

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY11 Preliminary Final Performance Report
July 13, 2012**

Cover Page

PI:	Shaobin Zhong
Institution:	North Dakota State University
Address:	Department of Plant Pathology NDSU Dept. # 7520 PO Box 6050 Fargo, ND 58108-6050
E-mail:	Shaobin.Zhong@ndsu.edu
Phone:	701-231-7427
Fax:	
Fiscal Year:	FY11
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

Shaobin Zhong
Principal Investigator

July 9, 2012
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?

Gene pyramiding (combining the resistance genes) is considered one of the most effective strategies to achieve durable resistance to FHB. Current wheat breeding programs for FHB focus mainly on type II resistance, which limits pathogen spread but may not be sufficiently durable. Despite that, few studies have been conducted to address the effects of type I resistance and combination of both types of resistance to FHB. To combine type I with type II resistance, we developed a population of 113 F₉-derived recombinant-inbred lines (RILs) from a three-way cross of wheat genotypes Frontana/W9207//2*Alsen using a single seed descent method. In our preliminary experiments, several RILs showed more resistance (reduced disease severity and low DON content) than the resistant parents. The goal of this research project is to evaluate and validate the RILs with enhanced FHB resistance. The specific objectives of this project are to (i) assess the resistance spectrum of the pyramided lines using mixture of 3-ADON, 15-ADON and NIV producers of *G. zeae* in the greenhouse, and (ii) characterize 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:

In this project, we have validated the resistant line(s) selected based on preliminary results and tested them in series of experiments in the greenhouse and field. These RILs were evaluated for resistance to initial infection, FHB spread, final disease severity, and DON. The results indicated that they were significantly better than the resistant parents (Alsen and Frontana) for all these disease parameters assessed. Importantly, these RILs possess a high level of type I, II, and V resistance to *F. graminearum*.

Impact:

These pyramided lines could be valuable sources of resistance to FHB and utilized in wheat breeding programs in the region. Development of durable resistance to *F. graminearum* would help for better management of the disease in the field.

FY11 (approx. May 11 – May 12)

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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.

None