

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

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Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-6-059
USDA-ARS Agreement Title:	Responding to Montana's Head Scab Epidemic.
FY08 USDA-ARS Award Amount:	\$ 9,688

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
VDHR-SPR	Responding to Fusarium Head Blight for the Northern Intermountain Region and the Northwestern Great Plains.	\$9,688
	Total Award Amount	\$ 9,688

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

Project 1: *Responding to Fusarium Head Blight for the Northern Intermountain Region and the Northwestern Great Plains.*

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

Development of hard red spring wheat cultivars with scab tolerance under irrigated production and dryland areas impacted by the wheat stem sawfly. Current scab tolerant varieties from the Great Plains are tall for irrigated systems and will lodge prior to harvest, further promoting scab infestation of the grain. No-till management of residue and chemical fallow has resulted in higher levels of *Fusarium* infested residue within the irrigated and dryland fields. Integrated management of the sawfly and FHB will require wheat varieties with solid stem character as well as scab tolerance. Our goal is to evaluate varieties by public and private breeding companies for FHB and evaluate phenotypic expression of the Sumai3 resistance in adapted germplasm designed for high yield environments or for sawfly resistance.

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 Sumai 3 QTL has the greatest and most consistent effect on FHB resistance. The first of the backgrounds used is ‘Choteau’, a solid-stemmed variety with resistance to the wheat stem sawfly that has performed very well in irrigated production. The other line has MT0249 are the recurrent parent. MT0249 is a sister line to our recent cultivar release ‘Vida’. MT0249 has long green leaf duration similar to Vida, but is about 6 cm shorter under irrigation. Currently, we have identified approximately 40 homozygous F2 individuals in backcross derivatives of Choteau and MT0249. Naturally occurring inoculum from wheat residue, including ascospore and macroconidia, and sprinkler irrigation have provided optimum disease expression and evaluation in field trials. We have evaluated over 200 lines and varieties from breeding programs with WestBred LLC, AgriPro-Coker Inc, Montana State University and University of Idaho.

Impact: Soil incorporation and destruction of the infected wheat residue is restricted by conservation practices because of the highly erodible soils. The conservation policy results in *Fusarium* inoculum(s) that are uniformly distributed across the fields and on the soil surface. To reduce inoculum and minimize FHB in crop and DON mycotoxin in grain, the best management practices for FHB, as outlined in a MSU Extension Bulletin, are practiced by growers in the affected regions. A post-harvest irrigation is performed to germinate the volunteer infected grain, followed by chemical or light-cultivation to destroy the plants. During the growing season, varieties are sown with an effective seed treatment to reduce seed borne inoculum, a foliar fungicide application prior to anthesis for protection of the flower, and the removal of sprinkler irrigation for up to 10 days during flowering to prevent floral infection. Field inoculum consist of macroconidia and ascospores that survive largely on infested wheat residue. It is not known what role corn may play in the FHB of wheat in this region as corn has limited acreage. The limited acres of corn are largely green chopped for silage with almost no over-wintering residue and inoculum. Lodging during grain

maturation causes increased kernel infection and DON accumulation in the grain, particularly among the taller scab tolerant varieties. Reduced plant height and scab tolerance will be an effective management tool for irrigated wheat production. For dryland production, a normal height variety with solid stem character and scab tolerance is needed for the no-till, high residue cropping systems.

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.

Wenda-Piesik, A., Z.Sun, W.E. Grey, D.K. Weaver and W.L. Morrill. 2009. Mycoses of Wheat Stem Sawfly (Hymenoptera: Cephidae) Larvae by *Fusarium* spp. Isolates. *Environ. Entomol.* 38(2): 387-394.

Mary Burrows, William Grey, and Alan Dyer. 2008. *Fusarium head blight (scab) of wheat and barley. MontGuide, MSU Extension, MT200806AG New 6/08.*

William Grey, Alan Dyer, and Luther Talbert. 2008. Responding to *Fusarium* Head Blight and Grain Deoxynivalenol in Montana. Midwest Association of Analytical Communities, International. Midwest Sectional Meeting, Bozeman June 8-10, 2008.

William Grey and Alan Dyer. 2009. *Fusarium* head blight management strategies and variety selection for irrigated and dryland cropping systems. Crop Pest Management School, MSU, Bozeman, MT January 07, 2009.

William Grey and Alan Dyer. 2009. Managing *Fusarium* head blight in irrigated wheat and barley. Sugarbeet Symposium, Billings, MT January 12, 2009.

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.

No cultivars or germplasm were released in FY08.