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

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page

Principle Investigator (PI):	Kira Bowen
Institution:	Auburn University
E-mail:	bowenkl@auburn.edu
Phone:	334-844-1953
Fiscal Year:	2021
USDA-ARS Agreement ID:	59-0206-6-008
USDA-ARS Agreement Title:	Integrated Strategies for Improved Management of FHB and DON in Soft Red Winter Wheat in Alabama
FY20 USDA-ARS Award Amount:	$20,362
Recipient Organization:	Auburn University Department of Entomology and Plant Pathology 209 Rouse Bldg. Auburn, AL 36849
DUNS Number:	066470973
EIN:	63-6000725
Recipient Identifying Number or Account Number, if any:	361848
Project/Grant Period:	5/23/19-05/22/22
Reporting Period End Date:	5/22/2022

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT-IM	Integrated Strategies for Improved Management of FHB and DON in Soft Red Winter Wheat	$20,362
	FY21 Total ARS Award Amount	$20,362

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.

Kira T. Bowen

22 July 2022

Principal Investigator Signature — 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: 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 SRWW grown in AL, and
2. To evaluate the efficacy of MiravisAce, applied at varying times, to standard Prosaro and Caramba treatments for FHB and DON 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? May 2019 – May 2022

During summer and fall 2019, yield data were collected and analyzed, and harvest samples were tested for DON from winter wheat field studies planted in the fall of 2018. Studies at three locations were aimed at comparing MiravisAce to Caramba and Prosaro fungicides.

Treatments applied in spring 2020 and 2021 (wheat planted in Fall 2019 and 2020, respectively) were aimed at comparing MiravisAce application timings to one another and to Caramba and Prosaro. At PBU (= east central AL, 32.4993, -85.8915) and GC (= south AL, 30.542, -87.882) three and two wheat varieties, respectively, were included. Disease was rated at all locations, and head samples were collected for determining the scab index. Plots were harvested and yield and test weight recorded, harvest samples were evaluated for percent Fusarium-damaged kernels (FDK %). DON content of samples was analyzed by the Schmale lab.

b) What were the significant results?

2019 yields did not differ at any location in AL. DON content in samples from the northern location (TV = 34.6897, -86.8869) was < 0.4 ppm in 92% of samples. Three of the four samples with > 0.4 ppm DON were from plots not treated with any fungicide or with a fungicide application prior to flower; one sample was from a MiravisAce-treated plot. DON was consistently < 0.30 in samples from other locations.

In the spring of 2020, no treatments affected scab index or FDK %, yield or test weights at our southern (GC = 30.542, -87.882) or central (PV = 32.4255, -86.4465) sites. At the east central site (PBU = 32.4993, -87.882), all fungicide treatments reduced FDK % and

improved 1000-kernel weights compared to the control; numerically greatest reductions in FDK % were noted with MiravisAce applied at anthesis and MiravisAce followed by tebuconazole. There were no differences in yield or test weights among fungicide treatments.

In spring of 2021, emphasis was again given to MiravisAce application timing.
At the southern location (GC), the MR variety (AGS3030) had lower FDK % than the MS variety (Pioneer P26R94), but no other measured variables differed between varieties. All fungicide treatments reduced FDK % and DON compared to controls; greatest reductions in DON were noted with the two-fungicide application programs, delayed application of MiravisAce, and the Sphaerex treatment (40 to 70% lower than in controls). Test weights and yield were also improved with all fungicide programs at GC, and greatest yield gains were seen with two-application programs as well the MiravisAce at anthesis and the delayed MiravisAce application.
At the central location (PBU) in spring 2021, the MR variety (AGS 3030) had somewhat lower DON than the S variety (SS 5550); an experimental variety from UGA had even lower DON. No other measured variables differed among varieties. MiravisAce treatments reduced scab index but not FDK %, and only a two-fungicide application program reduced DON compared to controls at PBU.
At the northern location (TV), disease levels were very low and there were no differences in any measured variables.

c) List key outcomes or other achievements.
Results from spring 2021 (GC) indicate that a delayed application of MiravisAce can contribute to reductions in scab levels and DON. Sphaerex is also effective for reducing scab and DON levels. In 2020-2021 wheat in south AL, any fungicide applied near anthesis contributed to yield gains.

3. What opportunities for training and professional development has the project provided?
Graduate students 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 is shared with growers at a commodity group meeting. Results are also discussed with extension specialists on campus.

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).

None

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).

None

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.

Paul, P. A., S. J. Ng, G. Bergstrom, K. Bissonnette, K. Bowen, and 21 others. 2019. Fusarium head blight management coordinated project: Integrated management trials 2018-2019. Proc. 2019 Nat. FHB Forum, pp. 21-24.

Paul, P. A., S. J. Ng, G. Bergstrom, K. Bissonnette, K. Bowen, and 21 others. 2019. Fusarium head blight management coordinated project: Uniform fungicide trials 2018-2019. Proc. 2019 Nat. FHB Forum, pp. 25-29.

Bowen, K. L. 2019. Fusarium head blight management in Alabama. Proc. 2019 Nat. FHB Forum, p. 3.

Ghimire, B., M. Mergoum, J. Johnson, A. E. Glenn, K. L. Bowen, and 4 others. 2019. Understanding the genetic diversity of *Fusarium* species causing Fusarium Head Blight (FHB) of wheat in Georgia. Proc. 2019 Nat. FHB Forum, p. 71.

Luis, J. M., Ng, S. J., Bergstrom, G., Bissonnette, K., Bowen, K., and 24 others. 2020. Fusarium head blight management coordinated project: Integrated management trials 2018-2020. Proc. Nat. Fusarium Forum, pp. 38-43.

Luis, J. M., Ng, S. J., Bergstrom, G., Bissonnette, K., Bowen, K., and 24 others. 2020. Fusarium head blight coordinated project: uniform fungicide trials 2018-2020. Proc. Nat. Fusarium Forum, pp. 44-48.

Bowen, K. L. 2022. Fusarium Head Blight management in Alabama in 2021. So. Div APS (to be published in Phytopathology from March meeting).