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

PI:	Yang Yen
Institution:	South Dakota State University
Address:	Department of Biology & Microbiology 249C NPB Box 2140D Brookings, SD 57007
E-mail:	Yang.Yen@sdstate.edu
Phone:	605-688-4567
Fax:	605-688-5624
Fiscal Year:	FY11 (NCE for FY12)
USDA-ARS Agreement ID:	59-0206-0-060
USDA-ARS Agreement Title:	Developing More Precise Markers to FHB Resistance QTLs for Wheat.
FY11 USDA-ARS Award Amount:	$ 9,756

USWBSI Individual Project(s)

USWBSI Research Category*	**Project Title**	**ARS Award Amount**
HWW-CP	Developing More Precise Markers to FHB Resistance QTLs for Wheat.	$ 9,756
	Total ARS Award Amount	**$ 9,756**

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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: *Developing More Precise Markers to FHB Resistance QTLs for Wheat.*

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

Our previous work had resulted in two pieces of important information about the FHB resistance in wheat: 1) mapped major FHB-resistant QTLs and 2) FHB-resistance-related genes. Our hypothesis was that, at least, some of these FHB-resistance-related genes are the gene components of the major FHB-resistant QTLs and therefore can be used as more precise markers for those QTLs. The proposed research was to test this hypothesis by linking these two pieces of information together with real-time RT-PCR and association mapping and to develop gene-specific markers for the QTLs. Our objective for FY11 and FY12 was to associate known FHB-associated genes with known major FHB-resistant QTLs by functionally studying their differential expression in a pair of near-isogenic lines for *Qfhb1* and among the Sumai 3/Y1193-06 recombinant inbred population. The objective aims at identifying candidate genes that have potential to be precise markers to the QTLs they are associated with.

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:

This research had being progressed well according to our plan but could not be completed because funding from USWBSI was cut off in the middle of the planned research. However, we were able to complete our objective for FY11/FY12. The number of our candidate genes was narrowed down from 637 to 47 after two years of bulk analysis with the Sumai 3/Y1193-06 recombinant inbred population we created. Three of the 47 candidates were also associated with *QFhb1* by analyzing the *Qfhb1* near-genic lines in the two years.

Impact:

This research has paved a solid foundation for our identification of a functional genic component of *QFhb1* and for our development of a gene-specific marker for *QFhb1* with funding from other sources.

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.

Non-peer reviewed Poster presentation and Abstracts:

Galla A, Zhuang Y, **Yen Y**. 2012. A putative fungal miRNA that might play a role in Fusarium head blight pathogenesis in wheat. In: *Proceedings of the 2011 National Fusarium Head Blight Forum,* December 4-6, 2011, St. Loius, MO, USA, pp.85.

Zhuang Y, Galla A, **Yen Y**. 2011. Identifying and characterizing candidate genes associated with FHB resistant QTL *Qfhb1*. In: *Proceedings of the 2011 National Fusarium Head Blight Forum,* December 4-6, 2011, St. Louis, MO, USA, pp.100.

Zhuang Y, Galla A, Yen Y. 2012. Identification of candidate genes of major FHB-resistant QTLs in wheat cultivar Sumai 3. In: *Proceedings of the 2012 National Fusarium Head Blight Forum,* December 4-6, 2012, Orlando, FL, USA, pp.152.

Moustafa Eldakak, Ansuman Roy, Yongbin Zhuang, Karl Glover, Shaukat Ali, Yang Yen, and Jai S. Rohila. 2012. Proteomic dissection of near isogenic lines for the discovery of scab responsive genes in wheat. In: *Proceedings of the 2012 National Fusarium Head Blight Forum,* December 4-6, 2012, Orlando, FL, USA, pp.133.