

**U.S. Wheat and Barley Scab Initiative
 FY00 Final Performance Report (approx. May 00 – April 01)
 July 30, 2001**

Cover Page

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Grant Number:	59-0790-9-063
Grant Title:	Fusarium Head Blight Research
2000 ARS Award Amount:	\$98,531

Project

Program Area	Project Title	Requested Amount
Food Safety, Toxicology, & Utilization	Malting barley deoxynivalenol diagnostic services.	\$59,364.00
Food Safety, Toxicology, & Utilization	Utilization of Fusarium infected malting barley	\$41,630.00
	Requested Total	\$100,994.00¹

 Principal Investigator

 Date

¹ Note: The Requested Total and the Award Amount are not equal.

Project 1: Malting barley deoxynivalenol diagnostic services.

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

DON analytical services are provided to seven collaborating researchers at three barley varietal development programs. Approximately 5000 samples are received and analyzed each year. The major issue is to provide the DON analytical services in a cost effective, timely and accurate manner. Funds provided by the US Wheat and Barley scab initiative have allowed us to hire additional personnel, and to subsidize the cost of analysis.

2. What were the most significant accomplishments?

There was a complete turnover of the personnel associated with the NDSU-Cereal Science DON Diagnostic laboratory during FY2000. A chemist II laboratory supervisor (NDSU funded) was hired in September 2000. A chemist I laboratory assistant (USWBSI funded) was hired in November 2000.

A total of 5213 samples from the 2000 crop were analyzed during FY2000. These included 4316 from barley breeders/pathologists, 148 from the regional crop survey, 577 samples from project II, and 18 inter-laboratory collaborative samples. Analysis of all breeders' samples was complete by March 2001, which meets the objective of timely reporting.

A new inter-laboratory DON barley and malt check sample service was established by the NDSU-Cereal Science DON Diagnostic laboratory in the fall of 2000. Monthly samples of barley and malt are mailed to 8 cooperating laboratories.

New statistical quality control procedures were implemented by the NDSU-Cereal Science DON Diagnostic laboratory in 2000, as a means of improving repeatability/reproducibility of results.

Project 2: Utilization of *Fusarium* infected malting barley

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

The primary objectives were to (1) evaluate the relationship between *Fusarium* infection levels and grain quality damage, and (2) to investigate control strategies for limiting the growth of *Fusarium* during the malting process.

Samples collected as part of regional barley quality surveys (1995-2000) were to be analyzed for markers of FHB (plate count, DON and ergosterol), barley quality and malt quality (objective 1). Statistical analysis of the data will be used to determine possible relationships between markers of infection and barley/malt quality. The results of this analysis may indicate the minimal infection levels at which quality decreases can be detected.

Objective 2 involves the investigation of physical, biological and chemical control strategies intended to limit the growth of *Fusarium*, and production of DON during the malting process.

Physical methods are currently being screened for effectiveness at reducing *Fusarium* infection rates without decreased germination rates. Methods being screened are dry heat, moist heat, microwaving, electron beam irradiation, UV irradiation and UV irradiation combined with ozone production. Analysis includes measurement of mold infection rates and germination rates

2. What were the most significant accomplishments?

Approximately 120 (N=2, 240) samples of Robust barley were analyzed as part of objective 1. All analyses for barley quality (protein, plumpness), FHB markers (DON, ergosterol, plate count), and micro-malting were completed prior to the end of FY2000. Malt quality analyses (extract, free amino nitrogen, soluble nitrogen, beta-glucans, viscosity, color, xylanase, beta-glucanase) are nearly complete. Statistical analyses of the data should be complete by October 2001.

Treatments with UV irradiation do not appear to be effective in reducing *Fusarium* viability on barley kernels (objective 2). The UV irradiation does not seem to penetrate the outer layers of the kernel. Immersion of barley into warm water has shown some significant effects. Reductions of 97% of the *Fusarium* were observed when kernels were immersed in water at 45 or 50°C for 10 min. There was little effect on germination. Experiments looking at the effect of electron-beam irradiation are in progress.

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.

Schwarz, P.B. (poster abstract). Relationship between Fusarium Head Blight infection and the malting quality of barley. Master Brew. Assoc. of the Americas. MBAA Communicator 52(2):11-12, 2001

Schwarz, P.B., Schwarz, J. G., Zhou, A., Prom, L.K., and Steffenson, B. J. 2001. Effect of *Fusarium graminearum* and *F. poae* infection on barley and malt quality. Monatschrift für Brauwissenschaft 54(3/4):55-63, 2001.