

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY08 Final Performance Report (approx. May 08 – April 09)  
July 15, 2009**

**Cover Page**

<b>PI:</b>	Stephen Harrison
<b>Institution:</b>	Louisiana State University
<b>Address:</b>	Agronomy Department 104 Sturgis Hall Baton Rouge, LA 70803-2110
<b>E-mail:</b>	sharrison@agctr.lsu.edu
<b>Phone:</b>	225-578-2110
<b>Fax:</b>	225-578-1403
<b>Fiscal Year:</b>	2008
<b>USDA-ARS Agreement ID:</b>	59-0790-4-104
<b>USDA-ARS Agreement Title:</b>	Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.
<b>FY08 USDA-ARS Award Amount:</b>	\$ 34,321

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Adjusted Award Amount</b>
VDHR-SWW	Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.	\$34,321
	<b>Total Award Amount</b>	<b>\$ 34,321</b>

\_\_\_\_\_  
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  
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

(Form FPR08)

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

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

Fusarium Head Blight (FHB) occurs across the Gulf Coast and causes significant loss of yield and quality in some environments. The climate and disease spectrum of the region 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. There is very little resistance to FHB in varieties currently produced by growers in the region, which raises the likelihood of having toxin-contaminated wheat from the Gulf Region enter the export market through large grain elevators on the Mississippi River. It is important that these programs develop and release highly productive, scab resistant varieties that are embraced and produced by growers. Information on scab reaction of available varieties should be included in performance trial reports so growers can choose those with the most scab resistance for production.

Scab occurred in growers fields across Louisiana in 2009 and was particularly problematic in the rice growing 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 in scab nurseries, 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 (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:**

The statewide variety trials included 34 breeding lines and 35 commercial varieties during 2009. These were included in misted nurseries at two locations and were heavily infected with 'natural' FHB at a third location. The trials included two LA breeding lines with known FHB QTL. FHB data from the Crowley location will be included in the official Research Summary used by growers and seedsmen when making variety choices. LA01164D-43-7 (5AS) was included in the Gulf-Atlantic Wheat Nursery evaluated in eight states. It had average yield, excellent test weight, and good resistance to leaf rust, stripe rust, and powdery mildew. A FHB management trial was conducted at two locations during 2008-09 and included six genotypes with known FHB reaction in combination with three fungicide levels.

The wheat breeding program continued to place significant emphasis on development and release of locally-adapted varieties with resistance to FHB during 2008-09. Eight advanced breeding lines derived from 2001 crosses, and three checks were evaluated in replicated yield trials at two locations in 2009. Marker data indicates that five of these lines contained FHB1, 2DL, 5A, or a combination. Three breeding lines, one with 2DL, one with FHB1 and 5A, and (Form FPR08)

PI: Harrison, Stephen

USDA-ARS Agreement #: 59-0790-4-104

one with no known QTL, out-yielded all three commercial checks at two locations in conventional yield trials and had lower scab index and FDK in inoculated trials.

There were 102 advanced breeding lines and 5 check varieties evaluated in non-replicated yield plots at one location and in misted FHB nurseries at three locations during 2009. Three lines from the FOBS will be advanced to the Uniform Southern Fusarium Nursery and replicated yield trials based on excellent yield, disease resistance, low scab index, and the presence of known QTL. Other entries will be advanced to replicated yield trials and FHB nurseries.

Numerous segregating populations that contain known sources of resistance to FHB were generation-advanced and selected for agronomic type. More advanced segregating populations with FHB resistance sources were grown as spaced plants (14" grid) and selected plants were advanced to FOBS for 2010. There were 3856 F5+ headrows with FHB resistant parents at Baton Rouge, 188 of which were selected and harvested for advancement to FOBS. Pedigrees of 84 of 280 F1 lines grown in 2009 contained known FHB parentage and 84 crosses made in 2009 included a FHB resistant parent.

**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 five varieties since 2002 and accounted for a large proportion of wheat production in Louisiana during 2009. 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.

**Impact:**

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.

FY08 (approx. May 08 – April 09)  
PI: Harrison, Stephen  
USDA-ARS Agreement #: 59-0790-4-104

FY08 Final Performance Report

**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

**If your FY08 USDA-ARS Grant contained a VDHR-related project, 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. If this is not applicable (i.e. no VDHR-related project) to your FY08 grant, please insert 'Not Applicable' below.**

None