L. Gonzalez-Hernandez. 2016. Development of fusarium head blight Resistance germplasm in highly adapted Winter wheat background. In: S. Canty, A. Clark, K. Wolfe and D. Van Sanford (Eds.), Proceedings of the 2016 National Fusarium Head Blight Forum (East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
Status: Poster presented
Acknowledgement of Federal Support: yes