USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY18 Performance Report
Due date: July 12, 2019

Cover Page

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Fiscal Year:	2018
USDA-ARS Agreement ID:	59-0206-8-210
USDA-ARS Agreement Title:	Integrated Management of Fusarium Head Blight in Wheat in Pennsylvania.
FY18 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:	7/1/18 - 6/30/19
Reporting Period End Date:	06/30/19

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
	FY18 Total ARS Award Amount	$ 24,945

Paul Esker

7/3/19

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

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Project 1: *Integrated Management of Fusarium Head Blight in Wheat in Pennsylvania.*

1. What are the major goals and objectives of the 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? *Address items 1-4) below for each goal or objective.*

1) major activities

a. For (1), we established uniform fungicide and 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.
b. For (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 a second year since in our first year, results were very promising under natural inoculum conditions.
c. For (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 2018 growing season and recommendations that farmers could take in preparation for the 2019 season.
d. We also were able to develop a sampling program for FHB-infected small grains from which we obtained approximately 300 putative *Fusarium* spp. isolates.

2) specific objectives: As highlighted under major activities, we focused activities to address our three main objectives for this project. This involved a combination of field research, field sampling of farmer fields, and extensive extension activities considering the favorable conditions we had during 2018. This enabled us to establish for 2018-2019 field trials as defined by the coordinated protocols.

3) significant results: As indicated earlier, four sets of trials were established in Pennsylvania under the uniform fungicide trial and integrated management trial. Data are still being collected, including harvest, but preliminary data show that Pennsylvania once again had a very favorable 2018-2019 season for FHB. Results are showing that our untreated check plots with inoculation were similar to those where inoculum was applied. Furthermore, there are clear differences being observed for the different fungicide products and application timings and the new product from Syngenta, Miravis Ace, is again showing very positive results.

Indirectly, our extension efforts based on our response to the 2017-2018 growing season are indicating that many of our stakeholders were paying more attention to the FHB risk in 2018-

2019. Early evidence is suggesting that many applied a foliar fungicide at anthesis and from discussions with PSU Extension Educators who conducted wheat crop tours, field observations suggested lower levels of FHB than the reports we received in 2017-2018.

4) key outcomes or other achievements:

- Successful establishment of multiple field trials
- Isolation of approximately 300 putative Fusarium spp. isolates
- Successful protocol development and inoculum application of the Fusarium spp. isolates in our field trials
- Proactive extension programming on FHB risk and management presented in 32 talks to over 1,600 participants

3. 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 visting scholar in the Esker Laboratory. She has led development of protocols for Fusarium spp. identification and inoculum development, as well as field research and participationg in extension activities.

Our project has provided opportunities for 6 students to work on field and laboratory research related to FHB and learn about wheat production and disease management.

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

For the period 2018-2019, Co-PIs Esker and Collins presented FHB-related information in 32 meetings to 1646 participants in Pennsylvania and the eastern region.

Co-PI Collins wrote 7 updates for the Fusarium Head Blight Prediction Center.

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

Lastly, the co-PIs (Collins and Esker) were invited to present an invited talk at the 2018 National Fusarium Head Blight Forum on the challenges for FHB management in the northeastern USA.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY18 award period. 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 FY18 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 FY18 award period?**

No

If yes, how many?

3. **Have any post docs who worked for you during the FY18 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 FY18 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 FY18 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 FY18-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY18 grant. Only include citations for publications submitted or presentations given during your award period (7/1/18 - 6/30/19). If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

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

> Conley, E.J., and J.A. Anderson. 2018. Accuracy of Genome-Wide Prediction for Fusarium Head Blight Associated Traits in a Spring Wheat Breeding Program. In: Proceedings of the XXIV International Plant & Animal Genome Conference, San Diego, CA.
> Status: Abstract Published and Poster Presented
> Acknowledgement of Federal Support: YES (poster), NO (abstract)

Journal publications.

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

Other publications, conference papers and presentations.

Bandara, A., Weerasooriya, D., Wilt, B., Miller, C., Tatsumi, E., Rovelo, L., Antle, M., Anchor, C., Bollinger, J., Collins, A., Roth, G., & Esker, P. (2018). Effects of selected fungicides and their application timing on FHB disease incidence, severity, seed germinability, and DON levels of winter wheat in Pennsylvania. In Canty, S., A. Hoffstetter, B. Wiermer and R. Dill-Macky (Eds.), *Proceedings of the 2018 National Fusarium Head Blight Forum.* (pp. 8). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
Status: Published
Acknowledgement: Yes

Bandara, A., Weerasooriya, D., Wilt, B., Miller, C., Tatsumi, E., Rovelo, L., Antle, M., Anchor, C., Bollinger, J., Collins, A., Roth, G., & Esker, P. (2018). Impact of selected FHB-targeted fungicides and their time of application on yield performances of winter wheat in Pennsylvania. In Canty, S., A. Hoffstetter, B. Wiermer and R. Dill-Macky (Eds.), *Proceedings of the 2018 National Fusarium Head Blight Forum.* (pp. 9). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
Status: Published
Acknowledgement: Yes

Collins, A. A., & Esker, P. (2018). Understanding cultural impacts on scab management adoption in the East. In Canty, S., A. Hoffstetter, B. Wiermer and R. Dill-Macky (Eds.), *Proceedings of the 2018 National Fusarium Head Blight Forum.* (pp. 17). East Lansing, MI/Lexington,KY: U.S. Wheat & Barley Scab Initiative.
Status: Published
Acknowledgement: No

Collins, A. A., & Esker, P. (2019). Fusarium head scab update. *Field Crop News - Penn State Extension.* http://extension.psu.edu/fusarium-head-scab-update.
Status: Published
Acknowledgement: No

Esker, P. & Collins, A. A. (2019). Fusarium head scab update for May 28, 2019. *Field Crop News - Penn State Extension.* http://extension.psu.edu/fusarium-head-scab-update-for-may-28-2019.
Status: Published
Acknowledgement: No

Collins, A. A., Esker, P., & Murillo-Williams, A. (2019). Scouting and quantifying Fusarium head blight in small grains. *Field Crop News - Penn State Extension.* http://extension.psu.edu/scouting-and-quantifying-fusarium-head-blight-in-small-grains.
Status: Published
Acknowledgement: No