

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

Cover Page

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| Phone: | 919-513-7388 |
| Fiscal Year: | 2017 |
| USDA-ARS Agreement ID: | N/A |
| USDA-ARS Agreement Title: | Improvement and Adoption of FHB Management Techniques. |
| FY17 USDA-ARS Award Amount: | \$ 30,088 |

USWBSI Individual Project(s)

| USWBSI Research Category* | Project Title | ARS Award Amount |
|----------------------------------|--|-------------------------|
| MGMT | Integrated FHB Management of Winter Barley in the Mid-Atlantic USA. | \$ 14,010 |
| EC-HQ | Reducing Scab and DON by Following Up on National Survey of Producers. | \$ 16,078 |
| | FY17 Total ARS Award Amount | \$ 30,088 |

Christina Cowger

7/31/18

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 FHB Management of Winter Barley in the Mid-Atlantic USA.*

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

The first objective is to provide data to enhance the selection of Mid-Atlantic barleys with FHB resistance.

The second objective is to better understand profitability of integrating cultivar resistance and fungicide applications for scab reduction in Mid-Atlantic winter barley crops.

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

1) major activities

Starting in 2014-15, several Mid-Atlantic barley nurseries were screened for FHB resistance: the Uniform Winter Barley Yield Trial, Uniform Winter Malting Barley Nursery, Uniform Barley Winterhardiness Nursery, and the ARS Barley Elite Yield Trial. A total of 91 checks and experimental lines were screened for scab resistance in a replicated, inoculated, misted trial. The nursery was of similar size in 2015-16, 2016-17, and 2017-18. Both two- and six-row barleys are accepted in all the nurseries; currently, most entries are six-row. The P.I. collaborates with Dr. Dave Marshall and the Virginia Tech team to provide data, which include disease symptoms and DON. Some of these data are included in the peer-reviewed manuscript to be submitted this year on the integrated management trials.

In 2014-15, we conducted the first trial of a three-year integrated management experiment. In a split-plot design, main plots consisted of four barley cultivars widely grown in the Mid-Atlantic region and having different levels of FHB resistance. Three levels of spray treatment with Prosaro (“on-time,” “late,” and an unsprayed check) were the sub-plots. Data are being collected on disease symptoms, yield, test weight, and DON. The experiment has been repeated in 2015-16 and 2016-17.

2) specific objectives (already given under 1).

3) significant results

The three-year integrated management experiment was concluded, and a peer-reviewed publication is being prepared.

4) key outcomes or other achievements

Conclusions from the integrated management experiment:

VARIETY RESISTANCE: Across the three years, DON ranked the cultivars Endeavor < Nomini = Thoroughbred < Atlantic.

FUNGICIDE TIMING: Neither visual disease symptoms nor deoxynivalenol (DON) gave any reason to prefer one of the fungicide timings over the other.

FUNGICIDE + RESISTANCE: Relative to the unsprayed treatment of the susceptible cultivar Atlantic, the percent DON reduction provided by the moderately resistant cultivar Endeavor was 70% (Fig. 1). The percent DON reduction from a fungicide application on Atlantic was 35%, averaging the two spray timings together. The combination of Endeavor's moderate resistance and a fungicide, again averaging the two timings, resulted in a 75% DON reduction compared to unsprayed Atlantic.

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

Technicians and hourlies have been trained in field techniques. County agents have learned about management of FHB in barley.

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

A poster on the integrated management results was presented at

* the 2017 USWBSI Forum.

* the January 2018 Joint Crops conference in Durham, NC, which brings together growers, county agents, commodity group representatives, and industry reps from across the state

P.I. gave a talk on the results Malting Barley Field Day, Franklin County, May 8, 2018.

Project 2: *Reducing Scab and DON by Following Up on National Survey of Producers.*

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

In spring 2014, the National Agricultural Statistics Service (NASS) conducted a survey commissioned by the USWBSI of wheat and barley producers in 17 states. The survey covered growers' perceptions of scab as a problem, their scab management practices, and their scab information sources. Preliminary analysis of the results indicates both gaps in adoption of scab management practices and regional/state differences with respect to which barriers to adoption are seen as most important. Both things suggest that there is much the Initiative could do, working in a targeted manner, to enhance adoption of best management practices (BMP) for scab.

*Use of moderately resistant cultivars: In each of six market classes, the varieties that growers reported as their top varieties were assigned a scab rating of MR, MS, S, or UNKNOWN, based on all available data. Of the acreage reported by respondents that was planted to identifiable and scab-rated varieties, the percentages of MR acreage were: 9% for barley, 31% for durum, 51% for hard red spring, 15% for hard red winter, 31% for soft red winter, and 47% for soft white winter. In each case, the remainder of the identifiable, scab-rated acreage was in MS or S varieties. However, in several market classes the percentage of MR acres is undoubtedly less, as is explained.

* Use of effective fungicides: Many respondents indicated they used strobilurins or triazole-strobilurin mixes for scab management.

* Barriers to adoption of scab management practices: Four barriers that were experienced to varying degrees are potentially areas in which the Initiative can take action. Of these, the most widely selected by respondents across states was the difficulty in determining flowering dates in order to apply fungicides at the right time; a full 10.3% of respondents indicated that was a problem. The other three barriers that could be most readily addressed are: information on scab resistance of varieties is not available or timely (8.4%); seed of scab-resistant varieties is hard to obtain (5.9%); information about scab risk is hard to get in a timely way (6.3%).

Survey results have highlight certain areas where effort to increase BMP use should be focused. It is proposed that the Executive Committee convene a USWBSI Task Force to Increase Scab BMP Adoption. The task force should consist of MGMT Committee members, grain purchasers, growers, small-grain commodity representatives, and agricultural communications professionals. The EC should charge the task force to develop initiatives related to each of the opportunities identified by the survey. Potential initiatives are sketched.

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

1) major activities

A peer-reviewed publication is being prepared with Cowger as primary author and 3 co-authors. It should be submitted this fiscal year.

2) specific objectives:

Communicate the specific survey results and findings to the Initiative community to stimulate discussion and problem-solving; engage smaller teams in brainstorming and tasks needed to enhance the Initiative's toolbox and impact

3) significant results

* Peer-reviewed publication.

4) key outcomes or other achievements:

Development by USWBSI of list of MR varieties is an outgrowth of this work.

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

None.

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

*Peer-reviewed publication.

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? 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 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?

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

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. 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.

Nothing to report.

Journal publications.

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

Other publications, conference papers and presentations.

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