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

Cover Page

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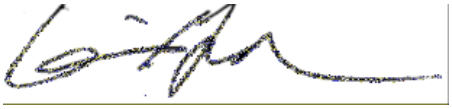
Fiscal Year:	FY13
USDA-ARS Agreement ID:	59-0200-3-008
USDA-ARS Agreement Title:	PH/GBA3-Dependent Stability of D3G's Glycosidic Bond and the Potential Risk to Human Health.
FY13 USDA-ARS Award Amount:	$ 25,560

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FSTU-R	PH/GBA3-Dependent Stability of D3G's Glycosidic Bond and the Potential Risk to Human Health.	$ 25,560
	FY13 Total ARS Award Amount	**$ 25,560**



07/15/2014

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: *PH/GBA3-Dependent Stability of D3G's Glycosidic Bond and the Potential Risk to Human Health.*

1. **What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?**

   We applied our expertise in chemistry and toxicology to determine the levels of DON and D3G in agricultural products, determine the rate of D3G deconjugation (cleave glycosidic bond of D3G) and relative concentration of D3G *vs*. DON in biological system, and investigate metabolism pathways of D3G as well as their possible toxic effects on human health.

   There **are three specific aims** in this study: (1) to survey D3G and DON levels from samples of barley, durum wheat and hard red spring (HRS) wheat, (2) to validate pH-dependent and GBA-catalyzed hydrolysis of D3G, and (3) to characterize metabolic products of D3G in human parietal and hepatocyte cells.

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:

   We have completed survey of D3D and DON for barley samples from researchers in our state. Many samples from year 2011 to 2013 have been analyzed for DON and DON-3-glucoside from my lab by collaborating with colleagues, such as Dr. Paul Schwarz.

   We also confirmed that GBA catalyzed hydrolysis of D3G is a not major enzymatic reaction from the experiments.

   Impact:

   Our data lays down the foundation for future investigation on the toxic effects of D3G as well as its metabolites on human health. Not only does our work meet the research priorities of USWBI, but it also fits with our research interests for seeking further long-term funding from NIH and USDA. Our long-term objective is to provide safety guidelines for levels of D3G in agricultural products intended for human and animal consumption.

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.

Peer Reviewed Article:

Schwarz PB, Qian SY, Zhou B, Xu Y, Barr JM, Horsley RD, Gillespie J. Occurrence of deoxynivalenol-3-glucoside on barley from the upper in Midwestern United States. *J. Am. Soc. Brewing Chemists.* 2014, In press.

Oral Pesentations:

Schwarz P, Qian S, Brueggeman R, Gillespie J, Xu Y, Barr J. Occurrence of Deoxynivalenol-3-Glucoside in Barley and Malt from North Dakota. *2013 ASBC Annual Meeting*. Tucson, Arizona, May 2013.

Tinsley S, Yang X, Qi J, Xu Y, Qian S. Hydrolysis and Metabolism of Deoxynivalenol-3-β-D-Glucoside. *2013 NDSU STEM Research Internship Program*, Fargo, ND. July 2013 (***the 1st Place Award***).