

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

Cover Page

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Fiscal Year:	2009
USDA-ARS Agreement ID:	59-0790-5-076
USDA-ARS Agreement Title:	Effect of Inoculum Levels, Host Resistance, Fungicide and Weather on FHB.
FY09- USDA-ARS Award Amount:	\$ 7,750

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
VDHR-SPR	Characterizing the Type 1 Resistance to FHB in Wheat.	\$ 7,750
	Total Award Amount	\$ 7,750

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: *Characterizing the Type I Resistance to FHB in Wheat.*

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) is one of the most destructive diseases of wheat worldwide. The use of resistant cultivars is the most effective and economical method to manage FHB. Generally, FHB resistant cultivars possess either type I (resistance to initial infection) or type II (resistance to spread within infected spikes). Most FHB wheat breeding programs focus on type II resistance, which may not be sufficiently durable. An alternative approach is to combine type I and type II resistance from diverse genetic sources. In this study, three genetic materials developed previously by NDSU and UM wheat breeding programs were evaluated. These included (1) reciprocal backcross monosomic (RBCM) lines developed from the resistant cultivar 'Frontana' (possess type I resistance), and the susceptible cultivar 'Chris', (2) near-isogenic lines (NILs) developed from wheat cultivar 'Frontana' background, and (3) recombinant inbred lines (RILs) developed from a cross between wheat cultivars Frontana, Alsen (possesses type II resistance), and W9207. These lines were artificially inoculated and disease incidence and severities, kernel damage, and DON data were collected and analyzed. In addition, microsatellite markers located on the 3BS and 6BS and linked to type II resistance (in cv. Alsen) and BARC markers located on the 5AS chromosome and linked to type I resistance (in cv. Frontana) were tested in order to confirm the type of resistance present in the wheat lines.

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:

Both conventional and molecular methods were used to assess resistance in wheat lines to FHB. Based on these results, some wheat lines (for examples, 3424, 3492 3512, & 3545) exhibited higher levels of resistance to FHB and lower DON content compared to the resistant parents. DNA markers linked to both type I and type II resistance alleles were detected, suggesting that these lines contain both type I and type II resistance and provide resistance to initial infection, FHB spread and DON accumulation.

Impact:

This study was useful to identify some wheat lines even more resistant than the parents. The enhanced resistant lines identified in this study could be valuable sources of resistance to FHB and can be utilized directly in wheat breeding programs to develop durably resistant wheat cultivars.

FY09 (approx. May 09 – May 10)

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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.

Burlakoti, R. R., Mergoum, M., Kianian, S. F., and Adhikari, T. B. 2010. Combining different resistance components enhances resistance to Fusarium head blight in spring wheat. *Euphytica* 172:197-205.