

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY13 Final Performance Report  
One-Year No Cost Extension (NCE) through FY14  
July 15, 2014**

**Cover Page**

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

**USWBSI Individual Project(s)**

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



Principal Investigator

07/15/2015

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  
 WES-CP – Western 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 were 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.

Although GBA-catalyzed hydrolysis of D3G is very low, our results suggested that DON could be readily and largely converted from D3G if in vitro system was contaminated by trace of bacterium (could be occurred in all steps of food process).

**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 North Dakota State. Many samples from previous years have also been analyzed for DON and DON-3-glucoside from my lab by collaborating with colleagues, such as Dr. Paul Schwarz.

**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.

### **Training of Next Generation Scientists**

**Instructions:** Please answer the following questions as it pertains to the FY13-NCE 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 FY13-NCE 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 PhD degree during the FY13-NCE award period? Yes**

**If yes, how many? One**

- 3. Have any post docs who worked for you during the FY13-NCE award period and were supported by funding from your USWBSI grant taken faculty positions with universities? Yes**

**If yes, how many? One**

- 4. Have any post docs who worked for you during the FY13-NCE award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies? None**

**None**

**If yes, how many?**

FY13-NCE (approx. May 13 – May 15)  
PI: Qian, Steven  
USDA-ARS Agreement #: 59-0200-3-008

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**Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY13-NCE award period. List the release notice or publication. Briefly describe the level of FHB resistance. If not applicable because your grant did NOT include any VDHR-related projects, enter N/A below.**

N/A

**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 through the one-year No Cost Extension. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.**

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.* **72**: 208-213, 2014.

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.