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

Cover Page

Principle Investigator (PI):	Paul Schwarz
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Fiscal Year:	2016
USDA-ARS Agreement ID:	59-0206-4-015
USDA-ARS Agreement Title:	Evaluation of Barley and Malt for Don and Deoxinivalenol-3-Glucoside.
FY16 USDA-ARS Award Amount:	$ 135,483
Recipient Organization:	North Dakota State University Office of Grant & Contract Accouting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0022048
Project/Grant Reporting Period:	5/5/16 - 5/4/17
Reporting Period End Date:	05/04/17

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST	Diagnostic Services for Deoxynivalenol in Barley and Malt.	$ 135,483
	FY16 Total ARS Award Amount	**$ 135,483**

Paul Schwarz — July 28, 2017
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

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Project 1: *Diagnostic Services for Deoxynivalenol in Barley and Malt.*

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? *Address items 1-4) below for each goal or objective.*

1) major activities
Approximately 12,800 samples (excluding 1292 check samples) were analyzed for DON during the reporting period (eclusive of checks). Analyses began in August 2016 and were largely completed by May 2017.

2) specific objectives
A primary onjective continued to be reducing the level of error associated with DON analyses. Some progress was made over the previous reporting period, but there is till room for improvement and efforts will continue

3) significant results
Sixteen researchers, in seven states (CO, ID, KY, MN, ND, OH NY), were served. The majority are submitted three barley breeding programs and one barley pathology.

4) key outcomes or other achievements
We are currently the only the laboratory providing DON3G analyses, and over 1200 samples were analyzed during the the reporting period. Analyses were largely for two researchers (MD and OH).

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

Two undergraduate students, one graduate student and one post-doctoral research assist in the laboratory. Undergraduate students have learned basic laboratory skills, while graduate students have learned DON analysis and laboratory quality control. 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.

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 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?** Yes

   If yes, how many? One. Yujuan Wang (MS Cereal Science, May 2107). Was partially supported by USWBSI funds

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? none

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? none

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? 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 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

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 (5/5/16 - 5/4/17). If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications.

Schwarz, P.B. Fusarium head blight and deoxynivalenol in malting and brewing: successes and future challenges. Tropical Plant Pathology 42 (3): 153-164, 2017.
Status: Published
Acknowledgement of Federal Support: Yes

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

Other publications, conference papers and presentations.

Fusarium Head Blight in Malting and Brewing: Successes and Future Challenges. Scab and Mycotoxin Workshop. Agraria Cooperative, Guarapuava, Brazil, September 21, 2016. Invited Presentation.
Status: Presented
Acknowledgement of Federal Support: Yes

What Did We Learn in 2016? FHB and DON: Safety, Testing and Quality Impacts. International Durum Forum, Minot, ND, November 15, 2016. **Invited Presentation**
Status: Presented
Acknowledgement of Federal Support: Yes

Jin, Z., Zhou, B., Gillespie, J., Barr, J., Gross, T., Brueggeman, R., and Schwarz, P. "Development of deoxynivalenol (DON) and DON-3-glucoside during malting of *Fusarium* Infected hard red spring wheat." In S. Canty, K. Wolfe and D. Van Sanford (Eds.), *Proceedings of the 2016 National Fusarium Head Blight Forum.* East Lansing, MI/Lexington, KY: U.S. Wheat and Barley Scab Research Initiative. Pages 37-38.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: Yes (Abstract) No (Poster #16)

PI: Schwarz, Paul
Project: Diagnostic Services for Deoxynivalenol in Barley and Malt.

FY16 FPR – USWBSI ADDENDUM
DON Service Labs – Quality Control Data

Insert below Quality Control Data/Results from the FY16 Award Period (5/5/16 - 5/4/17):

The variance in check samples shown below is still higher than desired. Values should ideally be in the teens or lower, with the expection of checks with very low DON values. When the mean is small, even minor varitions in results result in higher CV's.

It should be noted that the below values are from 2 instruments (4 detectors). If the results are calculated on an instrument or detector basis, the magnitude of the CV's decreases. Nevertheless, this is a matter that needs to be addressed. Staff are currently evaluating changes in the current derivatization proceedure.

Std. ID	Grain	No. of times analyzed		Average DON ppm		CV %
7	malt	168		4.41		24.68
12	barley	159		2.04		26.49
15	malt	160		22.53		17.92
17	barley	152		0.50		32.80
20	malt	197		2.58		27.26
29	malt	148		21.40		19.02
31	malt	140		13.25		23.81
44/45	barley	142		29.08		21.05
mix	barley	85		24.70		27.47
corn	corn	24		4.23		16.34