

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

Cover Page

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Fiscal Year:	2019
USDA-ARS Agreement ID:	59-0206-6-012
USDA-ARS Agreement Title:	IPM for FHB and DON in SRWW in Wisconsin
FY19 USDA-ARS Award Amount:	\$ 19,785
Recipient Organization:	University of Wisconsin - Madison Office of Research & Sponsored Programs 21 N. Park Street, Suite 6401 Madison, WI 53715-1218
DUNS Number:	161202122
EIN:	39-6006492
Recipient Identifying Number or Account Number:	AAB3147
Project/Grant Reporting Period:	6/6/19 - 6/5/20
Reporting Period End Date:	6/5/2020

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Improving IPM for FHB and DON in SRWW in Wisconsin	\$ 19,785
FY19 Total ARS Award Amount		\$ 19,785



Principal Investigator

7/23/2020

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: *Improving IPM for FHB and DON in SRWW in Wisconsin*

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

Overall Project Goal: Develop integrated management strategies for FHB and mycotoxins specific to Wisconsin soft red winter wheat production.

Objectives:

- 1) Conduct the standard multi-state MGMT-CP Integrated management protocol involving new chemistries applied to various varieties;
- 2) Conduct a uniform fungicide trial in Wisconsin;
- 3) Validate action thresholds for spraying fungicide based on the FHB Prediction center, for Wisconsin's unique climate.

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?

The IM-CP standard protocols were followed and implemented in Wisconsin on soft red winter wheat (SRWW). This included conducting the integrated management (IM) protocol, treating resistant and susceptible varieties with various fungicides at different application timings. We also conducted the uniform fungicide trial (UFT) to bolster multi-state recommendations for efficacious fungicides. Finally, we conducted the coordinated scab prediction validation protocol using a susceptible variety in Wisconsin.

b) What were the significant results?

Results from the IM protocol revealed that the most significant reduction in FHB and DON is a result of planting a resistant variety (Harpoon). FHB could further be reduced by using fungicide. However, DON levels were below 1ppm for all treatments where a Harpoon was used. In the susceptible variety (Hopewell), the use of Miravis Ace® at anthesis resulted in levels of DON that were significantly lower than if the same product was applied at half-head emergence. Best reductions in DON were obtained when Miravis Ace was applied 5 days after anthesis. This latter result is consistent with findings using Prosaro® or Caramba®. Results from the uniform fungicide trials also indicate that application of Miravis Ace at half-head emergence is just too early. Reductions in DON levels were much better when this product was applied at anthesis, or 5-days after anthesis, with the last application timing giving us the best reductions. This has been consistent in Wisconsin now for several seasons. Prosaro and Caramba continue to perform well in Wisconsin for reducing FHB and DON, as long as these products are applied at anthesis or 5 days after anthesis.

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The scab prediction tool continues to fall short on accuracy in Wisconsin. We have experienced two years of heavy FHB in winter wheat. In 2019 the model never recommended a fungicide application on susceptible varieties in Wisconsin, with significant damage noted in the validation trials. More work needs to be done to refine the scab advisor tool for unique environments like Wisconsin.

c) List key outcomes or other achievements.

Key outcomes of this work have been improved recommendations for FHB management in Wisconsin. Prior to this work, we were recommending that farmers apply just the fungicides Prosaro and Caramba at Anthesis. Now we know that Miravis Ace is a viable option and can be applied at full head emergence or as late as 5 days after the start of anthesis. Combined with moderately resistant varieties, this strategy has proven to be an excellent recommendation for limiting DON accumulation in finished grain harvested in Wisconsin. Prosaro and Carmaba continue to be proven fungicide options and our foray into using these options in two-spray programs has also demonstrated excellent reductions in DON.

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.

No

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

While this project did not directly train a graduate student, several graduate students were involved in assisting technicians in implementing the trials. These graduate students obtained experience in experimental design and disease management strategies in wheat.

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

Results obtained were disseminated to stakeholders using cooperative extension outlets. The University of Wisconsin Field Crops Pathology program maintains a website(s) (<https://badgercropdoc.com>) for data distribution. All pertinent results from these trials were posted in online portals. In addition, data were delivered to growers via annual cooperative extension Pest Management Update Meetings and Winter Agronomy meetings. All data were also supplied to the IM-CP manager to be included in the multi-state analysis.

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Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY19 award period (6/6/19 - 6/5/20). 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?

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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

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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 (6/6/19 - 6/5/20)** 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*, Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY. p. 12.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

N/A

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

N/A

Other publications, conference papers and presentations.

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)

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Mueller, D. and Smith, D.L. 2019. Evaluation of foliar fungicides for control of Fusarium head blight of wheat in Wisconsin, 2018. *Plant Disease Management Reports* 13:CF060.

Status: Peer-reviewed research report

Acknowledgement of Federal Support: Not applicable

Conley, S., Roth, A, Gaska, J., Mueller, B., Smith, D. 2019. *Wisconsin Winter Wheat Performance Tests*, University of Wisconsin-Madison, Cooperative Extension (A3868).

Status: Extension report

Acknowledgement of Federal Support: Not applicable

Friskop, A., Wise, K., Bradley, C., Smith, D.L., Kleczewski, N., Darby, H., Mehl, H., and Collins, A. 2019. Optimizing fungicide use for Fusarium head blight (scab) and associated mycotoxins. *Crop Protection Network Fact Sheet: CPN-3001*.

Status: Extension fact sheet

Acknowledgement of Federal Support: Not applicable

Conley, S.P. and Smith, D.L. 2019. Top 8 recommendations for winter wheat establishment in 2019. *Wisconsin Crop Manager* 26(17):118-119.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable

Smith, D.L. and Conley, S.P. 2019. Don't let Fusarium head blight keep down – Prepare now to harvest those scabby wheat fields. *Wisconsin Crop Manager* 26(13):88-90.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable

Smith, D.L. and Mueller, B. 2019. Wisconsin Winter Wheat Disease, June 28, 2019. *Wisconsin Crop Manager* 26(13):83-85.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable

Smith, D.L. and Mueller, B. 2019. Wisconsin Winter Wheat Disease, June 4, 2019. *Wisconsin Crop Manager* 26(9):44.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable

Smith, D.L. and Mueller, B. 2019. Wisconsin Winter Wheat Disease, May 21, 2019. *Wisconsin Crop Manager* 26(7):31.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable

Smith, D.L. and Mueller, B. 2019. Wisconsin Winter Wheat Disease, Spring Update. *Wisconsin Crop Manager* 26(6):27.

Status: Extension newsletter article

Acknowledgement of Federal Support: Not applicable