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

FY23-YR2 Performance Progress Report

Due date: January 31, 2025

Cover Page

USDA-ARS Agreement ID:	59-0206-2-095
USDA-ARS Agreement Title:	Management of Fusarium Head Blight (FHB) and DON in Soft Red Winter Wheat in Alabama
Principle Investigator (PI):	Kira Bowen
Institution:	Auburn University
Institution UEI:	DMQNDJDHTDG4
Institution EIN:	63-6000724
Fiscal Year:	2023
FY22 USDA-ARS Award Amount:	No additional funds provided, added 6 month NCE
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Period of Performance:	May 1, 2022 – October 31, 2024
Reporting Period End Date:	October 31, 2024 (NCE)

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT IM-CP	Integrated Strategies for Improved Management of FHB and DON in Soft Red Winter Wheat	NCE
	FY23-YR2 Total ARS Award Amount	NCE

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.

Kira L. Bowen

6 January 2024

Principal Investigator Signature — Date Report Submitted

ǂ 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: Integrated Strategies for Improved Management of FHB and DON in Soft Red Winter Wheat

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

Major goals of this project are:

1. To develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in production fields of wheat.

2. Help develop and validate the next generation of management and mitigation tools for FHB and mycotoxin control.

Objectives are:

1. To evaluate the integrated effects of fungicide and genetic resistance on FHB and DON in soft red winter wheat (SRWW) grown in AL, and

2. To evaluate the efficacy of two newer products (ProsaroPro® and Sphaerex®) relative to currently recommended fungicides (MiravisAce®, Prosaro®, and Caramba®) for FHB management.

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?

i. During summer and fall 2023, yield data were collected and analyzed for DON, and harvest samples were tested for DON from winter wheat field studies planted in the fall of 2022.

ii. A field trial was planted in Fall 2023 at GC (= south AL, 30.542, -87.882) with a factorial set of treatments for two cultivars and six fungicide treatments. During Spring 2024, fungicides were applied, disease ratings were done, and head samples collected for determination of the average scab severity per head (=index). Cultivars were Pioneer 26R45 (MS) and AGS 2024 (S). Fungicide treatments were MiravisAce, ProsaroPro, Prosaro, Sphaerex, tebuconazole (all applied at FS 10.5.1), and a non-treated control. A second tebuconazole application was made 6 to 7 days after the first.
Wheat heads were sampled in early May for determining the FHB index in each plot. Yield values and grain samples were obtained in June. Thousand-kernel weights and DON content was determined from these samples.

b) What were the significant results?

i. In May 2023, from trial at GC, AGS 2021 (MR) had lower ($P < 0.03$) FHB index and % FDK than Pioneer P26R94 (MS). All disease levels were low. There were no significant differences due to fungicide treatment in index or FDK. Neither cultivar nor fungicide treatment significantly affected yield. Test weight was significantly affected by both main factors. P26R94 had a higher test weight than AGS 2021; Prosaro, ProsaroPro, and each of the two-application treatments improved test weight compared to the control. DON was also significantly affected by both cultivar and treatment. The P26R94 (MS) had greater DON than AGS 2021 (MR), and the Caramba, Prosaro, and each of the two-application treatments significantly reduced DON compared to the non-treated control. These results affirm the importance of cultivar selection relative to FHB and DON management.

ii. Scab levels were low in 2024. The 'S' cultivar, AGS2024, pooled over fungicide treatments, had lower FHB incidence and index than the MS cultivar. This is likely because P26R45 flowered several days later than AGS2024, following a rain event. AGS2024 had greater test weight than P26R45, perhaps due to lower FHB. Pooled over cultivars, each of the fungicide treatments improved yield (bu/A), test weight (lbs/bu), and 1000-kernel weight compared to non-treated controls; fungicide treatments did not differ from one another. No detectable levels of DON were noted in grain samples.

iii. List key outcomes or other achievements.

iv. In 2023 (harvest year), established fungicides for FHB management (Caramba, Prosaro, MiravisAce) continue to provide good efficacy compared to newer products such as ProsaroPro and Sphaerex, based on FDK and DON.

v. Observations in 2024 (harvest year), based on field ratings and cultivar differences, highlight the role of weather on FHB.

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

Graduate students (two) have been trained to recognize and rate disease levels in wheat.

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

A summary report is provided to station personnel and results from all locations at which work was done and are shared with extension specialists on campus.

5. What do you plan to do during the next reporting period to accomplish the goals and objectives?

Not applicable, this is the final report for the agreement.

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 FY22 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?
Mark your response with an "X":

X	Yes, I've included the citation reference in listing(s) below.
	No, I have nothing to report.

Journal publications as a result of FY23-YR2 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 FY23-YR2 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 FY23-YR2 award

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

Moraes, W. B., Ali, S., Ames, K. A., Bergstrom, G. C., Bish, M., Bissonnette, K., Bowen, K. L., and 21 others. 2024. Meta-analysis of the effects of pydiflumetofen + propiconazole application programs on Fusarium head blight and deoxynivalenol in wheat (abstr.). Phytopathology 113:S3.50.

- Published abstract of poster presentation, Federal funding acknowledged on poster.

Kikway, I., Moraes, W. B., Ali, S., Ames, K., Bergstrom, G., Bish, M., Bowen, K., and 21 others. 2024. Comparative assessment of new fungicide for Fusarium head blight (FHB) and deoxynivalenol (DON) management in wheat. Plant Health Poster (July).

- Expect that abstract will be published; Federal funding acknowledged.