USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: July 29, 2021

Cover Page

Principle Investigator (PI):	Alyssa Koehler
Institution:	University of Delaware
E-mail:	akoehler@udel.edu
Phone:	302-856-2585 ext. 571
Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-173
USDA-ARS Agreement Title:	FHB Management in Delaware
FY20 USDA-ARS Award Amount:	$ 19,066
Recipient Organization:	University of Delaware Research Office 220 Hullihen Hall Newark, DE 19716-0099
DUNS Number:	59007500
EIN:	516000297
Recipient Identifying Number or Account Number:	59-0206-0-173
Project/Grant Reporting Period:	5/15/20 - 5/14/21
Reporting Period End Date:	5/14/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Evaluation of FHB Management Strategies in DE following the MGMT CP Standard Protocol	$ 19,066
	FY20 Total ARS Award Amount	**$ 19,066**

7/27/21

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

Project 1: *Evaluation of FHB Management Strategies in DE following the MGMT CP Standard Protocol*

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

Winter wheat and malting barley are important crops to growers of Delaware. In recent years, environmental conditions have been highly conducive for Fusarium Head Blight. Many growers utilize risk model forecasting and rely on the application of fungicides when environmental conditions set up a high risk for FHB. The release of a new fungicide, Miravis® Ace, has drawn attention from growers and there is need for local data onrecommended application timing and product performance. This project seeks to follow the FHB ManagementCoordinated Project (MGMT_CP) to address the following objectives:

1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in wheat with emphasis on a new fungicide, Miravis Ace.

2) Compare the efficacy of Miravis Ace when applied at early heading, anthesis, or after anthesis to a standard anthesis application of Prosaro® or Caramba®.

3) Generate data to further quantify the economic benefit of FHB/DON management strategies.

4) Disseminate data to producers and stakeholders through extension outreach programming.

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?

As part of this project, 3 trials were conducted. Following the MGMT_CP, two winter wheat cultivars were planted to assess fungicide performance on susceptible and moderately resistant varieties (objective 1). Using a susceptible variety, a second inoculated wheat field was established to analyze efficacy of the new fungicide, Miravis Ace, and compare performance at different timings to previous fungicide standards (objectives 2 &3). A uniform fungicide trial was conducted in malting barley to analyze the efficacy of Miravis Ace at different timings (objectives 2&3). After fungicide application, plots were monitored and rated for FHB incidence and severity, flag leaf disease severity, yield, test weight, kernels damaged by FHB, and DON level.

Trial results were shared through extension programming, plant disease management reports, and at winter meetings (objective 4).

b) What were the significant results?

The most notable results occurred in the malting barley trial (obj 2&3). All products and timings reduced FHB incidence and severity in comparison to the no fungicide control. At harvest, the control plot yield averaged 86.7 bu/a. Miravis Ace applied at Anthesis had the highest yield at 105.6 bu/a. DON values were low and could not be sorted by treatment. Frosts at the time of heading impacted wheat yield potential. In the wheat fungicide trial, differences in FHB incidence and severity were observed with all treatments and timings having lower disease than the control plots (obj 2&3). Two new products, USF0115 and BAS840, were screened in addition to Miravis Ace. In the variety:fungicide trial, the susceptible variety, Shirley yielded higher than the variety with partial resistance, DG9932. However, FHB severity was higher in the susceptible (obj 1). Data generated from this project indicated that Miravis Ace performs just as well as Caramba and Prosaro, and that all timings provide disease control. Mycotoxin values were too low to separate optimal timing based on DON values.

c) List key outcomes or other achievements.

1) Expected Outcome: Regional product performance data for comparison of control provided by host resistance, fungicides, or both.
Actual Outcome: Product performance was assessed and dispersed to stakeholders.

2) Expected Outcome: Improved application-timing recommendations and efficacy data on various application timings of the new product, Miravis Ace.
Actual Outcome: Data was generated comparing application timings and results were disseminated.

3) Expected Outcome: Increased data to support management decisions made by stakeholders.
Actual Outcome: Increases in local data were achieved.

4) Expected Outcome: Increase dispersion and utilization of new data through in person and digital communication platforms.
Actual Outcome: Multiple information dissemination platforms were used to share research findings and one graduate student was trained.

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.

The COVID-19 pandemic hit right in the middle of small grain field season. We had planned to inoculated all trials and set up misting in the wheat fungicide trial, but staff shortages kept this from being possible. Inoculum made prior to university shutdown was applied, but there was a few month period where access to the lab was very limited ruling out continuation of inoculum preparation. The PI was able to continue to work through a research continuity clause, but operations were largely disrupted much of 2020.

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

Data from the project was presented virtually at Mid Atlantic Crop School and Delaware Ag Week that provide pesticide credit training to hundreds of stakeholders.

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

Updates on disease risk,product efficacy, and optimal application periods were shared through the University of Delaware's Weekly Crop Update, social media platforms, and two Plant Disease Management Reports. A joint poster was presented at the virtual FHB forum and a poster was presented by the graduate student on the project at the APS Potomac Division Annual meeting held virtually in 2021.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/15/20 - 5/14/21). 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 FY20 award period?**
   ☐Yes ☒No
   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 FY20 award period?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

3. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

4. **Have any post docs who worked for you during the FY20 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
   If yes, how many? Click to enter number here.

FY20 Annual Performance Progress Report
PI: Koehler, Alyssa
USDA-ARS Agreement #: 59-0206-0-173
Reporting Period: 5/15/20 - 5/14/21

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 (5/15/20 - 5/14/21). 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 (5/15/20 - 5/14/21**) 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.

Nothing to report.

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

Nothing to report.

Other publications, conference papers and presentations.

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

Cinderella J. and Koehler A.M. 2020. Evaluation of fungicide efficacy and timing to manage wheat diseases in Delaware. APS Potomac Division Meeting, Virtual.

Status: Abstract Published and Poster Virtually Presented

Acknowledgement of Federal Support: Yes (Poster)

Cinderella J. and Koehler A.M. 2021. Assessment of fungicides and application timings for control of barley head and leaf diseases in Georgetown, DE, 2020. Plant Disease Management Reports. 15:CF152.

Status: PDMR Published

Acknowledgement of Federal Support: no place to specify

Cinderella J. and Koehler A.M. 2021. Assessment of fungicides and application timings for control of wheat head diseases in Georgetown, Delaware, 2020. Plant Disease Management Reports. 15:CF151.

Status: PDMR Published

Acknowledgement of Federal Support: no place to specify