

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY16 Final Performance Report
Due date: July 28, 2017**

Cover Page

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Fiscal Year:	2016
USDA-ARS Agreement ID:	59-0206-4-036
USDA-ARS Agreement Title:	USWBSI Integrated Management of FHB on Delaware Wheat.
FY16 USDA-ARS Award Amount:	\$ 18,966
Recipient Organization:	University of Delaware 210 Hullihen Hall Newark, DE 19716-7501
DUNS Number:	59007500
EIN:	51-6000297
Recipient Identifying Number or Account Number:	AGEX35212215000
Project/Grant Reporting Period:	6/1/16 - 5/31/17
Reporting Period End Date:	05/31/17

USWBSI Individual Project(s)

USWBSI Research Category *	Project Title	ARS Award Amount
MGMT	Integrated Management of FHB and DON in SRWW in Delaware.	\$ 15,694
MGMT	Evaluation of Commercial Wheat and Barley Cultivars for FHB Reaction in DE/MD.	\$ 3,272
	FY16 Total ARS Award Amount	\$ 18,966



7/28/17

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

Project 1: *Integrated Management of FHB and DON in SRWW in Delaware.*

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

The **overall project goal** is to improve the management of FHB and DON in Soft Red winter wheat grown under Delaware and Eastern Shore Maryland by identifying best and most economical management practices.

The specific **project objectives** are as follows:

- 1) Compare a two-pass fungicide program (FGS10.5.1 + 4d post) to the standard, single pass program applied at FGS 10.5.1;
- 2) Compare the effectiveness of the aforementioned fungicide programs for FHB and DON suppression in moderately resistant and moderately susceptible soft red winter wheat varieties grown in Delaware and Maryland;
- 3) Include the Delaware project site as part of the Coordinated Management Program to assess the stability of results across different environments and wheat classes; and
- 4) Assess efficacy and economics of fungicide rate by timing for management of FHB and DON

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

1) major activities: Studies were conducted in 2016 and 2017 that assessed the impacts of varietal resistance level and fungicide program on FHB and DON suppression. A second study assessed the impacts of fungicide timing and rate for FHB and DON suppression in a susceptible wheat variety. The studies were located at the Carvel research and education center located in Georgetown, Delaware. Both studies followed the proposed protocol, and data on yield, test weight, FDK, FHB, and DON were obtained. Data were shared with PI Paul to be included as part of larger, multi-state projects. 2017 data are still being generated.

2) specific objectives:

Compare a two-pass fungicide program (FGS10.5.1 + 4d post) to the standard, single pass program applied at FGS 10.5.1;

- Compare the effectiveness of the aforementioned fungicide programs for FHB and DON suppression in moderately resistant and moderately susceptible soft red winter wheat varieties grown in Delaware and Maryland;
- Include the Delaware project site as part of the Coordinated Management Program to assess the stability of results across different environments and wheat classes; and
- Assess efficacy and economics of fungicide rate by timing for management of FHB and DON

3) significant results:

The 2 pass programs containing Proline followed by Folicur and Prosaro followed by Caramba resulted in the greatest yields and lowest FHB indices, while the DON was reduced the most by the Proline followed by Folicur treatments. Although statistically significant, the amount of yield gain and FHB/DON suppression was not significantly different from the single pass programs under our environmental

conditions. In addition, we saw no benefit from increasing the rate of product application, regardless of timing, when considering FHB and DON

4) key outcomes or other achievements:

Our research showed that although the two pass programs may be effective in managing DON, they may not be economically viable given the subtle improvements realized compared to standard, single pass programs. In addition, we saw no additional value in increasing the fungicide rate, regardless of when the application occurred. These results provide useful information that will improve grower productivity by avoiding unneeded applications of fungicides and saving money by avoiding the use of high rates of fungicides to manage FHB.

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

This project provided training opportunities for five summer interns. The interns learned how work with fungi, produce inoculum, conduct and analyze field data, and organize data.

4. How have the results been disseminated to communities of interest? These data are still in the process of being analyzed, and the final, multi-state data set is not yet complete. Therefore, we have made an effort to limit the amount of result sharing from these trials. Some information has been shared at the Delaware Agricultural Week Field Crop special session, as well as multiple county-level grower meetings.

Project 2: *Evaluation of Commercial Wheat and Barley Cultivars for FHB Reaction in DE/MD.*

- 1. What are the major goals and objectives of the project?** The major goal of this project is to assess commercially available wheat varieties for FHB and DON reaction.
- 2. The specific project objectives are:**
 - Establish a misted nursery in Maryland to assess FHB and DON in commercially available and soon to be released winter wheat and barley varieties,
 - Improve grower access to unbiased FHB screening data on commercially available or soon to be released wheat and barley varieties planted in Delaware and Maryland, and
 - Enhance communication and end user extension/outreach.
- 3. What was accomplished under these goals?** *Address items 1-4) below for each goal or objective.*
 - 1) major activities:

A misted wheat nursery was constructed and located in Beltsville, Maryland in 2016 and 2017. The nursery was inoculated with FHB and misted to enhance disease development. Disease and DON were recorded and data shared through multiple avenues. A survey was conducted to assess impact and value to MD and DE growers.
 - 2) specific objectives
 - a. Establish a misted nursery in Maryland to assess FHB and DON in commercially available and soon to be released winter wheat and barley varieties,
 - b. Improve grower access to unbiased FHB screening data on commercially available or soon to be released wheat and barley varieties planted in Delaware and Maryland, and
 - c. Enhance communication and end user extension/outreach.
 - 3) significant results

We identified several varieties with excellent FHB resistance that had not previously been rated for FHB resistance rating. In addition, because the misted nursery allows us to rank varieties based on direct comparison, we were able to produce a wholistic FHB / DON resistance guide for growers in the region. Previously growers relied on company-based data, which are often a result of comparison to that companies standards.
 - 4) key outcomes or other achievements

We were able to reestablish the misted nursery in Maryland, which was inactive in recent years. I recent survey of Delaware growers indicated that the data produced by this nursey will save Delaware producers a minimum of \$1 million annually.

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

This project provided training opportunities for two technicians and two summer interns, who learned how to work with microbes, set up and harvest field trials, and analyze data.

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

Results were shared on SCABSMART, the Field Crop Disease Management Blog, the Maryland Agronomy page, and at multiple regional and county-level meetings throughout Maryland and Delaware

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Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY16 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 FY16 award period?**

If yes, how many? Nothing to report

- 2. Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY16 award period?**

If yes, how many? Nothing to report

- 3. Have any post docs who worked for you during the FY16 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**

If yes, how many? Nothing to report

- 4. Have any post docs who worked for you during the FY16 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**

If yes, how many? Nothing to report

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 FY16 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

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 FY16-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY16 grant. Only include citations for publications submitted or presentations given during your award period (6/1/16 - 5/31/17). 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 presented at the FHB Forum:

Conley, E.J., and J.A. Anderson. 2016. 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.

Nothing to report

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

Nothing to report

Other publications, conference papers and presentations.

Kleczewski N, and J. Wight. 2016 Fusarium Head Blight Screening Nursery Results. Online <https://psla.umd.edu/extension/extension-project-pages/small-grains-maryland>
Status: Presented
Acknowledgement of Federal Support: Yes