USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY15 Final Performance Report
Due date: July 15, 2016

Cover Page

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Fiscal Year:	2015
USDA-ARS Agreement ID:	59-0206-4-010
USDA-ARS Agreement Title:	Identify and Develop Durum Wheat Resistant to Fusarium Head Blight.
FY15 USDA-ARS Award Amount:	$ 110,972
Recipient Organization:	North Dakota State University Office of Grant & Contract Accouting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0022040
Project/Grant Reporting Period:	05/05/15-05/04/16
Reporting Period End Date:	05/04/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
DUR-CP	Develop Durum Wheat Resistant to Fusarium Head Blight.	$ 75,986
DUR-CP	Identify Sources of Resistance to Fusarium Head Blight in Durum Wheat.	$ 34,986
	FY15 Total ARS Award Amount	**$ 110,972**

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: *Develop Durum Wheat Resistant to Fusarium Head Blight.*

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

The relevance of the project's objectives to the goals and research priorities of the USWBSI are as follows:

a) Breeding FHB-resistant durum wheat (Action VDHR goals 1-3 and CP priority 3-4);
b) Screen durum populations/experimental lines for FHB resistance in greenhouses and irrigated field nurseries (Action VDHR goal 2 and CP priority 1);
c) Evaluate experimental lines for DON (Action VDHR goal 2 and CP priority 4);
d) Use marker assisted selection at the USDA-ARS Genotyping Center in Fargo, ND for valuable loci (Action VDHR goal 2-3 and CP priority 2);
e) Evaluate identified FHB resistant lines for quality (Action VDHR goal 2); and
f) Develop new populations by crossing adapted germplasm to newly identified sources of resistance (Action VDHR goal 1-3 and CP priority 3-4).

2. What was accomplished under these goals?

- 3 lines were evaluated in the Uniform Regional Durum Nursery
- 14 lines were evaluated in the Elite Advanced Yield Trial
- 49 lines were evaluated in the Advanced Yield Trials
- 236 lines were evaluated in the Preliminary Yield Trials
- 100 populations were screened in the field and greenhouses
- 38 new populations were developed
- 354 lines were tested for DON
- 694 lines were genotyped at the USDA-ARS Genotyping Center in Fargo, ND

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

Yes. Three students rating scab nurseries.

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

Presentations:

Gave presentations at field days at the Research Centers and to trade teams through ND Wheat Commissions.

Project 2: *Identify Sources of Resistance to Fusarium Head Blight in Durum Wheat.*

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

The relevance of the project's objectives to the goals and research priorities of the USWBSI are as follow:

1) Screen diverse durum accessions from ICARDA for reaction to FHB in a FHB screening nursery located at the Jiangsu Academy of Agricultural Sciences in Nanjing, China (Action VDHR goals 1-3 and CP priority 1);
2) Re-evaluate the accessions exhibiting high levels of resistance in the preliminary screening test in the greenhouse and field screening nurseries in North Dakota (Action VDHR goals 1-3 and CP priority 1) ;
3) Determine whether the new sources of resistance carry novel resistant loci by marker haplotyping using the existing markers associated with known resistant QTL's (Action VDHR goals 3 and CP priority 2);
4) Make crosses using the resistant lines and distribute them to durum wheat breeders (Action VDHR goals 1-3 and CP priority 3).

2. What was accomplished under these goals?

- 5,053 accessions from ICARDA have been evaluated to date. After several evaluations in the field and greenhouses three accessions maintained disease severity less than 30%. Fifteen populations were developed from crossing the three accessions with adapted germplasm.
- 630 new lines were sent to China for evaluation.
- 95 selected ICARDA accessions from 2014 were reevaluated in the fall 2015 greenhouse.
- 9 F_5 populations were advanced from crossing adapted germplasm with Tunisian 7.
- 5 F_5 populations were advanced from crossing adapted germplasm with *Tiriticum dicoccum.*
- 2 F_5 populations were advanced from crossing adapted lines to *T. Carthilicum*
- 15 F_4 populations were advanced from crossing adapted lines to ICARDA's world collection accessions.

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

Yes. Three students rating scab nurseries

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

Presentations:

Gave presentations at field days at the Research Centers and to trade teams through ND Wheat Commissions.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY15 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 FY15 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 FY15 award period? No

If yes, how many?

3. Have any post docs who worked for you during the FY15 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 FY15 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 FY15 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**
None				

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

Refer to the FY15-FPR_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications.

Xianwen Zhu, Shaobin Zhong, Shiaoman Chao, Yong Qiang Gu, Shahryar F. Kianian, Elias Elias and Xiwen Cai. 2015. Toward a better understanding of the genomic region harboring Fusarium head blight resistance QTL Qfhs.ndsu-3AS in durum wheat. Theor Appl Genet. 129(1):31-43.
Status: Publication in a refereed journal
Acknowledgement of Federal Support: YES

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

None

Other publications, conference papers and presentations.

Abstracts:

Shahryar F. Kianian*, Farhad Ghavami, Seyed M. Pirseyedi, Ajay Kumar, Jitendra Kumar, Ruth Dill-Macky, Steven Xu, and Elias M. Elias. (2015). Enhancing FHB resistance in durum Wheat. In: S. Canty, Clark, S. Vukasovich and D. Van Sanford (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum*. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 92.
Status: Abstract Published and poster presented
Acknowledgement of Federal Support: YES

Szabo-Hever, A., Q. Zhang, S. Zhong, T.L. Friesen, E.M. Elias, S.S. Xu*, and S. Chao. (2015). Characterization of new synthetic wheat germplasm for resistance to Fusarium Head Blight. 2015. In: S. Canty, Clark, S. Vukasovich and D. Van Sanford (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum*. East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 107.
Status: Abstract Published and poster presented
Acknowledgement of Federal Support: YES