USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY13 Final Performance Report
July 15, 2014

Cover Page

PI:	Gina Brown-Guedira
Institution:	USDA-ARS
Address:	Eastern Regional Small Grains Genotyping Lab NCSU-Crop Science Campus Box 7620 Raleigh, NC 27695-7620
E-mail:	gina_brown-guedira@ncsu.edu
Phone:	919-513-0696
Fax:	919-810-4798
Fiscal Year:	FY13
USDA-ARS Agreement ID:	NA
USDA-ARS Agreement Title:	Genotyping to Expedite Enhancement of FHB Resistance in Soft Winter Wheat.
FY13 USDA-ARS Award Amount:	$ 72,000

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-NWW	Regional Multi-QTL Populations.	$ 62,500
VDHR-SWW	Developing Double Haploids to Expedite Mapping and Enhance FHB Resistance in SRWW.	$ 9,500
	FY13 Total ARS Award Amount	**$ 72,000**

_____

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: *Regional Multi-QTL Populations.*

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

   There is a need to rapidly develop wheat cultivars adapted to the southeastern United States with high levels of resistance to Fusarium head blight. Improved breeding methods that make use of marker-assisted selection and doubled haploid technology are needed. To address these needs, this project is the mapping of FHB resistance in experimental line ARGE97-1042-4-5-20 has been the most effective source of FHB resistance in the soft winter wheat region. This will result in development of useful markers to select for and deploy this resistance in individual 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:

   A new population for mapping FHB resistance genes was developed from the cross LA01069D-23-4-4/ARGE97-1042-4-5-20. Approximately 200 doubled haploid lines were grown to increase seed that was distributed to breeding programs in the Southeast that will evaluate the population in screening nurseries. Seed was sent to the Eastern Regional Genotyping Lab at Raleigh, NC for DNA isolation and SNP genotyping. A total of 192 DH lines were SNP genotyped with the iSelect beadchip having 90,000 wheat SNP markers and approximately 20,000 polymorphic markers were scored on the population.

   Impact:

   This population will provide germplasm having resistance from ARGE97-1042-4-5-20 that has been the most effective source of FHB resistance in the soft winter wheat region. Efficiency of breeding programs to develop and release FHB resistant varieties will be enhanced by marker-assisted selection for resistance genes derived from ARGE97-1042-4-5-20.

Project 2: *Developing Double Haploids to Expedite Mapping and Enhance FHB Resistance in SRWW.*

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

   There is a need to rapidly develop wheat cultivars adapted to the southeastern United States with high levels of resistance to Fusarium head blight. Improved breeding methods that make use of marker-assisted selection and doubled haploid technology can be used to speed the development of these cultivars. To address these needs, this project had created regional populations segregating for FHB resistance QTL, will generate doubled haploid (DH) lines and distribute them to all participating breeding programs. Breeders will conduct multi-location and year testing of lines to identify candidates for cultivar release.

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:

   Approximately 1000 three-way cross F1 seed have been generated from crosses with germplasm line 11-3-10, a McCormick derivative into which have been backcrossed three FHB resistance QTL that has been highly resistant to FHB when grown in regional scab screening nurseries. These QTL are being combined with other resistance genes and desirable agronomic traits present in elite experimental lines from regional breeding programs. F1 are seedlings are being grown at the Eastern Regional Genotyping Lab and will be genotyped for markers for FHB resistance QTL. Plants having at least 3 resistance QTL are being shipped to Heartland Plant Innovations to generate doubled haploid plants.

   Impact:

   These populations will provide pure breeding experimental lines having multiple FHB resistance QTL in agronomically desirable backgrounds. Efficiency of breeding programs to identify and FHB resistant varieties will be enhanced through the combined use of marker-assisted selection and double haploid technology.

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 FY13 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

None.