USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY19 Performance Report
Due date: July 24, 2020

Cover Page

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Fiscal Year:	2019
USDA-ARS Agreement ID:	59-0206-8-210
USDA-ARS Agreement Title:	Integrated Management of Fusarium Head Blight in Wheat in Pennsylvania
FY19 USDA-ARS Award Amount:	$ 24,945
Recipient Organization:	The Pennsylvania State University Research Accounting 227 W Beaver Ave, Ste 401 State College, PA 16801-4819
DUNS Number:	00-340-3953
EIN:	24-6000376
Recipient Identifying Number or Account Number:	000203336
Project/Grant Reporting Period:	7/1/19 - 6/30/20
Reporting Period End Date:	6/30/2020

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management of Fusarium Head Blight in Wheat in Pennsylvania	$ 24,945
	FY19 Total ARS Award Amount	**$ 24,945**

Paul Esker 7/22/20

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
EC-HQ – Executive Committee-Headquarters
BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
HWW-CP – Hard Winter Wheat Coordinated Project
VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
SPR – Spring Wheat Region
NWW – Northern Soft Winter 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?

The goals and objectives of this project were to:

1) Develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in production fields of wheat and barley.
2) Help develop and validate the next generation of management and mitigation tools for FHB and mycotoxin control.
3) Enhance communication and end user education/outreach.

2. What was accomplished under these goals or objectives? *(For each major goal/objective, address items a-b) below.)*

a) What were the major activities?

For Goal (1), we established integrated management trials at two locations in Pennsylvania, with the first at the Russell E. Larson Agricultural Research Center at Rock Springs and the second at the Southeast Agricultural Research and Extension Center at Manheim. We also established the uniform fungicide trial at the Rock Springs farm.

For Goal (2), all trials were established with the specific goal to study the combination of genetics (resistance) and fungicide active ingredient and timing. We were especially focused on looking at the efficacy of Syngenta's new product, Miravis Ace, under Pennsylvania environments for an additional year since in our initial years results were very promising.

For Goal (3), we worked with our Penn State Extension Field and Forage Crop Team network to disseminate information throughout Pennsylvania to highlight the challenges that FHB posed during the 2019 growing season and recommendations that farmers could take in preparation for the 2020 season.

b) What were the significant results?

Trial data are still be analyzed, as two of the three trials were just harvested in the past week. Conditions in 2020 were less favorable for FHB than during the previous two years of research. As indicated below, we also had to modify somewhat our program given the COVID-19 situation. Specifically, given that Penn State was under the definition of "mission critical" for an extended period into June, we could not justify having someone in the laboratory 4-5 days per week to prepare inoculum. As such, we expect results to show a lesser impact of FHB given the conditions for natural infection.

Additionally, research being conducted by Visiting Scholar Maira Duffeck will be used as part of her PhD thesis at the Federal University of Vicosa in Brazil. She has made

excellent progress on finishing her research that looks at the genotypic diversity of *Fusarium* spp. in small grains, as well as questions about pathogenicity and aggressiveness of Fusarium isolates.

c) List key outcomes or other achievements.

- Successful establishment of multiple field trials.
- Continued laboratory efforts to examine the genotypic diversity of Fusarium.
- Successful contribution of data from Pennsylvania in the national database on integrated management of FHB.
- Proactive extension programming on FHB and important risk factors and management.

3. Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.

Yes, our research was impacted by COVID-19. As earlier mentioned, we were unable to continue with the necessary lab work that we would normally accomplish to inoculate plots. Furthermore, due to a shortage in staffing and delays in being able to have summer interns, we were unable to establish a second site for the uniform fungicide trial. There are still questions about how we might be impacted moving into Fall 2020 since right now, we are still limited in terms of the number of people that can be working in the laboratory and at the research farm.

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

Maíra Duffeck, PhD student at the Universidade Federal de Viçosa (Brazil), has been a visiting scholar in the Esker Laboratory. She has led development of protocols for Fusarium spp. identification and inoculum development, as well as field research and participating in extension activities. Her success can be measured by her selection for the upcoming 19th I.E. Melhus Graduate Student Symposium as part of the APS Plant Health 2020 online conference.

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

For the period 2019-2020, Co-PIs Esker and Collins presented FHB-related information in seven meetings to 532 participants in Pennsylvania and the eastern region, including train-the-trainer type education for extension professionals

Co-PI Collins wrote three updates for the Fusarium Head Blight Prediction Center and contributed to the annual USWBSI-produced national scab summary article.

Furthermore, we wrote five articles for our Field Crop News publication for the Field and Forage Crop Team of Penn State Extension (see publications).

Results were also presented in two posters at the USWBSI Forum in Milwaukee, and also contributed to two additional posters as part of the IM-CP.

Results will also be presented by Maíra Duffeck at the 19th I.E. Melhus Graduate Student Symposium as part of the APS Plant Health 2020 online conference, which will occur in August 2020. She will also present a poster at the same meeting developed from work from this project.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY19 award period (7/1/19 - 6/30/20). The term "support" below includes any level of benefit to the student, ranging from full stipend plus tuition to the situation where the student's stipend was paid from other funds, but who learned how to rate scab in a misted nursery paid for by the USWBSI, and anything in between.

1. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY19 award period?**

   No.

   If yes, how many?

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY19 award period?**

   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**

   No.

   If yes, how many?

4. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**

   No.

   If yes, how many?

Release of Germplasm/Cultivars

Instructions: In the table below, list all germplasm and/or cultivars released with full or partial support through the USWBSI during the FY19 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations.

NOTE: Leave blank if you have nothing to report or if your grant did NOT include any VDHR-related projects.

Name of Germplasm/Cultivar	**Grain Class**	**FHB Resistance** (S, MS, MR, R, where R represents your most resistant check)	**FHB Rating** (0-9)	**Year Released**

Add rows if needed.

NOTE: List the associated release notice or publication under the appropriate sub-section in the 'Publications' section of the FPR.

Abbreviations for Grain Classes

Barley - BAR
Durum - DUR
Hard Red Winter - HRW
Hard White Winter - HWW
Hard Red Spring - HRS
Soft Red Winter - SRW
Soft White Winter - SWW

Publications, Conference Papers, and Presentations

Instructions: Refer to the FY19-FPR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY19 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (7/1/19 - 6/30/20**) should be included. If you did not publish/submit or present anything, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each citation, you **must** indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in the publication/ presentation. See example below for a poster presentation with an abstract:

De Wolf, E., D. Shah, P. Paul, L. Madden, S. Crawford, D. Hane, S. Canty, R. Dill-Macky, D. Van Sanford, K. Imhoff and D. Miller. 2019. "Impact of Prediction Tools for Fusarium Head Blight in the US, 2009-2019." In: S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Macky (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 12), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Books or other non-periodical, one-time publications.

Collins, A., and P.D. Esker. 2020. Keep your eye on Fusarium head blight risk in Pennsylvania. Field Crop News – Penn State Extension. https://extension.psu.edu/keep-your-eye-on-fusarium-head-blight-risk-in-pennsylvania.
Status: Published
Acknowledgement of Federal Support: NO

Collins, A., and P.D. Esker. 2020. Fusarium head scab update. Field Crop News – Penn State Extension. https://extension.psu.edu/fusarium-head-scab-update.
Status: Published
Acknowledgement of Federal Support: NO

Collins, A., and P.D. Esker. 2020. Preparing for Fusarium head scab on small grains. Field Crop News – Penn State Extension. https://extension.psu.edu/preparing-for-fusarium-head-scab-on-small-grains.
Status: Published
Acknowledgement of Federal Support: NO

Esker, P.D., A. Collins, and A. Murillo-Williams. 2020. Scouting small grains diseases for improved fungicide decision making. Field Crop News – Penn State Extension.

https://extension.psu.edu/scouting-small-grains-diseases-for-improved-fungicide-decision-making.
Status: Published
Acknowledgement of Federal Support: NO

Esker, P.D., A. Murillo-Williams, A. Collins, K. Borrelli, M. Antle, and M. Duffeck. 2020. Multifaceted approaches to management Fusarium head blight in small grains in PA. Field Crop News – Penn State Extension. https://extension.psu.edu/multifaceted-approaches-to-managing-fusarium-head-blight-in-small-grains-in-pa.
Status: Published
Acknowledgement of Federal Support: YES

Other publications, conference papers and presentations.

Duffeck, M., A.Y. Bandara, D.K. Weerasooriya, T.S. McFeaters, A.A. Collins, E.M. Del Ponte, and P.D. Esker. 2019. "Comparative aggressiveness of *Fusarium graminearum* isolates causing Fusarium head blight in Pennsylvania." In S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Mackey (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 65), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES

Duffeck, M., T.S. McFeaters, A.Y. Bandara, D.K. Weerasooriya, E.M. Del Ponte, and P.D. Esker. 2019. "Sensitivity of *Fusarium graminearum* isolates causing wheat scab in Pennsylvania to triazole fungicides." In S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Mackey (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 13), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES

Paul, P.A., S.J. Ng, and 25 other co-authors. 2019. "Fusarium head blight management coordinated project: Integrated management trials 2018-2019. In S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Mackey (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 20), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Paul, P.A., S.J. Ng, and 25 other co-authors. 2019. "Fusarium head blight management coordinated project: Uniform fungicide trials 2018-2019." In S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Mackey (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 25), Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Rodrigues Duffeck, M., A.Y. Bandara, D.K. Weerasooriya, and P. Esker. 2020. Genetic population structure and trichothecene genotype composition of *Fusarium graminearum* populations causing Fusarium head blight in Pennsylvania. 2020 APS Annual Meeting online.
Status: Abstract Published and Poster to be presented
Acknowledgement of Federal Support: YES (Poster)

Rodrigues Duffeck, M., E.M. Del Ponte, and P. Esker. 2020. Regional management of Fusarium head blight in Brazil and Pennsylvania: Integrative risk assessment approaches using literature and field survey data. 2020 APS Annual Meeting online. (19th I.E. Melhus Graduate Student Symposium).
Status: Abstract Published and Talk to be presented
Acknowledgement of Federal Support: YES (Talk)