

FY22 Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-2-128
USDA-ARS Agreement Title:	Integrated Management of Fusarium Head Blight (FHB) in Pennsylvania
Principle Investigator (PI):	Paul Esker
Institution:	Pennsylvania State University
Institution UEI:	NPM2J7MSCF61
Fiscal Year:	2022
FY22 USDA-ARS Award Amount:	\$27,101
PI Mailing Address:	Pennsylvania State University Department of Plant Pathology and Environmental Microbiology 219 Buckhout Lab University Park, PA 16802
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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	Integrated Management of Fusarium Head Blight in Wheat in Pennsylvania	\$27,101
FY22 Total ARS Award Amount		\$27,101

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.



July 22, 2023

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 Management of Fusarium Head Blight in Wheat in Pennsylvania

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

1. Develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in wheat and barley production fields.
2. Develop and validate the next generation of management tools, forecasting models, and fungicide application technologies for FHB and mycotoxin control
3. Enhance communication and end-user education/outreach.

To accomplish the research goals, we contribute to the following:

1. Validating the integrated management strategies with the next generation of wheat and barley varieties in multiple production environments.
2. Developing economic analyses of effective integrated management strategies used alone and in combination.
3. Evaluating the flexibility of fungicide application timing within the context of the integrated management strategies.
4. Continuing to update and enhance the content of the ScabSmart website.
5. Providing commentaries from the FHB forecasting site available on the USWBSI website and sent to users via mobile devices.

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?

For FY22, we conducted four wheat trials at two locations. Two trials were part of the uniform fungicide program, and the additional two were part of the integrated management coordinated project. Data were summarized and shared with the lead institution for the CP. Trials were also established to maintain the same number of trials and locations for the 2022-2023 growing season.

FHB was relatively low in our trials. Plots that were inoculated did provide measurable quantities of DON, indicating that if environment were more favorable for FHB, we have the conditions (i.e., inoculum) to establish an epidemic. As such, our outreach efforts focused on providing timely information about the risk of FHB during the growing season as part of Penn State Extension's Field Crop News, which is sent to over 11,000 people. Dr. Alyssa Collins continued to provide local commentary for the Fusarium Head Blight Prediction Center.

b) What were the significant results?

By continuing to conduct a standard set of trials across multiple locations, we are well-positioned to monitor and quantify FHB in Pennsylvania. While the last growing season had a lower FHB disease intensity, we could provide timely information to farmers and other stakeholders. We also contributed field data to the larger CP, valuable information used to validate current models.

c) List key outcomes or other achievements.

We have an established system to conduct four trials annually and the laboratory setup to inoculate those trials. We continue to train one graduate student on FHB, which integrates into their Ph.D. dissertation. Two postdoctoral fellows also contributed to the project, and we trained several undergraduate researchers on disease assessment and quantification in small grains. For 2022-2023, we also established several on-farm trials, which provide farm-scale data about the impact of FHB under natural conditions.

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

None to report

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

Extension articles were written and published as part of Penn State Extension's Field Crop News. These articles provided timely information to stakeholders about the risk of FHB, among other wheat diseases. The Field Crop News is sent via email to well over 10,000 subscribers.

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).

1. Del Ponte, E., and 26 other authors. 2022. *Fusarium graminearum* species complex: A bibliographic analysis and web-accessible database for global mapping of species and trichothecene toxin chemotypes. *Phytopathology* 112:741-751.
<https://doi.org/10.1094/PHYTO-06-21-0277-RVW>. (acknowledgement of federal support: no)

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.

1. **Esker, P.**, P. Ojiambo, and P. Paul. 2022. Wheat and maize in North America. Pages 46-50. in: *Global Plant Health Assessment*, L. Willocquet, M. Singh, S. Sah, F. Bove, S. Savary, and J. Yuen (Eds.) International Society of Plant Pathology. ISBN 978-91-988233-0-1.
(acknowledgement of federal support : no)

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.

1. Moraes, W.B., G. Bergstrom, et. al. (27 total authors). (2022). Fusarium head blight management coordinate project: Uniform fungicide trials in 2022. Proceedings of the 2022 National Fusarium Head Blight Forum; Tampa, FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>
2. Moraes, W.B., G. Bergstrom, et. al. (27 total authors). (2022). Fusarium head blight management coordinate project: Integrated management trials in 2022. Proceedings of the 2022 National Fusarium Head Blight Forum; Tampa, FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>
3. Garnica, V.C., D.A. Shah, P.D. Esker, and P.S. Ojiambo. (2022). MSE FindR: An R shiny app tool for recovering variance in designed experiments using treatment means and post-hoc test results. Proceedings of the 2022 National Fusarium Head Blight Forum; Tampa, FL. December 4-6, 2022. Retrieved from: <https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf>
4. Collins, A. A., & Esker, P. (Author, 50%) (2023). "Helpful resources for wheat and barley scab prevention." *Field Crop News - Penn State Extension*.
<https://extension.psu.edu/helpful-resources-for-wheat-and-barley-scab-prevention>
5. Collins, A., & Esker, P. (Author, 50%) (2023). "Sooty mold on small grains." *Field Crop News Penn State Extension*. <https://extension.psu.edu/sooty-mold-on-small-grains>