

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY14 Final Performance Report  
July 15, 2015**

**Cover Page**

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<b>Fiscal Year:</b>	FY14
<b>USDA-ARS Agreement ID:</b>	NA
<b>USDA-ARS Agreement Title:</b>	Genotyping Breeding Lines for FHB Resistance using Next Generation Sequencing Methods
<b>FY14 USDA-ARS Award Amount:</b>	\$ 45,000

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
VDHR	Genotyping Breeding Lines for FHB Resistance.	\$ 45,000
	<b>FY14 Total ARS Award Amount</b>	<b>\$ 45,000</b>

\_\_\_\_\_  
Principal Investigator

\_\_\_\_\_  
Date

\* MGMT – FHB Management

FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain

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

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:** *Genotyping Breeding Lines for FHB Resistance.***1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?**

Marker-assisted selection based on markers associated with known scab resistance has been making a slow progress on improving the levels of resistance in wheat and barley due to its complex trait inheritance. Breeding strategies such as genomic selection (GS) allows breeders to select for complex traits based on genome-wide marker data alone. Availability of high-density SNP marker arrays and next-generation sequencing technologies has enabled genome-wide marker data to be obtained from a large number of samples at a more affordable cost. In this project, we applied sequencing-based genotyping methods to genotype breeding populations and provide breeders with genome-wide marker data to be used in their breeding programs.

**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 successfully employed two sequencing-based genotyping methods to obtain genotype data after optimizing protocols. One method is to sequence a few hundred targeted genomic regions containing the known SNP information, and the other is to sequence the complexity reduced portions of the genomic regions to obtain genotype data

**Impact:**

The targeted sequencing method was used to genotype 1,600 breeding lines for genomic selection efforts in spring barley. The complexity reduced GBS method was used to genotype 180 spring wheat parents and 46 durum wheat parents used in the breeding programs for scab improvement. The allele diversity information present among the parents was provided to the wheat breeders. The GBS method was also explored for winter barley breeding program.

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

**Instructions:** Please answer the following questions as it pertains to the FY14 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 FY14 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 Ph.D. degree during the FY14 award period? No.**

**If yes, how many?**

- 3. Have any post docs who worked for you during the FY14 award period and were supported by funding from your USWBSI grant taken faculty positions with universities? None**

**If yes, how many?**

- 4. Have any post docs who worked for you during the FY14 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**

**If yes, how many?**

FY14 (approx. May 14 – May 15)

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USDA-ARS Agreement #: NA

**Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY14 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 FY14 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.**

Results were shared with the breeders, but none were published.