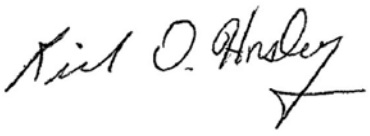
USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY12 Final Performance Report
July 16, 2013

Cover Page

PI:	Richard Horsley
Institution:	North Dakota State University
Address:	Department of Plant Sciences NDSU Dept # 7670 PO Box 6050 Fargo, ND 58108-6050
E-mail:	Richard.Horsley@ndsu.edu
Phone:	701-231-8142
Fax:	701-231-8474
Fiscal Year:	FY12
USDA-ARS Agreement ID:	59-0206-9-062
USDA-ARS Agreement Title:	An Integrated Approach for Developing Scab Resistant Barley.
FY12 USDA-ARS Award Amount:	$ 189,562*

USWBSI Individual Project(s)

USWBSI Research Category**	Project Title	ARS Award Amount
BAR-CP	Developing 6- and 2-rowed Malting Barley Cultivars with Enhanced FHB Resistance and Reduced DON Accumulation.	$ 189,562
	Total ARS Award Amount	**$ 189,562**



June 25, 2013

Principal Investigator Date

* Award Amount does not include additional funding awarded in September of 2012 earmarked for other PIs at same institution

** 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 Soft Winter Wheat Region
SWW – Southern Soft Red Winter Wheat Region

Project 1: *Developing 6- and 2-rowed Malting Barley Cultivars with Enhanced FHB Resistance and Reduced DON Accumulation.*

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 of North Dakota and northwestern Minnesota annually since 1993. 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 six- and two-rowed malting barley germplasm. Marker-assisted selection for FHB-resistance and DON accumulation genes on chromosome 6H is being done on six-rowed lines in the USDA-ARS-CCRU molecular marker laboratory in Fargo. Winter nurseries in Arizona, 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:

   In the 2012 fall greenhouse, 100% of the six- and two-rowed crosses made had a least one parent with improved FHB resistance and lower DON accumulation. The six-rowed line ND27177, which accumulates less DON than Robust, was rated satisfactory in its second year of AMBA Pilot Scale evaluation and is eligible to enter the AMBA Plant Scale evaluation program in 2014. Lines must be rated satisfactory in two years of AMBA Plant Scale evaluation before they are added to the list of "recommended malting barley varieties." In 2012, four of the five six-rowed lines and two of the three NDSU two-rowed lines submitted for AMBA Pilot Scale evaluation came from our FHB-resistance breeding program. Over the next few years, our goal is to increase the frequency of lines with improved resistance to 100% from both programs.

   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 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.

None

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.

- Update on barley varieties for North Dakota at the Hettinger and Carrington RECs, and the Agronomy Seed Farm in July 2012, Casselton, ND.

- Barley Breeding at NDSU. Invited talk to employees of the USDA-FAS, October 2012, Fargo, ND.

- Update on barley varieties for North Dakota, presentation at the North Dakota Barley Show in Osnabrock, ND in April 2013.