

USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY18 Performance Report
Due date: July 12, 2019

Cover Page

Principle Investigator (PI):	Harold Trick
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Fiscal Year:	2018
USDA-ARS Agreement ID:	59-0206-6-007
USDA-ARS Agreement Title:	A Centralized Wheat Transformation Facility for the Fusarium Community.
FY18 USDA-ARS Award Amount:	\$ 65,905
Recipient Organization:	Kansas State University 10 Anderson Hall Manhattan, KS 66506
DUNS Number:	929773554
EIN:	48-0771751
Recipient Identifying Number or Account Number:	AR9854 / GAPP603893
Project/Grant Reporting Period:	05/23/18 - 05/22/19
Reporting Period End Date:	05/22/19

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
GDER	A Centralized Wheat Transformation Facility for the Fusarium Community.	\$ 65,905
	FY18 Total ARS Award Amount	\$ 65,905



07/10/2019

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

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Project 1: *A Centralized Wheat Transformation Facility for the Fusarium Community.*

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

The major goal of this project was to maintain a wheat plant transformation facility for U.S. Wheat and Barley Scab Initiative. The main objective was to generate transgenic plants and provide T1 generation seed stocks to funded Initiative research projects.

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

1) major activities

The transformation facility has setup protocols to provide transformation services year round. Cultivars are planted weekly or biweekly to ensure constant supply of immature embryos used as targets for genetic transformations. On a weekly basis several experiments are simultaneously going. After transformation the cultures go through the transformation selection, plant regeneration process, followed by molecular confirmation genetic transformation. Approximately five-six months after initiating transformation seeds representing the T1 generation were and will be harvested and mailed to PIs under the appropriate APHIS movement Permit.

2) specific objectives

PI's from three Initiative funded projects [FY16-RA-026 (Rawat), FY16-SH004 (Shah) and FY16-TU-011 (Tumer)] have submitted vectors for wheat transformation.

3) significant results

For project FY16-TU-0111 four vectors including a blank cassette were submitted and a total of ten separate bombardments were performed in the reporting timeframe. Three cultivars have been used in these experiments including Bobwhite, Forefront, and RB07. Selection and regeneration is still ongoing for a few of these experiments and have four additional events that need to be shipped to the PI.

For project FY16-RA-026 (Rawat) five vectors were submitted and in this reporting date eight separate bombardments were performed generating 14 additional transgenic lines. Cultivars used for this project were Bobwhite and Fielder as requested by the PI.

For project FY16-SH004 (Shah) two vectors have been submitted. In this reporting timeframe nine additional bombardments have been made for these two vectors and thirteen putative transformed lines have been identified. Selection continues for a few of these experiments.

4) key outcomes or other achievements

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The generation of wheat transgenic lines for collaborators and providing them with seeds representing T1 generation.

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

This project, in part, has provided tissue culture and transformation of wheat cultures training for one Post doc (Yueying Chen), two PhD student (Jordan Brungardt and Monica Navia) and two undergraduates (Harley Pag-Letterman and Logan Whetzel).

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

Individuals providing vectors were updated periodically of progress on their requests and at the annual NFHBF meeting.

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Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY18 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 FY18 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 FY18 award period?**
No
If yes, how many?
- 3. Have any post docs who worked for you during the FY18 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
Yes
If yes, how many?
one
- 4. Have any post docs who worked for you during the FY18 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?

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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 FY18 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations.

NOTE: 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 FY18-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY18 grant. Only include citations for publications submitted or presentations given during your award period (05/23/18 - 05/22/19). 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 presentation with an abstract:

Conley, E.J., and J.A. Anderson. 2018. 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.

Sujon Sarowar, Syeda Alam, Ragiba Makandar, Hyeonju Lee, Harold N. Trick, Yanhong Dong, and Jyoti Shah. 2019. Targeting the pattern-triggered immunity pathway for enhancing resistance to *Fusarium graminearum* *Molecular Plant Pathology* (DOI: 10.1111/mpp.12781)
Status: Published
Acknowledgement of Federal Support: YES

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

none

Other publications, conference papers and presentations.

Chen, Hui; Su Zhenqi; Tian, Bin; Trick, Harold N.; and Bai, Guihua. 2018. CRISPR/Cas9 editing technology for FHB resistance improvement in wheat. Annual meeting of the National Fusarium Head Blight Forum, St. Louis, Missouri, USA. December 2-4, 2018.
Status: Abstract Published and Invited talk Presented
Acknowledgement of Federal Support: YES (presentation), Yes (abstract)

Alam, Syeda T.; Tyagi, Neerja; Trick, Harold N. and Shah, Jyoti 2018. Host-induced gene silencing (HIGS) for enhancing resistance to *Fusarium Graminearium*. Annual meeting of the National Fusarium Head Blight Forum, St. Louis, Missouri, USA. December 2-4, 2018.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (poster), Yes (abstract)

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McLaughlin, John E.; Tyagi, Neerja; Trick, Harold N.; McCormick, Susan; Dill-Macky, Ruth and Tumer, Nilgun E. 2018. *Arabidopsis* and wheat non-specific lipid transfer (NSLTP) proteins inhibit *Fusarium Graminearium* and confer resistance to FHB: Greenhouse, Field and *in vitro* evidence. in Annual meeting of the National Fusarium Head Blight Forum, St. Louis, Missouri, USA. December 2-4, 2018.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (poster), Yes (abstract)