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

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page

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Fiscal Year:	2021
USDA-ARS Agreement ID:	59-0206-0-125
USDA-ARS Agreement Title:	Applied Management of Fusarium Head Blight in Missouri Soft Red Winter Wheat
FY20 USDA-ARS Award Amount:	$18,314
Recipient Organization:	University of Missouri Divison of Plant Science 214 Waters Hall, 1112 University Ave. Columbia, MO 65211-0001
DUNS Number:	153890272
EIN:	43-6003859
Recipient Identifying Number or Account Number, if any:	68644
Project/Grant Period:	5/1/21 - 4/30/23
Reporting Period End Date:	4/30/2022

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT-IM	Integrated Disease Management for FHB and DON in Missouri	$18,314
	FY21 Total ARS Award Amount	$18,314

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

July 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: Integrated Disease Management for FHB and DON in Missouri

1. **What are the major goals and objectives of the research project?**
   Objective A) Integrated Management: Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in all major grain classes in Missouri, with emphasis on new fungicides.
   Objective B) Uniform Fungicides: Compare the efficacy of a standard anthesis application of new fungicides as compared to a standard application of Prosaro or Caramba.

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?**
Objective A: Two trial locations were selected and planted in November 2021 with three different wheat varieties: Truman, Bess, and the FHB-susceptible variety 25R40. Fungicide application dates for the 10.3 growth stage varied by location. Applications to Bess and 2540 at 10.3 were made on 5/16/22 and 5/17/22. Truman, a slower-maturing variety, had 10.3 applications on 5/20/22 and 5/23/22. FHB inoculations and fungicide applications at the 10.5.1 growth stage occurred on 5/20/22 for Bess and 25R40 and on 5/24/22 on the slower-maturing Truman variety. Ratings occurred the second week of June. Wheat was harvested the last week of June.

Objective B: Two trial locations were selected and planted in November 2021 with the FHB susceptible wheat variety 25R40. Fungicide applications were applied at 10.3, 10.5.1, and 4 to 6 DAA 10.5.1 application with *Fusarium* inoculations occurring immediately following 10.5.1 sprays. Ratings occurred second week of June. Wheat was harvested the last week of June.

b) **What were the significant results?**
Objective A: Preliminary analysis of 2022 data indicate treatment, location, and variety effects and location by variety effect on wheat yield. Prosaro, Miravis Ace applied at the 10.3 growth stage and Miravis Ace (10.5.1) followed by Tebuconazole resulted in yields that were higher than the non-treated, FHB inoculated controls. Miravis Ace applied at 10.5.1 was similar to these treatments. Future plans include analyzing data across site years and including environmental data to the analysis to assist with interpretation of results. We speculate that when data is analyzed across years, the Miravis Ace applications at 10.5.1 will have comparable yields to the above-mentioned treatments.

Objective B: Preliminary analysis of 2020-2022 data from both locations indicated that Miravis Ace application at 10.5.1 and Miravis Ace at 10.5.1 followed by an application of Prosaro, Caramba, or Tebuconazole 4 to 6 days later resulted in the lowest disease severity of treatments tested. Although no differences in yield were observed when combined across site years. Differences in DON accumulation, Fusarium damaged kernels, and yields were observed when data sets were analyzed by location and year. Future plans include adding environmental data to the analysis to assist in interpreting results.

c) List key outcomes or other achievements.

Objectives A and B: Data sets have been generated to provide Missouri wheat producers with information on fungicide treatments. Much of the information distributed to Missouri wheat producers previously was based on data collected from other states. Future plans with the data include further analysis as described previously and distribution of information at field days and winter meetings.

A) What opportunities for training and professional development has the project provided?

a) Missouri undergraduates Sam East and Adam Albright were trained on FHB ratings. Sam is beginning the graduate school application process.

b) Undergraduate Adam Albright had the opportunity to present some of the 2021 research in a power presentation at the national US Wheat and Barley Scab Initiative annual meeting, which was held virtually in December.

B) How have the results been disseminated to communities of interest?

a) Highlights from the research were presented in a Mizzou Crop & Pest News article *Control of Fusarium Head Blight (or Scab) in Wheat* on May 5, 2022. The article received 529 direct clicks and was shared 23 times on Facebook directly from the newsletter webpage. Average read time of 5 minutes; 21 seconds exceeds the average 3 minute; 12 second read and indicates the interest of clientele in this topic.

b) Following further analysis, we plan to share results at field days and conferences during the 2022 and 2023 seasons.

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.

Albright, A.L., Biggs, M., Sjarpe, D., Victor, C., and Bissonnette, K.M. (2021) Cost effectiveness of fungicides for FHB control: Impacts on FDK and test weight. *Proceedings of the 2021 National Fusarium Head Blight Forum*; Virtual. December 6-7, 2021. Retrieved from: https://scabusa.org/forum/2021/2021NFHBForumProceedings.pdf