USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: August 31, 2021

Cover Page

Principle Investigator (PI):	Alyssa Collins
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Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-139
USDA-ARS Agreement Title:	Reducing Scab and Vomitoxin in Malting Barley in the Mid-Atlantic
FY20 USDA-ARS Award Amount:	$ 19,267
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:	G#900303
Project/Grant Reporting Period:	6/1/20 - 5/31/21
Reporting Period End Date:	5/31/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management of Malting Barley in Pennsylvania	$ 19,267
	FY20 Total ARS Award Amount	**$ 19,267**

8/31/21

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
R- Research
S – Service (DON Testing Labs)
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 Malting Barley in Pennsylvania*

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

The objectives of this project in alignment with the USWBSI Action Plan are to:

- Develop integrated management strategies for FHB and mycotoxins that are robust to conditions experienced in MidAtlantic production fields of barley by trialing fungicide chemistries, timing, and genetic resistance.
- Help develop and validate the next generation of management and mitigation tools for FHB and mycotoxin control by providing information regarding field scale conditions and disease development.
- Enhance communication and end user education/outreach regarding best management practices for production of high-quality malting barley

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?

Malting barley integrated management trials and uniform fungicide trials were established in two production regions of Pennsylvania (the Penn State Southeast Agricultural Research & Extension Center in the south and Russell E. Larson Agricultural Research Center in the central region).

Following the coordinated project established protocols, fungicide products and application timings were tested on three mid-Atlantic adapted malting barley varieties ranging susceptible to moderately FHB resistant. The trials were inoculated at both sites. Harvest has been completed and data analysis is now underway.

This and previous work has been used by the Penn State Agronomy Extension Team in delivering education focused on quality malting barley production for growers as well as maltsters and brewers/distillers.

b) What were the significant results?

Samples continue to undergo analysis at this time, but initial observations indicate poor conditions for the development of FHB in this year's trials, despite successful inoculation. An important component of this work in the long term is the evaluation of cultivar utility in unpredictable environmental conditions. Because we employ the same cultivars (Calypso, Thoroughbred, Violetta) each year, we hope to demonstrate the performance of these cultivars for malting in the region across years of both high and low disease pressure.

c) List key outcomes or other achievements.

A critical achievement during FY20 was the successful execution of all components of the plan of field and lab work despite limitations of staffing resulting from COVID and personnel retirements. Another achievement was the rapid conversion of in-person programming to digital formats, including our Farming for Success Field Day, Field Diagnostic Clinic, Grain Production Series, Crops Conferences, and the Philadelphia Grain & Malt Symposium. Many of these programs were able to be offered at no cost to participants and also allowed for the viewing of content at a later time, thus expanding our reach to an audience previously constrained by time, finances, or geographic location.

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

COVID-19 did contribute to some challenges, especially in our efforts to replace technical personnel in a timely manner. A delay in staffing the support position for this project and laboratory capacity restrictions created challenges, but ultimately all crops were planted, maintained, inoculated, and harvested.

A larger impact was felt in our educational programming since in-person events were not able to be held. This prevented our ability to conduct crop walks and field days. However, all efforts were channeled into the production of digital media including articles, webinars, and virtual field days or winter meetings.

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

While students were not directly supported on this award, this project has provided the opportunity for undergraduate students and interns to participate in study plot planting, evaluation, harvest, and sample analysis.

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

Data from FY20 trials will be shared back to the coordinated project. Because of the pivot to virtual extension as a result of pandemic restrictions, our outreach was largely online through digital media. A Grain Crop Production Webinar Series reached 76 producers spanning DE, MD, NJ, NY, OH, OR, PA, TN, and VA. Findings and recommendations from this work were also shared at other combined agronomy meetings with over 400 attendees. We wrote six articles during the growing season about scab risk as part of Penn State Extension's *Field Crop News*, which is received by over 10,000 currently signed up to receive information Penn State Extension. Updated commentary was also provided continuously through ScabSmart during the critical small grain disease management period.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (6/1/20 - 5/31/21). 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?**
   ☐Yes ☐No ☒ Not Applicable
   If yes, how many? Click to enter number here.

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?**
   ☐Yes ☐No ☒ Not Applicable
   If yes, how many? Click to enter number here.

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?**
   ☐Yes ☒No ☐ Not Applicable
   If yes, how many? Click to enter number here.

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?**
   ☐Yes ☒No ☐ Not Applicable
   If yes, how many? Click to enter number here.

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 FY20 award period (6/1/20 - 5/31/21). 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	FHB Rating (0-9)	Year Released
N/A	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year

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

Publications, Conference Papers, and Presentations

Instructions: Refer to the PR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY20 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (6/1/20 - 5/31/21**) 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:

> Winn, Z.J., Acharya, R., Lyerly, J., Brown-Guedira, G., Cowger, C., Griffey, C., Fitzgerald, J., Mason R.E., and Murphy, J.P. (2020, Dec 7-11). Mapping of Fusarium Head Blight Resistance in NC13-20076 Soft Red Winter Wheat (p. 12). In: Canty, S., Hoffstetter, A. and Dill-Macky, R. (Eds.), *Proceedings of the 2020 National Fusarium Head Blight Forum*. https://scabusa.org/pdfs/NFHBF20_Proceedings.pdf.
> Status: Abstract Published and Poster Presented
> Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Rodrigues Duffeck, M., Del Ponte, E.M., and Esker, P. 2021. Multifaceted insights of Fusarium head blight in small grains in Pennsylvania. Plant Health Progress, https://doi.org/10.1094/PHP-03-21-0067-SYN.
Status: Published
Acknowledge of Federal Support: Yes

Duffeck, M., Bandara, A., Weerasooriya, D, Collins, A., Jensen, P., Kuldau, G., Del Ponte, E., and Esker, P. 2021. Fusarium head blight of small grains in Pennsylvania: Unravelling species diversity, toxin types, growth, and triazole sensitivity (in review).
Status: Accepted
Acknowledge of Federal Support: Yes

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

Nothing to report.

Other publications, conference papers and presentations.

P. Esker, A. Collins, A. Murillo-Williams, H. Reed, and B. Clark. 2021. The home stretch: Evaluating your small grain crop. Field Crop News – Penn State Extension. https://extension.psu.edu/the-home-stretch-evaluating-your-small-grain-crops.
Status: Published
Acknowledge of Federal Support: No

A. Murillo-Williams, K. Borrelli, P. Esker, A. Collins. 2021. Grain Quality Is Key for Malting Barley Production and Marketing. Field Crop News – Penn State Extension. https://extension.psu.edu/grain-quality-is-key-for-malting-barley-production-and-marketing
Status: Published
Acknowledge of Federal Support: No

A. Collins, P. Esker. 2021. Heads Up, Barley Heads Are Out! Field Crop News – Penn State Extension. https://extension.psu.edu/heads-up-barley-heads-are-out
Status: Published
Acknowledge of Federal Support: No

Luis, J.M., Ng, S.J., Bergstrom, G., Bissonnette, K., 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., Madden, L., Marshall, J., Mehl, H., Moraes, W., Nagelkirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P.A. (2020). Fusarium head blight management coordinated project: Integrated management trials 2018-2020. In: *Proceedings of the 2020 National Fusarium Head Blight Forum*. Online: December 7-11, 2020, pp. 38-43.
Status: Published
Acknowledgement of Federal Support: Yes

Luis, J.M., Ng, S.J., Bergstrom, G., Bissonnette, K., 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., Madden, L., Marshall, J., Mehl, H., Moraes, W., Nagelkirk, M., Rawat, N., Smith, D., Telenko, D., Wegulo, S., Young-Kelly, H., and Paul, P.A. (2020). Fusarium head blight management coordinated project: Uniform fungicide trials 2018-2020. In: *Proceedings of the 2020 National Fusarium Head Blight Forum*. Online: December 7-11, 2020, pp. 44-48.
Status: Published
Acknowledgement of Federal Support: Yes