

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page

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Fiscal Year:	2021
USDA-ARS Agreement ID:	59-0206-0-167
USDA-ARS Agreement Title:	Development of FHB-Resistant Wheat Cultivars for the Midsouth
FY20 USDA-ARS Award Amount:	\$133,958
Recipient Organization:	University of Arkansas 1371 W. Altheimer Dr. Fayetteville, AR 72704-6898
DUNS Number:	140031639
EIN:	71-6003252
Recipient Identifying Number or Account Number, if any:	
Project/Grant Period:	6/1/21 - 5/31/23
Reporting Period End Date:	5/31/2022

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-SWW	Development of FHB Resistant Wheat Cultivars for the Midsouth	\$120,155
VDHR-SWW	Double Haploids to Expedite Development of FHB Resistant Soft Winter Wheat Varieties	\$13,802
FY21 Total ARS Award Amount		\$133,957

I am submitting this report as an: Annual Report 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

9/26/2022
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: Development of FHB Resistant Wheat Cultivars for the Midsouth

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

- 1) Develop and release high-yielding FHB-resistant cultivars adapted to Arkansas and the mid-south.
- 2) 2) Screen and report the reactions of breeding lines and currently grown commercial cultivars to FHB using misted inoculated nurseries.

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?

- 1) New FHB-resistance genotypes were initiated via crossing between FHB parental lines and high-yielding cultivars.
- 2) Continue developing breeding germplasm from early to advanced generations and different populations.
- 3) Screening Arkansas, SunGrain, and commercial breeding lines for FHB tolerance via field study.

b) What were the significant results?

Objective 1

- 1) Continue developing progenies including 384 F1, 406F2, 270 F3, and 300 F6. The superior lines from each progeny will be planted in the 2022-2023 planting season
- 2) Growing 196 DH fine lines for the next generation and evaluating for yield and phenotypic characteristics such as heading date, lodging, uniformity, etc.
- 3) of 10 F7 lines were submitted in the 2023-Sunfire trail.

Objective 2

Eight hundred sixty unique lines, including 80 DH lines, 208 Arkansas lines, 66 Arkansas variety testing lines, and 506 lines from SunGrain, were planted in three locations and two locations of Newport and Stuttgart, and inoculum to FHB using misted inoculated nurseries. After harvesting, the FDK was recorded from the seed samples, then seed samples from each plot were sent for DON evaluations. The reactions of breeding lines and currently grown commercial cultivars were observed on 5/ 10,16 and 24/ 2022 in Fayetteville and 5/ 11,16 and 25/ 2022 in Newport.

c) List key outcomes or other achievements.

Molecular markers and genomic selection identify FHB-resistant lines earlier in the breeding cycle and at a higher frequency.

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

This is the first year of the project. The goal was to set up the program and prepare the lab and field materials.

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

(Form – PPR21)

The University of Arkansas wheat breeding program resumed after two years of heitus. However, we re-introduce the program to the Arkansas farmers, joined the SunGrain group, and contacted wheat breeding scientists. We aim to publish our findings in scientific journals and extension publications and present at meetings where the target audience and stakeholders will be present, including the annual United States Wheat and Barley Scab Initiative Meeting.

Project 2: Double Haploids to Expedite Development of FHB Resistant Soft Winter Wheat Varieties

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

- 2.** This proposal aims to use double haploid technology to combine favorable loci for more rapid improvement of FHB resistance. This is done collaboratively with the exchange of DH lines

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

a) What were the major activities?

1- In 2021, 80 populations resulting from the DH procedure were evaluated for seed yield and several agronomic characteristics. The superior lines will be evaluated in 2023-SunPre.

2- We continued developing the population resulting from the DH procedure

b) What were the significant results?

1- 25 superior DH lines were selected and placed for further evaluation in Arkansas advanced tests.

2- Ten superior DH lines were placed in the 2023-SunPre test. These lines were selected based on their high-yield seed production.

c) List key outcomes or other achievements.

Double haploid lines with a high level of resistance were identified and advanced.

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

Nothing to report

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

6. The University of Arkansas wheat breeding program resumed after two years of hiatus. However, we re-introduce the program to the Arkansas farmers, joined the SunGrain group, and contacted wheat breeding scientists. We aim to publish our findings in scientific journals and extension publications and present at meetings where the target audience and stakeholders will be present, including the annual United States Wheat and Barley Scab Initiative Meeting.

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 grant 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).

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

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

In addition to the required inclusion in this report, to increase the visibility of your work we encourage you to also submit your publications in the new [USWBSI ScabSource Publication Database](#), an open-access resource for all FHB researchers to reference.