USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY13 Final Performance Report
July 15, 2014

Cover Page

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Fiscal Year:	FY13
USDA-ARS Agreement ID:	59-0206-9-068
USDA-ARS Agreement Title:	Determination and Characterization of Deoxynivalenol in Barley.
FY13 USDA-ARS Award Amount:	$ 129,590

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FSTU-S	Malting Barley Deoxynivalenol Diagnostic Services.	$ 129,590
	FY13 Total ARS Award Amount	**$ 129,590**

Principal Investigator Date

* MGMT – FHB Management
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
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 major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

Mycotoxin analyses are essential for most researchers working on FHB of cereals. However, in barley DON is a major economic factor, and new varieties must display increased resistance to DON accumulation as well as to FHB. Screening barley lines for DON is requisite for any breeding program intending to develop varieties for the upper Midwestern USA. DON analytical services are primarily provided to three barley varietal developmental programs. These breeding programs stated a need for the analysis of approximately 11,000 samples in FY13. In total, seven collaborating scientists were served. The major issue is to provide DON analytical services in a cost effective, timely and accurate manner. Funds provided by the USWBSI have allowed us to hire additional personnel and to subsidize the cost of analysis.

Research on bound DON (DON-3-glucoside) is important to efforts on food safety and breeding for FHB resistance. Wheat and barley have been shown to have the ability to detoxify deoxynivalenol (DON) by forming glucosides. The presence of these DON-glucosides, or bound DON in barley and wheat are a cause for concern, as by definition, bound DON is that which escapes detection by the routine analytical methods.

2. List the most important accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:

Accomplishment: A total of 6485 samples were analyzed for DON from May 2012 to June 2013 (plus 695 check samples = 7180). Approximately 60% of these samples were from the NDSU, University of Minnesota and Busch Agricultural Resources barley breeding programs. Approximately 35% of samples were from NDSU barley pathology. Barley and malt samples (n=895) were analyzed for DON-3-glucoside using HPLC QTOF MS/.

Total samples tested (DON, DON3G and checks = 8,075)

Impact: This project provides essential support to all barley breeding programs working on the development of FHB-resistant varieties for the Midwestern USA. The occurrence of FHB and DON is a primary factor in the dramatic decrease in barley acreage that has been observed over the past 20 years.

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the FY13 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Schwarz, P.B. Occurrence of deoxynivalenol-3-glucoside in barley and malt from North Dakota. 75th Oral Presentation: Annual Meeting of the American Society of Brewing Chemists, Tucson, AZ. May 19-22, 2013.

PI: Schwarz, Paul
Project: Malting Barley Deoxynivalenol Diagnostic Services.

FY13 FPR – USWBSI ADDENDUM
DON Service Labs – Quality Control Data

Insert below Quality Control Data/Results from the FY13 Award Period (approx. May 2013-May 2014):

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, is a used as a cue to recheck or possibly repeat the set of analyses.

2013-2014 DON

Std ID	No. of times analyzed	Average value DON (mg/kg)	CV %
1	154	7.95	10.88
2	87	12.49	7.53
3	94	13.44	7.88
4	49	5.06	10.34
5	235	16.88	15.58
6	76	0.15	15.01
	Total= 695		