USDA-ARS / USWBSI
FY03 Final Performance Report (approx. May 03 – April 04)
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Cover Page

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Year:	**FY2003 (approx. May 03 – April 04)**
FY03 ARS Agreement ID:	**59-0790-1-081**
FY03 ARS Agreement Title:	**Evaluation of Hordeum Germplasm for Resistance to Fusarium Head Blight.**
FY03 ARS Award Amount:	**$ 78,296**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
GIE	Evaluation of Hordeum Germplasm for Resistance to Fusarium Head Blight.	$ 78,296
	Total Amount Recommended	**$ 78,296**

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Principal Investigator Date

* BIO – Biotechnology
CBC – Chemical & Biological Control
EDM – Epidemiology & Disease Management
FSTU – Food Safety, Toxicology, & Utilization
GIE – Germplasm Introduction & Enhancement
VDUN – Variety Development & Uniform Nurseries

Project 1: ***Evaluation of Hordeum 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 genepools have not been systematically 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?
The screening of the entire six-rowed spring barley collection (8,100 accessions) from the USDA National Small Grains Collection yielded only a few accessions (CIho 6613 and CIho 11526) with a resistance level similar to that of the historical resistant check, Chevron. By analyzing pedigrees and origins of the evaluated accessions, we discovered that several of the most resistant accessions originated from Switzerland. This includes not only the resistant control Chevron (CIho 1111) and a Chevron selection (CIho 11526), but also PI 370919 and PI 371317. To further characterize germplasm from this region, we obtained 74 Swiss barley landraces from Geert Kleijer (Nyon, Switzerland) and 100 accessions from Igor Loskutov (St. Petersburg, Russia) and evaluated them for their reaction to FHB at St. Paul and Crookston, Minnesota. The foliar spray (macro-conidia) and grain spawn (ascospores) methods of inoculation were used at the St. Paul and Crookston nurseries, respectively. With respect to the Swiss collection, two-rowed accessions exhibited lower levels of FHB and deoxynivalenol (DON) than six-rowed accessions. Thirteen accessions (11 two-rowed and 2 six-rowed) exhibited FHB severities less than 3%, which was comparable to the range observed on the Chevron control (0-3.6%). Three of these 13 accessions had very low DON levels of <2 ppm (Chevron average=5.6 ppm). From the Russian collection, we identified 2 six-rowed accessions (15120 and 18358) that exhibited FHB severities comparable to that observed on Chevron (0-3.6%). Accession 15120 exhibited a very low DON level of <2ppm (Chevron average=5.6 ppm)

We are also continuing our efforts to evaluate six-rowed winter and wild barley (*Hordeum vulgare* subsp. *spontaneum*) germplasm for resistance to FHB in China. In 2002-03, we evaluated 400 six-rowed winter barley accessions and 74 accessions of wild barley. Thirty-six winter and nine wild barley accessions exhibited FHB severities comparable to Chevron.

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 you 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.

Olivera, P., Steffenson, B., and Anikster, Y. 2003. Reaction of *Aegilops sharonensis* to Fusarium Head Blight. Page 226 in: Canty, S. M., Lewis, J., Siler, L., and Ward, R. W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2003 Dec. 13-15; Bloomington, MN. East Lansing: Michigan State University.

ABS Steffenson, B. J. 2003 A population approach for identifying Fusarium head blight resistance in barley. Page 233 in: Canty, S. M., Lewis, J., Siler, L., and Ward, R. W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2003 Dec. 13-15; Bloomington, MN. East Lansing: Michigan State University.

ABS Steffenson, B. J., and Dahl, S. K. 2003 Evaluation of Swiss barley landraces for resistance to Fusarium head blight. Page 234 in: Canty, S. M., Lewis, J., Siler, L., and Ward, R. W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2003 Dec. 13-15; Bloomington, MN. East Lansing: Michigan State University.