

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY15 Final Performance Report
Due date: July 15, 2016**

Cover Page

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Fiscal Year:	2015
USDA-ARS Agreement ID:	59-0206-4-015
USDA-ARS Agreement Title:	Evaluation of Barley and Malt for Don and Deoxinivalenol-3-Glucoside.
FY15 USDA-ARS Award Amount:	\$ 137,891
Recipient Organization:	North Dakota State University Office of Grant & Contract Accounting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
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Project/Grant Reporting Period:	05/05/15-05/04/16
Reporting Period End Date:	05/04/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST-S	Malting Barley Deoxynivalenol Diagnostic Services.	\$ 137,891
	FY15 Total ARS Award Amount	\$ 137,891

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: *Malting Barley Deoxynivalenol Diagnostic Services.*

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

The goal of this project is to provide barley breeders, pathologists, and other researchers working on the development of *Fusarium* resistant barley, with affordable, accurate and timely DON analysis.

2. What was accomplished under these goals?

1) major activities

Approximately 12,000 samples were analyzed for DON during the reporting period (exclusive of checks). Ten researchers, in five states (CO, ID, MN, ND, NY), were served. The majority are submitted by four barley breeding programs and one barley pathology project. Agronomy/ production researchers submitted approximately 200 samples. Approximately 15 *Fusarium* rice culture samples were analyzed for DON and other tricothecene toxins. A cooperative project involving DON on malting barley was initiated with Cornell University (n=100).

2) specific objectives

The goal of providing researchers with affordable, accurate and timely DON analysis was achieved.

3) significant results

Research continued on the concentration of DON-3-glucoside (DON3G) in malted grain samples. Results have shown that level of DON3G can be several-fold higher than DON in malted samples. Rye and wheat both appear to be especially prone to developing DON and DON3G during malting, especially when grain is processed soon after harvest.

4) key outcomes or other achievements.

Significant outreach efforts were conducted during the past year, with emphasis on craft brewing and malting. FHB presents a challenge to individuals in these areas, as malting grains are being produced in new areas, some of which are especially prone to FHB. These efforts have been coordinated with the Craft Malt Guild, the Brewers Association, Michigan State University, and Cornell University

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

A post-doctoral researcher has hired in June 2015. The post-doctoral researcher has been provided with opportunities to learn mycotoxin analysis by GC, GC-MS, LC-MS, some aspects of laboratory management and has also conducted independent research on FHB. She attended the 2015 Scab Forum in St Louis.

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

Data is provided directly to collaborating scientists. Information on DON in barley, malt and beer has been disseminated by presentations at conferences and webinars.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY15 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 FY15 award period?**

If yes, how many? None

- 2. Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY15 award period?**

If yes, how many? None

- 3. Have any post docs who worked for you during the FY15 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**

If yes, how many? One

- 4. Have any post docs who worked for you during the FY15 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? None

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 FY15 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

Publications, Conference Papers, and Presentations

Refer to the FY15-FPR_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications.

None

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

None

Other publications, conference papers and presentations.

1. Mycotoxins in Malting and Brewing. Malting Barley Seminar at the Escola Superior de Cerveja e Malte (ESCM), Blumenau, Santa Catarina, Brazil. September 9, 2015. **Invited Presentation**
Status: Presented
Acknowledgement of Funding Support: No
2. Fusarium Head Blight & Craft Malt (with Dr. James Pestka) Webinar hosted by the Craft Maltsters Guild. October 28, 2015. **Webinar**
Status: Presented
Acknowledgement of Funding Support: Yes
3. Managing DON from Field to Glass (with Gart Bergstrom). Farmer Brewer Winter Weekend, Hartwick College, Oneonta, NY, January 16, 2016 **Invited Presentation.**
Status: Presented
Acknowledgement of Funding Support: Yes
4. Managing DON from Field to Glass (with Gart Bergstrom). Great Lakes Hop and Barley Conference, Traverse City, MI. March 16. **Invited Presentation.**
Status: Presented
Acknowledgement of Funding Support: Yes
5. Fusarium Head Blight in Malting and Brewing: Successes and Future Challenges. The 5th International Symposium on Fusarium Head Blight (ISFHB), Florianopolis Brazil April 8, 2016. **Invited Presentation**
Status: Presented
Acknowledgement of Funding Support: Yes

PI: Schwarz, Paul

Project: Malting Barley Deoxynivalenol Diagnostic Services.

FY15 FPR – USWBSI ADDENDUM DON Service Labs – Quality Control Data

Insert below Quality Control Data/Results from the FY15 Award Period (05/05/15-05/04/16):

Three (3) Trilogy inter-lab check samples were run each month from August 2015 to April 2016. A low, medium and high sample are analyzed each month. Data from these samples provides a measure of comparison between the four USWBSI-funded diagnostic labs. The results from the NDSU Barley lab were generally within 1 standard deviation of the average, with the exception November 2015- January 2016 when results were slightly higher. The reasons for this observation are not apparent.

Barley check samples are included with each set of analysis. On average three to four checks are included for each 50 samples. Significant deviation from the expected check values, should be used as a cue to recheck or possibly repeat the set of analyses. The values presented below are from for separate detectors (ECD, MS) on three gas chromatographs.

Std ID	No. of times analyzed	Average value DON (mg/kg)	CV %
1	80	2.61	31.35
2	193	13.46	21.74
3	130	7.47	32.68
4	196	13.62	26.55
5	148	14.20	35.52
6	112	0.34	18.73
7	109	0.55	35.59
8	89	6.22	25.65
9	111	1.36	17.04
	Total= 1168		

Coefficients of variance vary with the magnitude of the mean, but generally CV's in excess of 20-25% are not acceptable for DON analysis. The check sample CV for the 2015 samples were considerably higher than past years. Upon investigation, it was learned that one staff member was not re-analyzing sample sets when check values were out of control limits, as is our normal procedure. This issue has been resolved by retirement, but the current laboratory supervisor will closely (weekly) monitor these values in 2016.