

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

Cover Page

PI:	Mohamed Mergoum
Institution:	North Dakota State University
Address:	Department of Plant Science Rm 166 Loftsgard Hall Fargo, ND 58105-5051
E-mail:	Mohamed.Mergoum@ndsu.edu
Phone:	701-231-8478
Fax:	701-231-8474
Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-4-094
USDA-ARS Agreement Title:	Hastening the Development of Specialty Spring Wheats with Resistance to Fusarium Head Blight.
FY08 USDA-ARS Award Amount:	\$ 33,907

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
VDHR-SPR	Combining Resistance Sources to Produce FHB Resistant Specialty Spring Wheat Varieties.	\$33,907
	Total Award Amount	\$ 33,907

Mohamed Mergoum

07/14/2009

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: *Combining Resistance Sources to Produce FHB Resistant Specialty Spring Wheat Varieties.*

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

In the US spring wheat (*Triticum aestivum* L.) region, Fusarium head blight (FHB) causes significant grain yield losses and losses due to the accumulation of fungal mycotoxins, such as deoxynivalenol (DON). Hard white spring wheat and specialty low-amylose starch genotypes resistant to FHB are needed by regional producers to remain competitive in domestic and international markets. We propose screening the Uniform Hard White Spring Wheat Nursery for resistance to FHB at several ND locations. This nursery will include experimental hard white spring wheat lines and specialty low-amylose spring wheat line entries from around the region.

A successful wheat breeding approach has been to combine different sources of host FHB resistance into a single genotype. To evaluate the function of types I resistance genes, we will use previously developed reciprocal backcross monosomic lines developed by hybridizing FHB resistant spring wheat 'Frontana' to a set of 'Chris' spring wheat monosomics, which are susceptible 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:

From the past USWBSI funds, two related spring wheat lines, designated NDSW0714 and NDSW0715, were developed such that they contained one and two QTL for FHB resistance, respectively. Across all experiments, the mean disease severity rating of NDSW0715 at 21 days after inoculation was 8.3%, which was significantly lower than the 17.6% rating for NDSW0714. Mean FDK and DON content measurements of the lines were not significantly different.

This current project is in second year. Screening of white/specialty wheat genotypes under scab nursery conditions (artificial inoculation and mist irrigation) at three locations in ND was conducted in 2008 and is being carried out in 2009. Based on 2008 data, the genotypes could be easily discriminated and identified. However the 2009 field data and the molecular markers information from the USDA-ARS Fargo Genotyping Center are needed to make final selection of resistant genotypes that combine different sources of resistance. Currently, the graduate student is conducting the second year of evaluation of the monosomics lines to determine the function of both type I resistance. First year data are being analyzed and will be combined with 2009 data to final analysis.

Impact:

Developing white and specialty wheat cultivars with FHB resistance are needed by regional producers to remain competitive in domestic and international markets. The results of this study will allow us to identify white and specialty wheat genotypes with good FHB resistance. It will also indicate the importance of the type I FHB resistance from Frontana and its benefits in pyramiding genes for FHB, which will be demonstrated by a decrease in the level of disease severity over time. The above results will provide information that will help breeders determine if pyramiding genes will be useful in developing host plant resistance to FHB, and it ultimately will result in the release of a spring wheat germplasm line which combines two different genes for resistance to FHB. It will also demonstrate if molecular markers can be effectively employed to pyramid different genes, despite these genes expressing a similar Type II phenotypic resistance to FHB.

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.

No publication yet this year.

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.

In the past, the NDSW0714 and NDSW0715 were released as germplasm using part of USWBSI funds.