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

PI:	Richard Horsley
Institution:	North Dakota State University
Address:	Department of Plant Science 166 Loftsgrad Hall Box 5051 Fargo, ND 58105-5051
E-mail:	Richard.Horsley@ndsu.edu
Phone:	701-231-8142
Fax:	701-231-8474
Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-4-106
USDA-ARS Agreement Title:	An Integrated Approach for Developing Scab Resistant Barley.
FY08 USDA-ARS Award Amount:	$ 213,163

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
BAR-CP	An Integrated Approach for Developing Scab Resistant Barley.	$213,163
	Total Award Amount	**$ 213,163**

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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: *An Integrated Approach for Developing Scab Resistant Barley.*

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), primarily incited by *Fusarium graminearum*, has adversely affected the quality of barley grown in most areas North Dakota and northwestern Minnesota the last 16 years. Quality of harvested grain is reduced because of blighted kernels and the presence of deoxynivalenol (DON), a mycotoxin produced by the pathogen. Seeding resistant cultivars is the only promising method of controlling FHB in barley because cultural and chemical controls of FHB have been unsuccessful. My breeding program is incorporating FHB resistance from exotic and US barley germplasm into our elite malting barley germplasm. Marker assisted selection for FHB-resistance and DON accumulation genes on chromosome 6H is being done in the USDA-ARS-CCRU molecular marker laboratory in Fargo. Winter nurseries in New Zealand and China are being used to accelerate the development of improved varieties.

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 (1):
   Markers associated with FHB-resistance and reduced DON accumulation on chromosome 6H were found to work across our six-rowed breeding program germplasm. This is significant because prior markers did not work across all crosses. The markers were ones that were identified by Dr. Kevin Smith of the University of Minnesota to work in his program.

   Impact:
   The markers on chromosome 6H are associated with reductions in DON accumulation of 25-35%. Use of the chromosome 6H markers should allow us to efficiently incorporate these QTL into all our six-rowed lines.

   Accomplishment (2):
   The six-rowed lines ND20448 is in the American Malting Barley Association's (AMBA) Plant Scale evaluation program. This testing is the last step needed before a line can be recommended as a "malting" barley and ND20448 is the first NDSU line to reach this level of testing. ND20448 accumulates about 35% less DON than the cultivar Robust. Two additional six-rowed (ND23497 and ND23898) and two-rowed (2ND24263 and 2ND24388) lines with improved FHB-resistance were advanced to the AMBA' Pilot Scale Evaluation Program.

   Impact:
   New malting barley varieties with improved FHB resistance and reduced DON accumulation would allow our Midwest barley producers to more consistently to meet the DON specifications of the malting and brewing industry and thus sell their crop at a higher price.

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.

Refereed publications:

Lamb, K.E., J.L. Gonzalez-Hernandez, B. Zhang, , M. Green, S.M. Neate, P.B. Schwarz, and R.D. Horsley. 2009. Identification of QTL conferring resistance to Fusarium head blight in the barley line C93-3230-24. Crop Sci. (accepted).

Proceedings:

Boyd, C, R. Horsley, and A. Kleinhofs. 2008. Towards rapid candidate gene discovery in the barley chromosome 2 (2H) bin 10 Fusarium head blight resistance gene. p. 144-147. *In* S.M. Canty and D. Van Sanford (eds.) Proc of the 2008 National Fusarium Head Blight Forum, Indianapolis, IN 2-4 Dec 2008. Michigan State University, East Lansing, MI.

Presentations

Field day presentations in July 2008 at the Carrington, Dickinson, Hettinger, Langdon, North Central, and Williston Research Extension Centers in North Dakota.

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.