

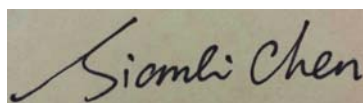
**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY14 Final Performance Report  
July 15, 2015**

**Cover Page**

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<b>Fiscal Year:</b>	FY14
<b>USDA-ARS Agreement ID:</b>	59-0206-4-041
<b>USDA-ARS Agreement Title:</b>	Developing FHB Resistant Wheat Cultivars for Idaho and the Western US.
<b>FY14 USDA-ARS Award Amount:</b>	\$ 14,591

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
WES-CP	Developing FHB Resistant Wheat Cultivars for Idaho and the Western US.	\$ 14,591
	<b>FY14 Total ARS Award Amount</b>	<b>\$ 14,591</b>



Principal Investigator

July 5, 2015

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:** *Developing FHB Resistant Wheat Cultivars for Idaho and the Western US.*

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

FHB is an emerging disease in Idaho and some areas in Pacific Northwest (PNW). Currently, most virtually grown cultivars in Idaho and PNW are susceptible to FHB and often produced high levels of DON toxin. It is critical to establish field and greenhouse screening nurseries to develop FHB resistant cultivar. With the support from the USWBSI we were able to purchase irrigation supplies and established a field-screening nursery. The greenhouse nursery was established previously with the support from Idaho Wheat Commission and University of Idaho Hatch Grant.

A total of 2060 lines previously developed were genotyped with markers *XUmn10 (FHB1)*, *XBarc117 (FHB3)*, and *XGwm610 (H25)*. Around 500 lines were selected based on marker genotype and agronomic performance in a headrow test.

Adapted cultivars and elite lines were crossed to known FHB resistance sources W14, Ning9016, and Futai8944 as well as newly identified lines from NSGC. The progeny was top-crossed or backcrossed to germplasm with resistance to stripe rust, hessian fly, cereal nematodes, and novel resistance to Ug99. A total of 130 FHB-related populations (50 F3, 50 BC1F2, 30 BC2F2) were advanced.

**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 FHB field screening nursery was established in Aberdeen, ID with limited funding from USDA-ARS USWBSI. We have inoculated 520 lines replicated twice in this nursery from three programs in Aberdeen.

**Impact:**

UI Stone soft white spring wheat cultivar, released in 2012, showed good type II resistance in previous and this year. This is the first resistant cultivar in production in southeast Idaho in 2014. This cultivar also have high grain yield, excellent end-use quality, and good level of resistance to stripe rust, therefore, the planted acres are expected to increase in 2015 to 2018. This cultivar has no Sumai 3 related backgrounds. Mapping of QTL associated with FHB resistance in this cultivar has been completed and the QTL and markers are being validated. Some of hard red spring wheat lines evaluated in 2014 have potential to release in 2017.

These lines pyramided *FHBI* from non-Sumai 3 germplasm with resistance to stripe rust and Hessian Fly.

Hard white spring wheat lines will be developed from crosses between native resistance sources (such as UI Stone and others being screened from PNW region and international nurseries) and W14 using doubled haploid system and MAS.

### **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? No**

**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?**

**If yes, how many?**

One visiting professor received training from our USWBSI grant from Feb., 2014 to March., 2015. He left for China in March in 2015. Chinese Government paid him.

**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.**

**Nayak, S.,** Y. Wang, W. Zhao, B. Bowman, J. Wheeler, and J. Chen. 2014. QTL Conferring Type II Resistance to Fusarium Head Blight in Adapted Wheat Cultivar 'UI Stone' and Its Effect on Yield. Poster presentation at Annual FHB Forum, St. Louis, MS, Dec. 7 -9, 2014.