

USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY17 Final Performance Report
Due date: July 31, 2018

Cover Page

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| Principle Investigator (PI): | Damon Smith |
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| Phone: | 608-262-5716 |
| Fiscal Year: | 2017 |
| USDA-ARS Agreement ID: | 59-0206-6-012 |
| USDA-ARS Agreement Title: | IPM for FHB and DON in SRWW in Wisconsin. |
| FY17 USDA-ARS Award Amount: | \$ 18,653 |
| 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: | 6/6/17 - 6/5/18 |
| Reporting Period End Date: | 06/05/18 |

USWBSI Individual Project(s)

| USWBSI Research Category* | Project Title | ARS Award Amount |
|----------------------------------|---|-------------------------|
| MGMT | Efficacy and Economics of IPM for FHB and DON in SRWW in Wisconsin. | \$ 18,653 |
| | FY17 Total ARS Award Amount | \$ 18,653 |



Principal Investigator

7/26/18

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: *Efficacy and Economics of IPM for FHB and DON in SRWW in Wisconsin.*

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

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

Objectives:

1. Investigate the utility of using a two-spray program for controlling FHB and mycotoxins compared to single-application programs on SRWW with varying levels of FHB resistance.
2. Investigate chemical control options for FHB management in Wisconsin SRWW production and calculate return on investment of the programs

2. What was accomplished under these goals? *Address items 1-4) below for each goal or objective.*

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

1. *Investigate the utility of using a two-spray program for controlling FHB and mycotoxins compared to single-application programs on SRWW with varying levels of FHB resistance.*
2. *Investigate chemical control options for FHB management in Wisconsin SRWW production and calculate return on investment of the programs*

Major activities: The IM-CP standard protocol was followed and implemented in Wisconsin on soft red winter wheat (SRWW). An additional set of trials was implemented to investigate the utility of compounds other than Carmaba® and Prosaro® for FHB management.

Specific objectives: Implement field-research trials to evaluate two-spray programs and additional chemistries for FHB management on multiple varieties.

Significant results: Levels of FHB during the funding period were relatively low for a second year in a row due to unseasonably low air temperatures during anthesis (flowering period that is critical for fungal infection). Based on similar work in previous years, two-spray programs do result in a reduction of deoxynivalenol (DON) over not treating, on susceptible varieties. However, under low FHB pressure, the two-spray programs do not result in a significant savings over a single-spray program. In fact, we see in Wisconsin, adequate control of FHB and significant reductions in DON concentrations when a single fungicide application is applied 5 days after the start of anthesis. This fungicide application timing has proven to be quite beneficial in our environment in Wisconsin, where many wheat fields often have an array of growth stages. By waiting an extra 5 days until after the start of anthesis, we can allow “uneven” fields to equalize in timing of flowering, thereby maximizing fungicide application. We also did not observe any additional fungicide products (other than Prosaro and Caramba) that perform well on FHB in Wisconsin. We continue to recommend only

Caramba and Prosaro for FHB management in Wisconsin. We are following up on timing of application of fungicide products in new FY18 proposed work. We are also investigating new fungicide products, in addition to Prosaro and Caramba in FY18. These results should help bolster our recommendations for FHB control in Wisconsin, moving forward.

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 fungicide simply at the start of anthesis. However, this work prompted us to investigate further, different application timings. In Wisconsin, a single fungicide application timed 5 days after the start of anthesis as resulted in the best management of FHB and a significant reduction in DON concentrations, while maximizing economic returns. We know that Prosaro and Caramba continue to be the two best fungicide choices for FHB management in Wisconsin.

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

This project has provided an opportunity to train a M.S. level graduate research assistant (Brian Mueller). Mr. Mueller has been able to participate in this project and also address more specific questions in his degree work, which were generated out of the work conducted here. We have been able to use the information in this project to leverage a follow-up project to investigate the *Fusarium spp.* populations in winter wheat grown throughout the state of Wisconsin. This project allowed us the opportunity to determine the primary species causing Fusarium head blight and the primary chemotype profiles of these isolates. In addition, Mr. Mueller received training and experience in conducting field research trials, data acquisition, and data analysis and reporting while participating in this project.

4. 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) (<http://fyi.uwex.edu/fieldcroppathology>) 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. Our results were also disseminated the Fusarium Head Blight Prediction center the SCABSMART information portal.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY17 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 FY17 award period?** Yes

If yes, how many? 1

Brian Mueller, M.S., Graduates December 2017 – Now employed as a university field research technician

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY17 award period?** No

If yes, how many?

3. **Have any post docs who worked for you during the FY17 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 FY17 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 FY17 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations. *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 |
|----------------------------|-------------|--|------------------------|------------------|
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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 FY17-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY17 grant. Only include citations for publications submitted or presentations given during your award period (6/6/17 - 6/5/18). 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.

Journal publications.

Mueller, B.D., Groves, C.L., Holtz, D. Deutsch, A., and Smith, D.L. 2018. First report of *Fusarium culmorum* causing Fusarium head blight of wheat in Wisconsin. Plant Disease. <https://doi.org/10.1094/PDIS-08-17-1220-PDN>.
Status: Published
Acknowledgement of Federal Support: not applicable

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

Broeske, M., Arriaga, F.J., Jensen, B.M., Laboski, C., Lauer, J.G., Luck, B.D., and Smith, D.L. 2017. *Grain management considerations in low-margin years*. University of Wisconsin-Extension, Cooperative Extension Publication, A4137.
Status: Published
Acknowledgement of Federal Support: Not applicable

Other publications, conference papers and presentations.

Mueller, B., Chapman, S., Conley, S.P., and **Smith, D.L.** 2018. Managing winter wheat diseases in Wisconsin. Proceedings of the 2018 Wisconsin Agribusiness Classic. Vol 2:44-54.
Status: Published
Acknowledgement of Federal Support: Not applicable

Extension Presentations

Disease Management and diagnostic training. 2017 Wisconsin Pest Management Update Meetings. November 7-11, 2016. Marshfield, Chippewa Falls, Belmont, Fond du Lac, Kimberly, Sparta, and Janesville, WI. (*Total of 7 presentations and 400 contacts*).

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