USDA-ARS | U.S. Wheat and Barley Scab Initiative

FY21 FINAL Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-0-151
USDA-ARS Agreement Title:	A Centralized Wheat Transformation Facility for the Fusarium Community
Principle Investigator (PI):	Harold Trick
Institution:	Kansas State University
Institution UEI:	CFMMM5JM7HJ9
Fiscal Year:	2021
FY21 USDA-ARS Award Amount:	$77,209
PI Mailing Address:	Kansas State University, Dept of Plant Pathology 1712 Claflin Rd, 4024 Throckmorton Manhattan, KS 66506
PI E-mail:	hnt@ksu.edu
PI Phone:	785-532-1426
Period of Performance:	5/23/21 - 5/22/23
Reporting Period End Date:	5/22/2023

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
GDER	A Centralized Wheat Transformation Facility for the Fusarium Community	$77,209
	FY21 Total ARS Award Amount	$77,209

I am submitting this report as a: ☒FINAL Report

I certify to the best of my knowledge and belief that this report is correct and complete for performance of activities for the purposes set forth in the award documents.

Principal Investigator Signature

7/24,2023
Date Report Submitted

‡ BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
EC-HQ – Executive Committee-Headquarters
FST-R – Food Safety & Toxicology (Research)
FST-S – Food Safety & Toxicology (Service)
GDER – Gene Discovery & Engineering Resistance
HWW-CP – Hard Winter Wheat Coordinated Project
MGMT – FHB Management
MGMT-IM – FHB Management – Integrated Management Coordinated Project
PBG – Pathogen Biology & Genetics
TSCI – Transformational Science
VDHR – Variety Development & Uniform Nurseries
NWW –Northern Soft Winter Wheat Region
SPR – Spring Wheat Region
SWW – Southern Soft Red Winter Wheat Region

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

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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/gene edited events were supplied for seven plasmid constructions to Guihua Bai's program, one construction to Jyoti Shah's program, and two constructions to Corby Kistler's program. Wheat cultivars used were Bobwhite, RB07, Forefront, and Rollag. During the funding period 300 liberty positive plants were produced for Dr. Bai, 18 for Dr. Shah and 24 for Dr. Kistler.

   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. **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 M.S. student (Sophie Filbert)

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 and GDER mid-year meetings.

Publications, Conference Papers, and Presentations

Please include a listing of all your publications/presentations about your FHB work that were a result of funding from your FY21 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period** should be included.

Did you publish/submit or present anything during this award period?

☒ Yes, I've included the citation reference in listing(s) below.

☐ No, I have nothing to report.

Journal publications as a result of FY21 award

List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like.

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published [include DOI#]; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Hao G, Naumann TA, Chen H, Bai G, McCormick S, Kim H, Tian B, Trick HN, Naldrett MJ, Proctor R. Fusarium graminearum effector FgNls1 targets plant nuclei to induce wheat head blight. *Molecular Plant-Microbe Interactions : Mpmi*. PMID 36853197 DOI: 10.1094/MPMI-12-22-0254-R. Acknowledged federal support: yes

Hui Chen, Zhenqi Su, Bin Tian, Guixia Hao, Harold N. Trick, Guihua Bai. 2022. *TaHRC* suppresses the calcium-mediated immune response and triggers wheat Fusarium head blight susceptibility. *Plant Physiology* Volume 190, Issue 3, November 2022, Pages 1566–1569, https://doi.org/10.1093/plphys/kiac352. Acknowledged federal support: yes

Hui Chen, Zhenqi Su, Bin Tian, Yang Liu, Yuhui Pang, Volodymyr Kavetskyi, Harold N. Trick and Guihua Bai. 2022. Development and optimization of a *Barley stripe mosaic virus* (BSMV)- mediated gene editing system to improve Fusarium head blight (FHB) resistance in wheat. *Plant Biotechnology Journal* Jun; 20(6):1018-1020. doi: 10.1111/pbi.13819. Epub 2022 Apr 8. Acknowledged federal support: yes

Books or other non-periodical, one-time publications as a result of FY21 award

Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis, or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Other publications, conference papers and presentations as a result of FY21 award

Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication.