

**U.S. Wheat and Barley Scab Initiative
 FY02 Final Performance Report (approx. May 02 – April 03)
 July 15, 2003**

Cover Page

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Grant Number:	59-0790-1-081
Grant Title:	Fusarium Head Blight Research
FY02 ARS Award Amount:	\$ 71,340

Project

Program Area	Project Title	USWBSI Recommended Amount
GIE	Evaluation of Barley Germplasm for Resistance to Fusarium Head Blight.	\$73,124
	Total Amount Recommended	\$73,124

 Principal Investigator

 Date

Project 1: Evaluation of Barley Germplasm for Resistance to Fusarium Head Blight.

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

FHB threatens the existence of the barley industry in the Upper Midwest. Deployment of resistant cultivars is the most effective and environmentally sound means of managing this disease. Sources of partial resistance to *Fusarium graminearum* and its toxins have been identified in barley; however, these lines have not been rigorously tested under many environments and in the greenhouse. Additionally, the winter and wild barley gene pools have not been evaluated for FHB resistance. To effectively manage FHB using host resistance, it is important that cultivars be bred with highest level of resistance possible from diverse sources. Therefore, the objectives of this research were to 1) re-evaluate lines that were previously reported to possess FHB resistance and 2) screen winter and wild barley germplasm for FHB resistance.

2. What were the most significant accomplishments?

Over 8,100 six-rowed spring barleys were initially screened for FHB resistance at two locations in North Dakota in 1999 and 2000. Only 27 accessions exhibited FHB severities less than 30% in one of the evaluations in 1999 or 2000. These accessions were then evaluated in the greenhouse under more controlled conditions and also in additional field environments. FHB severity and DON concentration varied considerably in the selected accessions across different evaluation tests; however, a few accessions (CIho 6613 and CIho 11526) consistently exhibited resistance levels that were similar to the resistant six-rowed check, Chevron. Several of the most resistant six-rowed accessions identified to date originate from Switzerland. This includes PI 370919, PI 371317, the resistant control Chevron (CIho 1111) and a Chevron selection (CIho 11526).

We also evaluated 600 six-rowed winter barley accessions from around the world and 400 accessions of wild barley (*Hordeum vulgare* subsp. *spontaneum*) from the Fertile Crescent for resistance to FHB in China (Zhejiang Province). Less than 1% (56) of the six-rowed winter barley germplasm exhibited FHB severities less than 30% under heavy disease pressure. Many of these accessions headed very early and may have escaped severe infection. Only three accessions (CIho 39516, CIho 2339, and CIho 14296) in this group of 56 had an intermediate heading time and a DON concentration less than 3 ppm (susceptible control Stander=5.4ppm). Forty wild barley accessions exhibited FHB severities less than 30% under heavy disease pressure. Two accessions from Israel (PI 391056 and PI 466519) had DON concentrations that were less than 3 ppm compared to 16 ppm in the susceptible cultivar Stander. *Hordeum vulgare* subsp. *spontaneum* exhibited a high degree of genetic diversity for FHB reaction as disease severities ranged from <10% to over 80%. This wild species may be a useful source of alternative FHB resistance alleles in barley breeding programs.

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.

Steffenson, B. J. 2003. Fusarium head blight of barley: Impact, epidemics, management, and strategies for identifying and utilizing genetic resistance. Pages 241-295: In: K. J. Leonard and W.R. Bushnell, eds. 2003. Fusarium Head Blight of Wheat and Barley. APS Press. St. Paul. 512 pp.

Schwarz, P.B., Jones, B. L., and Steffenson, B.J. 2002. Enzymes associated with *Fusarium* infection of barley. J. Am. Soc. Brew. Chem. 60:130-134.

Urrea, C. A., Horsley, R. D., Steffenson, B. J., and Frankowiak, J. D. 2002. Registration of 6NDRFG-1 six-rowed barley germplasm line with partial Fusarium head blight resistance. Crop Sci. 42:675.