

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

Cover Page

Principle Investigator (PI):	Jianli Chen
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Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-169
USDA-ARS Agreement Title:	Developing FHB Resistant Wheat Cultivars for Idaho and the Western US
FY20 USDA-ARS Award Amount:	\$ 113,124
Recipient Organization:	Regents of the University of Idaho Office of Sponsored Programs 875 Perimeter Drive MS 3020 Moscow, ID 83844-3020
DUNS Number:	075746271
EIN:	82-6000945
Recipient Identifying Number or Account Number:	AP4785
Project/Grant Reporting Period:	5/15/20 - 5/14/21
Reporting Period End Date:	5/14/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-SPR	Developing FHB Resistant Wheat Cultivars for Idaho and the Western US	\$ 113,124
FY20 Total ARS Award Amount		\$ 113,124

Jianli Chen

August 10, 2021

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: *Developing FHB Resistant Wheat Cultivars for Idaho and the Western US*

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

The objectives of the proposed study are: 1) To release 'IDO1805S' and make production of 'UI Cookie'; 2) To stack *Fhb1*, *Fhb2*, and *Fhb3* genes with native resistance into adapted elite line backgrounds using a combination of traditional breeding, molecular marker assisted selection, and wheat by maize doubled haploid methods; 3) To assess FHB resistance in FHB nurseries in Aberdeen, ID, and in Pullman, WA in collaboration with Dr. Deven See; 4) To use the unknown resistance gene from synthetic wheat in collaboration with Dr. Steven Xu at the USDA-ARS facility at Fargo, ND; and 5) To train an under-graduate student on FHB research.

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?

UI Cookie was licensed to Idaho Wheat Commission. It will be in full production in 2022. IDO1805S hard red spring wheat line has very good FHB resistance. We harvested breeder seed this year. This line has very weak straw, we decided to postpone the release.

Two FHB tolerant cultivars 'UI Stone' and 'UI Cookie' were used as recurrent parents and stacked with *Fhb1*, *Fhb2*, and *Fhb3*, as well as FHB resistant synthetic wheat. Around 30 F2 populations were advanced.

A total of 500 DON samples were tested in winter 2020.

Twelve lines, 2000 heads were screened for *Fhb1*, 800 of them were selected that have positive marker allele of *Fhb1* and planted in headrows for assessment of agronomic performance under irrigated condition in spring of 2021.

Four hundred lines, 1120 headrows were planted and inoculated with conidial suspension in a misted FHB nursery in Aberdeen, ID. Fifty elite lines were assessed simultaneously for FHB resistance in nurseries in ND and WA under collaboration with Dr. Steve Xu and Dr. Deven See. FHB severity was assessed and FDK and DON will be tested after harvesting. The FDK will be assessed using a seed color sort machine purchased by this project.

A color sort machine was purchased and will be used in FDK assessment.

All lines in the FHB nursery were simultaneously planted in yield trials and assessed for agronomic performance. The selected lines will be tested for baking quality after harvesting.

b) What were the significant results?

Fhb1 resistance gene from W14, Ning9016, and Futai8944 was introgressed in adapted soft white spring wheat backgrounds and elite lines with *Fhb1* showed promising agronomic performance. Few of them have potential to be released in near future.

c) List key outcomes or other achievements.

Adapted soft white spring wheat with *Fhb1* resistance gene are available to use in hard white and red spring backgrounds and shared with other breeding programs. Breeder seed from four soft white spring wheat lines were harvested.

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.

No

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

A part-time postdoc received training on FHB inoculum production. She produced inoculum for disease nursery. A technician received lab training on genotyping of *Fhb1* in individual heads of elite lines. A new field technician learned how to setup and operate a misting system and did inoculation. The postdoc, technician, and the PI attended FHB forum.

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

FHB resistant lines were demonstrated at a field day in Aberdeen in July.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/15/20 - 5/14/21). 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? [Click to enter number here.](#)

- 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? [Click to enter number here.](#)

- 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?

- 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? One part-time postdoc took a postdoc position with USDA-ARS.

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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 FY20 award period (5/15/20 - 5/14/21). 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
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
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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.

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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 (5/15/20 - 5/14/21)** 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:

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

Journal publications.

Nothing to report.

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

Nothing to report.

Other publications, conference papers and presentations.

Nothing to report.