

USDA-ARS | U.S. Wheat and Barley Scab Initiative
FY21 FINAL Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-0-118
USDA-ARS Agreement Title:	Efficacy of a New Fungicide for FHB and DON Management in Indiana
Principle Investigator (PI):	Darcy Telenko
Institution:	Purdue University
Institution UEI:	YRXVL4JYCEF5
Fiscal Year:	2021
FY21 USDA-ARS Award Amount:	\$30,669
PI Mailing Address:	Purdue University, Department of Botany and Plant Pathology Lilly Hall of Life Sciences Room 1-317, 915 West State Street West Lafayette, IN 47907-2054
PI E-mail:	dtelenko@purdue.edu
PI Phone:	765-496-5168
Period of Performance:	5/6/21 - 5/5/23
Reporting Period End Date:	5/5/2023

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT-IM	Efficacy of a New Fungicide for FHB and DON Management in Indiana	\$30,669
FY21 Total ARS Award Amount		\$30,669

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.

Principal Investigator Signature

07/05/2023

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: Efficacy of a New Fungicide for FHB and DON Management in Indiana

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

This research served as a location in the cooperative multi-state studies comparing the effects of integrated management (IM) and uniform fungicide (UFT) trials for FHB and DON control in wheat.

- 1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in soft winter wheat, with emphasis on a new fungicide, Miravis Ace®.
- 2) Compare the efficacy of Miravis Ace when applied at early heading or at anthesis to that of standard anthesis application of Prosaro® or Caramba®.
- 3) Generate data to further quantify the economic benefit of FHB/DON management strategies.
- 4) Develop more robust “best-management practices” for FHB and DON.
- 5) Generate data to validate and advance the development of FHB and DON risk prediction models.

The proposed research was conducted at two sites in Indiana: 1) Purdue Agronomy Center for Research and Education (ACRE) in West Lafayette, Indiana; and 2) Southwest Purdue Agriculture Center (SWPAC), Vincennes, Indiana.

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?

Research trials were established in the fall of 2020 at both locations indicated above in Indiana, and fungicide treatments were applied in the spring of 2021. In all trials, FHB, DON, FDK, foliar disease severity, yield and test weight were collected.

b) What were the significant results?

In 2021, weather conditions were not favorable for Fusarium head blight (FHB). FHB was the most prominent disease in all four trials showing significantly higher FHB in the nontreated controls. In southwest Indiana UFT trial, FHB incidence and FHB Index were reduced by all fungicides over the non-treated control on 2 Jun. FHB severity was reduced by all fungicides, except Prosaro, Sphaerex, Miravis Ace at 10.5.1, and Miravis Ace followed by Folicur. The concentration of deoxynivalenol (DON) was reduced over the non-treated control for all treatments. There was no difference in Fusarium damaged kernels (FDK), moisture, test weight or yield of wheat.

In the southwest Indiana IM trial, FHB incidence, severity and Index were reduced by all fungicides over the non-treated control on 2 Jun. The concentration of deoxynivalenol (DON) was reduced over the non-treated control for all treatments and in P25R61. The scab resistant variety, P25R61, had significantly less FHB, DON and test weight as compared to the susceptible P25R40 variety. Moisture and test weights were higher in fungicide treated plots as compared to the non-treated controls. There was no difference in yield.

In central Indiana UFT trial, FHB was the most prominent disease and there was little to no leaf blotch detected. FHB incidence was reduced by all fungicides over the non-treated control on 11 Jun. No differences were detected for FHB Index and severity as compared to the non-treated control. The concentration of deoxynivalenol (DON) was reduced over the non-treated control in all treatments, except Prosaro applied at 10.5.1 and Miravis Ace applied at 10.3. There was no difference in wheat moisture, test weight or yield.

In the central Indiana IM trial, FHB incidence was reduced by all fungicides over the non-treated control on 11 Jun, except Prosaro. All fungicide reduced FHB severity and Index as compared to the non-treated control. The concentration of deoxynivalenol (DON) was reduced by all fungicides except Miravis Ace applied at 10.3. There was no difference in treatment for wheat moisture, test weight or yield. P25R61 had reduced FHB incidence, FHB severity, DON, moisture and test weight as compared to P25R40, no differences in yield were detected.

c) List key outcomes or other achievements.

The results of these trials have shown that Miravis Ace is an effective fungicide for FHB management, additional new chemistries were evaluated for the first time which also have extremely promising results – continued evaluation of these products will be necessary to address some of the many questions being asked by stakeholders about the effectiveness, application timing, effectiveness towards other diseases, and yield and cost benefits of this new fungicide.

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

This project provided an opportunity to train plant pathology graduate students and undergraduates on plant disease identification and quantification, along with general field research trial establishment and data analysis.

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

The results were shared and combined with the multi-state data to summarize and publish in the Proceedings of the National Fusarium Head Blight Forum. They were also shared with Indiana wheat stakeholders via the annual Applied Research in Field Crop Pathology for Indiana Extension publication, 2021, and a Plant Disease Management Report. In addition, Dr. Telenko presented results to Indiana growers during winter Extension meetings.

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 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).

NA

Books or other non-periodical, one-time publications as a result of FY21 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).

NA

Other publications, conference papers and presentations as a result of FY21 award

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

Da Silva, C. R., Brand, S. B., and Telenko, D. E. P. 2022. Evaluation of fungicides and varieties for Fusarium head blight (FHB) management in organic wheat in Indiana, 2021. Plant Disease Management Reports. Vol 16:CF044. Status: Published. Acknowledgement of Support: No (not an option)

Shim, S. and Telenko, D. E. P. 2022. Applied Research in Field Crop Pathology for Indiana 2021. BP-217-W. Purdue Extension. https://extension.purdue.edu/fieldcroppathology/_media/bp-217-w-2021.pdf

Status: Published. Acknowledgement of Support: Yes.