

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY11 Final Performance Report
One-Year No Cost Extension (NCE) through FY12
July 16, 2013**

Cover Page

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Fiscal Year:	FY11 (NCE for FY12)
USDA-ARS Agreement ID:	59-0206-0-057
USDA-ARS Agreement Title:	Evaluating and Validating FHB Host Resistance Genes Pyramided in Spring Wheat.
FY11 USDA-ARS Award Amount:	\$ 9,756

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-SPR	Evaluating and Validating FHB Host Resistance Genes Pyramided in Spring Wheat.	\$ 9,756
	Total ARS Award Amount	\$ 9,756

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: *Evaluating and Validating FHB Host Resistance Genes Pyramided in Spring Wheat.*

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

Several types of resistance to Fusarium head blight (FHB) have been recognized, including type I (resistance to initial infection in spikelets), Type II (resistance to pathogen spread in spikes) and Type V (resistance to DON accumulation). However, current wheat breeding programs mainly focus on type II resistance, which may not be sufficient for achieving durable resistance to FHB. Our goal is to combine type I with type II resistance in the same wheat background. We developed a population of 113 F9-derived recombinant-inbred lines (RILs) from a three-way cross using Frontana (with type I resistance), W9207 (susceptible to FHB), and Alsen (with type II resistance from Sumai 3) in combination with a single seed descent method. Preliminary inoculation experiments indicated that several RILs showed more resistance (reduced disease severity and low DON content) than the resistant parents (Frontana and Alsen). To evaluate and validate the RILs with enhanced FHB resistance, we (i) assessed the resistance spectrum of the pyramided lines using mixture of 3-ADON, 15-ADON and NIV producers of *F. graminearum* in the greenhouse, and (ii) characterized selected resistant RILs with known simple sequence repeat (SSR) markers, which are associated with types I and II resistance.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

Accomplishment:

Those RILs selected based on previous evaluations were re-evaluated for resistance to initial infection, FHB spread, and DON in the greenhouse and field. The results indicated that they exhibited a significantly higher level of FHB resistance than the resistant parents (Alsen and Frontana) for all the disease parameters assessed. Known SSR markers associated with type I and Type II were confirmed in these RILs.

Impact:

These pyramided lines are being utilized in wheat breeding programs in the region (ND and SD). This will help improvement of FHB resistance in newly developed wheat cultivars for better management of the disease in the field.

FY11 (approx. May 11 – May 13)

FY11 Final Performance Report-NCE

PI: Zhong, Shaobin

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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 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

N/A