

FY22 Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-2-164
USDA-ARS Agreement Title:	Evaluation of Integrated Management Programs and Fungicides for Fusarium Head Blight & DON in Indiana
Principle Investigator (PI):	Darcy Telenko
Institution:	Purdue University
Institution UEI:	YRXVL4JYCEF5
Fiscal Year:	2022
FY22 USDA-ARS Award Amount:	\$30,669
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Period of Performance:	May 1, 2022 – April 30, 2026
Reporting Period End Date:	April 30, 2023

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT IM-CP	Evaluation of Integrated Management Programs and Fungicides for FHB & DON in Indiana	\$30,669
FY22 Total ARS Award Amount		\$30,669

I am submitting this report as an: Annual 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: Evaluation of Integrated Management Programs and Fungicides for FHB & DON 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 fungicides and resistance on FHB and DON, with emphasis on new fungicides.
2. Compare the efficacy of new fungicides to Prosaro, Caramba, and Miravis Ace.
3. Generate data to quantify the economic benefit of management programs.
4. Generate data to advance the development of FHB 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 2021 at both locations indicated above in Indiana, and fungicide treatments were applied in the spring of 2022. In all trials, FHB, DON, FDK, foliar disease severity, yield and test weight were collected.

b) What were the significant results?

In 2022, weather conditions were moderately favorable for Fusarium head blight (FHB). FHB was the most prominent disease in all four trials.

In central Indiana UFT trial, no differences were detected for FHB incidence and severity as compared to the nontreated control. FHB index a was reduced by Miravis Ace applied at 10.5.1 and Miravis Ave at 10.5.1 fb Sphaerex at 6 DAT over the nontreated control. The concentration of deoxynivalenol (DON) was reduced over the nontreated control by all treatments, except Prosaro applied at 10.5.1. Harvest moisture was higher in all of the fungicide treated plots, except for Prosaro Pro at 10.5.1, as compared to the nontreated control. There was no significant difference in yield of wheat.

In central Indiana IM trial, cultivar P25R61 had reduced FHB incidence, FHB severity, DON, percentage of FDK, and yield as compared to P25R40. FHB incidence and Index was reduced by all fungicides over the nontreated, inoculated control on 13 Jun. The concentration of deoxynivalenol (DON) was reduced by all fungicides applied at 10.5.1 over nontreated controls. There was no difference in treatment for FHB severity, percentage of fusarium damaged kernels (FDK), and yield over nontreated control.

In southwest Indiana UFT trial, FHB severity and FHB Index was reduced by all fungicides. The concentration of deoxynivalenol (DON) was reduced over the nontreated control for all treatments

(43). There was no difference in FHB incidence, percentage of fusarium damaged kernels (FDK), and yield of wheat.

In the southwest Indiana IM trial, the scab resistant cultivar, P25R61, had significantly less FHB, DON, test weight, harvest moisture and yield as compared to the susceptible P25R40 cultivar. FHB incidence, severity, and Index were reduced by Miravis Ace at 10.5.1 and Prosaro Pro at 10.5.1 as compared to the nontreated, inoculated control. No significant differences were detected between treatments and nontreated controls for DON, FDK and wheat yield.

c) List key outcomes or other achievements.

The results of these trials have continued to show that Miravis Ace is an effective fungicide for FHB management, additional new chemistries were evaluated for the second year 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. The use of scab resistant cultivars is an important aspect of management and reduced risk of FHB, especially when there is only moderate disease pressure.

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, 2022. 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 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 May 1, 2022 – April 30, 2023?

Yes, I've included the citation reference in listing(s) below.

No, I have nothing to report.

Journal publications as a result of FY22 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 FY22 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 FY22 award

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

- Telenko, D. E. P. (2022). Evaluation of Integrated Disease Management Options for Conventional and Organic Wheat Production in Indiana. Proceedings of the National Fusarium Head Blight Forum; Tampa FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>. Invited speaker.
- Wanderson, B. M., Bergstrom, G., Bissonnette, B., Bowen, K., Bradley, C., Byamukama, E., Chilvers, M., Collins, A., Cowger, C., Darby, H., DeWolf, E., Dill Macky, R., Esker, P., Friskop, A., Kleczewski, N., Koehler, A., Langston Jr., D., Madden, L., Marshall, J., Mehl, H., NegelKirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P. A. (2022). Fusarium Head Blight Management Coordinated Project: Integrated Management Trials 2022. Proceedings of the National Fusarium Head Blight Forum; Tampa FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>. Poster
- Wanderson, B. M., Bergstrom, G., Bissonnette, B., Bowen, K., Bradley, C., Byamukama, E., Chilvers, M., Collins, A., Cowger, C., Darby, H., DeWolf, E., Dill Macky, R., Esker, P., Friskop, A., Kleczewski, N., Koehler, A., Langston Jr., D., Madden, L., Marshall, J., Mehl, H., NegelKirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P. A. (2022). Fusarium Head Blight Management Coordinated Project: Uniform Fungicide Trials 2022. Proceedings of the National Fusarium Head Blight Forum; Tampa FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>. Poster
- Shim, S. and Telenko, D. E. P. 2023. Applied Research in Field Crop Pathology for Indiana 2022. Purdue Extension. <https://indianafieldcroppathology.com/wp-content/uploads/2023/06/BP-Extension-Applied-Research-on-Field-Crop-Disease-2022.pdf>