USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY05 Final Performance Report (approx. May 05 – April 06)
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Cover Page

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Fiscal Year:	**2005**
FY05 ARS Agreement ID:	**59-0790-4-104**
Agreement Title:	**Development of FHB Resistant Wheat Genotypes Adapted to the Gulf Coast.**
FY05 ARS Award Amount:	**$ 29,726**

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.	$ 29,726
	Total Award Amount	**$ 29,726**

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Principal Investigator Date

* BIO – Biotechnology
CBC – Chemical & Biological Control
EDM – Epidemiology & Disease Management
FSTU – Food Safety, Toxicology, & Utilization
GIE – Germplasm Introduction & Enhancement
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. Varieties developed by the LSUAC wheat breeding program accounted for a large proportion of wheat production in Louisiana during 2006. The climate and disease spectrum of Louisiana are unique and prevent most varieties developed outside of the Deep South from being successfully produced. Therefore it is important that the LSU AgCenter wheat breeding program release high-yielding scab-resistant varieties. A recent survey of Louisiana FHB populations found that strains from the region were quite unique and 78% were 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) Initiating a recurrent selection program, and (3) Crossing adapted soft wheat lines and varieties with genotypes having 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 good progress towards development of locally-adapted varieties with resistance to FHB in 2005-06. Wheat breeding lines with FHB resistant parentage were grown in a separate observation yield trial for the first time. Each of these was also evaluated as 3-row headrow plots in two misted FHB nurseries. Several of the lines in this test that appear to have good adaptation and disease ratings will be advanced to the 2007 regional FHB nursery. LA01096D-98 has ND2928 (NING7840/ND706) as a parent and was positive for the 3AS markers. Several other lines did not show presence of markers but showed good resistance to FHB.

Approximately 1600 advanced-generation headrows with FHB specific parentage were evaluated for agronomic type and resistance to a spectrum of diseases. Sixteen percent (142 of 880) of the headrows that were selected and harvested for advancement to yield trials last year came from these FHB-specific populations. This is a far-larger proportion than would be possible without support from the USWBSI. The 142 lines will be evaluated in observation plots and in misted FHB nurseries. They will also be screened for presence of 3AS and 5AS molecular markers.

Thirty-three of 117 F3 headrow populations that were selected and harvested had FHB resistance as a primary objective of the cross. These were grown as individual headrows in 2005-06 and selected based on agronomic traits and disease reaction. Three heads per selected row were bulk-threshed to provide seed for spaced plants in 2006-07. Bulk seed from the selected headrows will be planted as spaced plants (14” x 8”) F4 strips in 2006-07 and individual plants will be selected and harvested for observation plots and FHB trials. Sixteen F4 populations were harvested in the same fashion.

A number of new crosses were made to incorporate FHB resistance into locally adapted populations. Additional populations were obtained in exchanges of germplasm with Gene Milus, University of Arkansas pathologist. Crossing efforts have slowly shifted from crosses to exotic sources of resistance to backcrosses and crosses with adapted lines developed as a result of the scab initiative. This includes material form VA, NC, IN. ND, MN, AR, and other breeding programs that are now devoting substantial effort to developing FHB resistance.

Impact:

The LSU AgCenter wheat breeding program is primarily focused on the development of productive varieties with good disease-resistance that are adapted to the Gulf Coast region. This program has released several widely grown wheat varieties in recent years. 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 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.

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, L.R., T.J. Ward, K.O. O'Donnell, S.A. Harrison, and H.C. Kistler. Fusarium headblight of wheat in Louisiana is caused largely by nivalenol producers of *Fusarium graminearum asiaticum*. National Fusarium Headblight Forum Procedsings.