

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY06 Final Performance Report (approx. May 06 – April 07)
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Cover Page

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Fiscal Year:	2006
USDA-ARS Agreement ID:	59-0790-4-099
USDA-ARS Agreement Title:	Enhanced Resistance to Fusarium in Two-Rowed Barley.
FY06 ARS Award Amount:	\$ 80,320

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Award Amount
VDUN	Enhanced Resistance to Fusarium in Two-Rowed Barley.	\$ 80,320
	Total Award Amount	\$ 80,320

Principal Investigator

Date

* CBCC – Chemical, Biological & Cultural Control
 EEDF – Etiology, Epidemiology & Disease Forecasting
 FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
 GET – Genetic Engineering & Transformation
 HGR – Host Genetics Resources
 HGG – Host Genetics & Genomics
 PGG – Pathogen Genetics & Genomics
 VDUN – Variety Development & Uniform Nurseries

Project 1: *Enhanced Resistance to Fusarium in Two-Rowed Barley.*

1. What major problem or issue is being resolved and how are you resolving it?

Fusarium head blight (FHB), primarily incited by *Fusarium graminearum*, adversely affected the quality of barley grown in portions of eastern North Dakota and northwestern Minnesota the last 14 years. Quality of harvested grain was 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. Introduced two-rowed barley accessions grown in field nurseries in China and North Dakota from 1994 to 2001 were identified with putative FHB resistance. My breeding program is incorporating FHB resistance from several of these sources into elite malting barley germplasm. Winter nurseries are used to accelerate the process of developing improved cultivars.

**2. List the most important accomplishment and its impact (how is it being used?).
Complete all three sections (repeat sections for each major accomplishment):**

The NDSU developed cultivar Conlon accumulates less DON than any other malting barley cultivar grown in North Dakota. The native low DON accumulation in Conlon is being incorporated with sources of low DON from Chinese accessions.

Accomplishment:

The percentage of experimental lines with improved FHB-resistance and lower DON accumulation is increasing. Two-rowed lines that accumulate reduced DON are candidates for the American Malting Barley Association's (AMBA) Pilot Scale Evaluation Program. This testing is the first step in a 4-6 year process before a line can receive a recommendation from AMBA for use as a malting barley.

Impact:

The cultivar Conlon is grown on about 10% of the barley acreage in North Dakota. This cultivar provides the only option for growers looking to seed a malting barley cultivar that accumulates less DON.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

A two-rowed malting barley cultivar, Conlon, which accumulates less DON.

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 Journal Articles

Hill, N.S., P. Schwarz, L.S. Dahleen, S.M. Neate, R. Horsley, A.E. Glenn, and K. O'Donnell. 2006. ELISA analysis for *Fusarium* in barley: Development of methodology and field assessment. *Crop Sci.* 46:2636-2642.

Abstracts

Boyd, C., C. Maier, S. Sushailo, R. Horsley, and A. Kleinhofs. 2006. Genetic and physical mapping of the barley chromosome 2 (2H) *vrs1* region of *Fusarium* head blight resistance QTL. p. 87. *In* S.M. Canty and D. Van Sanford (eds.) Proc of the 2006 National *Fusarium* Head Blight Forum, Raleigh, NC 10-12 Dec 2006. Michigan State University, East Lansing, MI.

Hill, N.S., S. Neate, B. Cooper, R. Horsley, P. Schwarz, L.S. Dahleen, K.P. Smith, R. Dill-Macky, K. O'Donnell, and J. Reeves. 2006. Is there value in quantifying *Fusarium* mycelium for breeding FHB resistance? p. 98. *In* S.M. Canty and D. Van Sanford (eds.) Proc of the 2006 National *Fusarium* Head Blight Forum, Raleigh, NC 10-12 Dec 2006. Michigan State University, East Lansing, MI.