USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: July 29, 2021

Cover Page

Principle Investigator (PI):	Harold Trick
Institution:	Kansas State University
E-mail:	hnt@ksu.edu
Phone:	785-532-1426
Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-151
USDA-ARS Agreement Title:	A Centralized Wheat Transformation Facility for the *Fusarium* Community
FY20 USDA-ARS Award Amount:	$ 77,209
Recipient Organization:	Kansas State University 10 Andrerson Hall Manhattan, KS 66506
DUNS Number:	929773554
EIN:	48-0771751
Recipient Identifying Number or Account Number:	AR9768 / GAPP006347
Project/Grant Reporting Period:	5/23/20 - 5/22/21
Reporting Period End Date:	5/22/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
GDER	A Centralized Wheat Transformation Facility for the *Fusarium* Community	$ 77,209
	FY20 Total ARS Award Amount	**$ 77,209**

Harold Trick

7/28/21

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
R- Research
S – Service (DON Testing Labs)
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: *A Centralized Wheat Transformation Facility for the Fusarium Community*

1. **What are the major goals and objectives of the research 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 and/or gene –edited plants and provide T_1 generation seed stocks to funded Initiative research projects.

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

   a) **What were the 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 T_1 generation were and will be harvested and mailed to PIs under the appropriate APHIS movement Permit.

   b) **What were the significant results?**

   Transgenic events were supplied for two plasmid constructions to Guihua Bai's program, one construction to Jyoti Shah program, and one constructions to Steven Xu's program and two constructions to Kistler's program. Wheat cultivars used were Bobwhite, Fielder, RB07, and Rollag. Additional events for each of these constructions are pending and are various stages of the transformation pipeline.

   c) **List key outcomes or other achievements.**

   The generation of wheat transgenic lines for collaborators and providing them with seeds representing T_1 generation.

3. **Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns and/or restrictions, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.**

   In the middle of March 2020 the university instructed researchers to begin shutting down/ reducing research activities to essential research only and to minimize physical presence on campus because of the COVID-19 pandemic. This order caused my lab to

reduce plants grown in growth chamber and greenhouse space, minimized the workforce to two personnel working part-time in the lab. Cultures used for starting material for transformations and gene editing were discarded and planned new transformation/gene editing experiments were placed on hold. Experiments that were ongoing were kept as essential experiments and continued to be transferred on a weekly schedule.

Although the university was in Phase 3 of Covid-19 operations throughout fiscal year requiring reduce personnel in laboratories, additional experiments were initiated in the Fall of 2020 to start the transgenic pipeline. However, productivity was greatly reduced due to the limited researchers and hourly students in the laboratory.

4. 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 two PhD students (Monica Navia and Sifan Wu)

5. 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 and GDER mid-year meetings.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/23/20 - 5/22/21). 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 FY20 award period?**
   ☐ Yes ☒ No
   If yes, how many? 0

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY20 award period?**
   ☐ Yes ☒ No
   If yes, how many? 0

3. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   ☐ Yes ☒ No
   If yes, how many? 0

4. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   ☒ Yes ☐ No
   If yes, how many? 1

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 FY20 award period (5/23/20 - 5/22/21). 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	FHB Rating (0-9)	Year Released
N/A	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year

NOTE: List the associated release notice or publication under the appropriate sub-section in the 'Publications' section of the FPR.

Publications, Conference Papers, and Presentations

Instructions: Refer to the PR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY20 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (5/23/20 - 5/22/21**) should be included. If you did not publish/submit or present anything, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each citation, you **must** indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in the publication/ presentation. See example below for a poster presentation with an abstract:

Winn, Z.J., Acharya, R., Lyerly, J., Brown-Guedira, G., Cowger, C., Griffey, C., Fitzgerald, J., Mason R.E., and Murphy, J.P. (2020, Dec 7-11). Mapping of Fusarium Head Blight Resistance in NC13-20076 Soft Red Winter Wheat (p. 12). In: Canty, S., Hoffstetter, A. and Dill-Macky, R. (Eds.), *Proceedings of the 2020 National Fusarium Head Blight Forum*. https://scabusa.org/pdfs/NFHBF20_Proceedings.pdf.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

John E. McLaughlin, Noura Al Darwish, Jeffrey Garcia-Sanchez, Neerja Tyagi, Harold N. Trick, Susan McCormick, Ruth Dill-Macky, Nilgun E. Tumer. 2020. Overexpression of a non-specific lipid transfer protein enhances resistance of wheat to *Fusarium graminearum* infection. *Phytopathology*. **Published Online:** 25 Aug 2020 https://doi.org/10.1094/PHYTO-04-20-0153-R.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

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

None

Other publications, conference papers and presentations.

None