

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY07 Final Performance Report (approx. May 07 – April 08)
July 15, 2008**

Cover Page

PI:	Stephen Harrison
Institution:	Louisiana State University
Address:	Agronomy Department 104 Sturgis Hall Baton Rouge, LA 70803-2110
E-mail:	sharrison@agctr.lsu.edu
Phone:	225-578-2110
Fax:	225-578-1403
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USDA-ARS Agreement Title:	Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.
FY07 ARS Award Amount:	\$ 32,213

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.	\$32,213
	Total Award Amount	\$ 32,213

Principal Investigator

Date

* CBCC – Chemical, Biological & Cultural Control
EEDF – Etiology, Epidemiology & Disease Forecasting
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GET – Genetic Engineering & Transformation
HGR – Host Genetics Resources
HGG – Host Genetics & Genomics
IIR – Integrated/Interdisciplinary Research
PGG – Pathogen Genetics & Genomics
VDUN – Variety Development & Uniform Nurseries

Project 1: *Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.*

1. What major problem or issue is being resolved and how are you resolving it?

This project is developing wheat varieties adapted to the Gulf Coast that are resistant to Fusarium Head Blight (FHB), and evaluating FHB reaction of available varieties. The climate and disease spectrum of Louisiana are unique and most varieties developed outside of the region perform poorly. The LSU AgCenter wheat breeding program and its Sungrains partners (Universities of Florida, Georgia, Clemson, and NC State) release high-yielding disease-resistant varieties that account for most of the wheat acreage in the Gulf Coast and Southeastern states. It is important that these programs develop and release highly productive, scab resistant varieties that are embraced and produced by growers.

Louisiana FHB populations are unique and 78% were found to be NIV producers. Since NIV is more toxic than DON it is important to develop resistant varieties to prevent movement of NIV contaminated grain into the Mississippi River export elevators. Scab occurs occasionally across Louisiana and frequently in the rice region of southwest Louisiana. Objectives will be accomplished by: (1) participating in regional screening nurseries, (2) evaluating entries in statewide variety trials and uniform nurseries for FHB resistance, and, (3) conducting a breeding program to develop elite varieties with local adaptation and resistance to FHB.

**2. List the most important accomplishment and its impact (how is it being used?).
Complete all three sections (repeat sections for each major accomplishment):**

Accomplishment:

The wheat breeding program continued to make significant progress towards release of locally-adapted varieties with resistance to FHB during 2007-08. Nineteen of 26 breeding lines evaluated in a two-location yield trial, and in three-misted nurseries, were found to contain markers indicating the presence of one or more resistance alleles, including 5AS and 3BS. Data were collected on agronomic traits, FHB resistance, mycotoxin accumulation, and reaction to other diseases. The statewide variety trials should have FHB resistant entries, advanced from these trials, for the first time in 2008-09. LA01164, a topcross derivative from Futai8944, contains 3BS and 5AS QTLs, shows excellent FHB resistance in screening trials, and appears to be well adapted and productive. LA01162 also performed very well and shows good FHB resistance.

Sixteen lines were selected for advance, pending complete FHB data, out of a set of about 120 observation plots derived from FHB-targeted crosses. These lines were haplotyped, screened in misted nurseries, and selected for adaptation and general disease resistance. A number of these contain 3BS or 5AS QTLs, while others have resistant parents with less characterized sources in their background.

Sixty-four advanced generation headrows were harvest in May, 2008 for advancement to yield plots and misted FHB nurseries. All have known FHB resistant parents in their background.

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Approximately 300 single (widely spaced) plants were harvested from 23 F3 FHB populations and will be also be evaluated in yield trials during 2008-09. Each of these will be genotyped. Plants from two additional populations (from Paul Murphy) that contained sources of FHB resistance from Frontana and 3A-diccocoides were individually selected for plant type and disease reaction. Tissue samples have been sent to the Genotyping Lab and seed of selected pants that contain desired QTL will be shared with other Sungrains breeders this summer.

Heads were selected from F2 – F4 populations with known FHB resistance and advanced as headrows. Ninety of 280 new crosses made in 2008 contained a known source of FHB resistance and the sources used were diverse and considerably more adapted than those used in initial FHB crosses. In addition to breeding and screening activities, a trial was conducted at two locations to evaluate the interaction between genetic resistance to FHB and chemical control. This replicated, inoculated yield trial included six varieties with different levels of FHB resistance in a factorial arrangement with three levels of fungicide. Data from this and similar trials will allow appropriate site-specific management strategies to be developed for combinations of resistance and disease pressure.

Impact:

This program is primarily focused on the development of productive varieties with good disease-resistance that are adapted to the Gulf Coast region. The LSUAC wheat breeding program has released four varieties since 2002 and accounted for a large proportion of wheat production in Louisiana during 2007. There are no FHB-resistant varieties currently grown in Louisiana. The development of FHB resistant varieties will positively impact wheat production economics and should allow growers in the distressed rice producing region of southwest Louisiana where FHB is a significant problem to expand wheat production.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?:

Louisiana growers will soon have available varieties that are locally adapted and are resistant to Fusarium headlight. There are few cropping options for the rice region and scab-resistant wheat would provide an economically viable option.

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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.

Gale, Liane R., S.A. Harrison, et al. 2007. Diversity of *Fusarium graminearum* sensu strict from the U.S.: An Update. Poster presented at the 2007 FHB meeting, Indianapolis, IN.