

**U.S. Wheat and Barley Scab Initiative
 FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

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FY01 ARS Award Amount:	\$ 82,744

Project

Program Area	Project Title	Requested Amount
Germplasm	Evaluation of barley germplasm for Resistance to Fusarium Head Blight	\$ 87,803
	Total Amount Requested	\$ 87,803

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 resistance to *Fusarium graminearum* and its toxin 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 Chevron, the resistant six-rowed control. Several of the most resistant six-rowed accessions identified to date originate from Switzerland. These include PI 370919, PI 371317, the resistant control Chevron (CIho 1111) and a Chevron selection (CIho 11526)(Table 1).

Six hundred winter barley accessions from diverse regions of the world were evaluated for FHB resistance in China in 2001. Less than 1% (56) 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).

One hundred and ten wild barley (*Hordeum vulgare* subsp. *spontaneum*) accessions from Israel and Jordan were tested in China in 2000. Twenty-three accessions from this group exhibited less than 10% FHB incidence and severity under light disease pressure. In 2001, four hundred additional *H. vulgare* subsp. *spontaneum* accessions from across the Fertile Crescent were evaluated, and forty 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.

Scholz, U. and Steffenson, B. J. 2001. Effect of *Gibberella zeae* ascospores and *Fusarium graminearum* conidia on *Fusarium* head blight severity and deoxynivalenol production in barley. Pages 147-150 in: Proceedings of the 2001 National Fusarium Head Blight Forum. Erlanger, KY. December 8-10, 2001.

Steffenson, B. J., and Scholz, U. 2001. Evaluation of *Hordeum* accessions for resistance to *Fusarium* head blight. Pages 208-211 in: Proceedings of the 2001 National Fusarium Head Blight Forum. Erlanger, KY. December 8-10, 2001.