USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY09 Final Performance Report
July 15, 2010

Cover Page

PI:	Jerry Johnson
Institution:	University of Georgia
Address:	Department of Crop and Soil Sciences Redding Bldg 1109 Experiment St. CAES Griffin Campus Griffin, GA 30224
E-mail:	jjohnso@griffin.uga.edu
Phone:	770-228-7321
Fax:	770-229-3215
Fiscal Year:	2009
USDA-ARS Agreement ID:	59-0206-9-085
USDA-ARS Agreement Title:	Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.
FY09- USDA-ARS Award Amount:	$ 31,457

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
VDHR-SWW	Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.	$ 31,457
	Total Award Amount	**$ 31,457**

_____

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 Winter Wheat Region
SWW – Southern Sinter Wheat Region

Project 1: *Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.*

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

The Fusarium head blight (FHB) epidemics occurring in Georgia and the Southeast are resulting in reduced grain yield and in marketing difficulty of grain due to high DON concentrations. We are resolving the problem by: developing and releasing improved soft red winter wheat varieties and germplasm with improved FHB resistance combined with leaf rust and stripe rust resistance and evaluating FHB nurseries and regional nurseries for FHB level of resistance. 113 single, three-and four-way crosses were made involving one or more source of native and exotic FHB resistance (Truman, Neuse, Jamestown, McCormick, IL00-8530, IL00-8641, IL02-18228, IL97-1828, OH02-12678, OH02-12686, MO 050699, MO 050146, B030543) with elite Georgia lines that have moderate resistance to scab. 87 single crosses and 122 three and four-way crosses were also advanced to F2 generation and about 3400 headrows with F2-6 generations were evaluated in misted scab nursery. Over 300 lines from the Uniform Southern FHB nursery, southeastern breeding nurseries, and Georgia State Performance Trials were evaluated in replicated misted, inoculated nursery. Seven experimental lines were entered in the 2009 Uniform Southern FHB nursery. These lines were identified in previous testing as having improved levels of FHB resistance. GA 031454-DH38-7, VA01W-461 / USG 3592 had similar FDK, Index, and DON ratings as Ernie. Data and DON samples from the Uniform Southern FHB nursery grown in Georgia were submitted.

Marker Assisted Selection is also being employed to accelerate the development of adapted FHB resistant cultivars by the assistance in the selections within populations containing 3BS and 5AS in the UGA molecular lab and in cooperation with Gina Brown-Guedira, USDA Genotyping Center. In other cooperation with the Regional Genotyping Center and with breeders within the southern region, backcross populations (BC2F3) from NC (Neuse *2/VA 476) and SS 8641// Neuse*2/VA476) and MD (SS8641//McCormick*2/Ning 7840) were evaluated for both good scab resistance and agronomic type. Several other backcross populations are being developed with Truman, Langdon (3A dic), and Jamestown as source of FHB resistance. 113 single, three- and four-way crosses were made involving one or more source of native and exotic FHB resistance. F2 enrichment for several FHB resistant QTL was used on several of these populations.

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:

Several wheat germplasm from both native and exotic sources with FHB resistance have been transferred into elite lines that are adapted to the Southeast. Breeding lines have been identified with moderate scab resistance with Fhb1 and Truman as source of resistance. These lines will be tested again in two locations in GA with the intention for release. MAS with SSR markers were used to accelerate the development of scab resistance from 3BS and 5AS into elite lines. GA 031454-DH38-7 with Fhb1, VA01W-461 / USG 3592 had similar FDK, Index, and DON ratings as Ernie.

Impact:

Wheat lines from diverse origin with moderate FHB resistance are available that are adapted to the Southeast. Both native and exotic sources of scab resistance are also being incorporated into adapted lines with good agronomic performance. The crosses of scab resistant lines with high yielding, leaf and stripe resistant elite lines will enhance the development of scab resistant varieties for the region. Baldwin is a GA variety that is being marketed in GA and that has moderate type 2 FHB resistance level of scab resistance.

Include below a list all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance.

USG 3120 and DK 9318 was developed and released in 2009 that are moderately susceptible to scab.

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.

Jerry Johnson, Zhenbang Chen, and James Buck. 2009. Development of scab resistance in soft red winter wheat. National FHB Forum, Orlando, FL

J.W. Johnson, L. Miranda, and Z. Chen. 2009. Wheat Coordinated Agricultural Project (CAP). Small Grain and Soybean Expo, Statesboro, GA.