

**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:	59-0790-9-074
Grant Title:	Fusarium Head Blight Research
FY02 ARS Award Amount:	\$ 270,687

Project

Program Area	Project Title	USWBSI Recommended Amount
EC/HQ	U.S. Wheat & Barley Scab Initiative Networking & Facilitation Office (NFO).	\$190,660
VDUN	Development of FHB Resistant Soft White Wheat Varieties for Michigan and Similar Environments.	\$86,794
	Total Amount Recommended	\$277,454



Principal Investigator

7/15/03

Date

Project 1: U.S. Wheat & Barley Scab Initiative Networking & Facilitation Office (NFO).

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

Scab affects the industries and people involved in virtually every stage of the production, processing, and distribution systems of five market classes of wheat and barley across the U.S. The Networking and Facilitation Office (NFO) was established in 1999 to minimize the barriers to the U.S. Wheat & Barley Scab Initiative's success arising from the administrative burdens and communication challenges that are involved in working with around 80 researchers across 25 states. The NFO is addressing this problem by 1) helping scientists and all interested parties, who in the past may have problems communicating with each other, to learn from each other by facilitating communications and communication system development; 2) identifying and implementing an internet-based communication and collaboration mechanisms; and 3) acting as a center of accountability and a rapid clearing house of scab-related information. The NFO also provides administrative support to the various committees and associated conferences associated with the Initiative, including annual resolution of a comprehensive national research plan and budget.

2. What were the most significant accomplishments?

Volume 4 Issue 3 and Volume 5 Issue 1 of the Initiative's newsletter "Fusarium Focus" have been published. The call for pre-proposals for the FY2004 research plan has gone out, and final performance reports for the FY2002 projects are being completed by researchers and will be forwarded to ARS in late July. The 6th National Fusarium Head Blight Forum was held in December 2002 in Erlanger, Kentucky. Participation was up again from the previous year with over 200 under attendees. Planning for the 2003 National FHB Forum, which will be held December 13-15 in Bloomington, Minnesota, is well underway. The USWBSI has been asked by the International Organizing Committee for the International Scab Symposium to host the 2004 International Scab Symposium. Planning for that is also underway. The NFO is continuously drafting and revising its policies and mode of operation to improve its efficiency and effectiveness.

The NFO organized two Steering Committee meetings, and two Executive Committee conference calls. The following research area workshops were facilitated and partially or fully funded with resources from this office:

Variety Development & Uniform Nurseries – Barley Workers Site Visit to CIMMYT, Mexico (August 30-31, 2002). A report on this workshop can be accessed at http://www.scabusa.org/pdfs/08-02_CIMMYT-Visit_Report.pdf

Germplasm Introduction & Enhancement – Wheat Germplasm Workshop, St. Paul, MN (September 11-23, 2002). A report on this workshop can be accessed at http://www.scabusa.org/pdfs/09-02_GIE-Wksp_Report.pdf

Chemical & Biological Control – CBC Application Technology Workshop, Bloomington, MN (February 18-20, 2003). A report on this workshop can be accessed at http://www.scabusa.org/pdfs/04-03_CBC-Wksp_Report.pdf.

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The web-based database has been integrated with the static website, and from the feedback received to date, seems to be generating a great deal of use. That achievement contributes to the NFO's objective creating a seamless "real-time" network that allows individuals to search all of the Initiative's available information.

Project 2: Development of FHB Resistant Soft White Wheat Varieties for Michigan and Similar Environments.

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

All of the currently grown soft white winter wheat cultivars grown in Michigan or neighboring regions are highly susceptible to FHB. We employ conventional plant breeding approaches including field and greenhouse FHB screening nurseries to redress this shortcoming.

2. What were the most significant accomplishments?

- (1) Soft white winter wheat lines exhibiting commercially acceptable levels of agronomic and grain quality attributes coupled with FHB resistance are emerging from our breeding efforts. In this year's single-floret inoculation and mist-irrigation greenhouse screening, for instance, the number of scabby spikelets in MSU lines E0001-R1, E0009-R5, E0029-R1, E0039-R1, F0009-R1, E2032, E2038 and E2044 varied from 4 to 9 and the percentage of scabby spikelets was about 25%-50%. E2038 especially exhibited a higher level of type II resistance, which in this year's greenhouse evaluations was only second to MO11174 among all the American cultivars and lines. At the time of this report, data from the Northern Uniform Winter Wheat Scan Nurseries in Ontario, Ohio, and Indiana confirms that MSU line E0009 is moderately resistant to FHB. E0009 has excellent soft white wheat grain quality as well as agronomic performance equal to or better than the best commercial varieties currently grown in Michigan. Our field evaluations in this season (02/03) also confirm the FHB resistance of E0009, E0010 (also sprout resistant), and E2038. Field screening also identified MSU lines E2002, E2016, E2022, E2029, E2048, E2051, and E2057 as superior for FHB index. Preliminary yield test results strongly suggest that E2002, E2016, E2029 are equal to or superior in grain yield than the dominant white wheats grown in Michigan today. All of the "E2" lines are entered into yield tests for the first time this year and the fact that eight of the 60 total exhibit significant FHB resistance in either the greenhouse and/or field screening systems is extremely promising.
- (2) A new field misting system was installed and used for the field screening of all yield test materials in the 02/03 season. This system, based on the design developed by Thomas Scherer and associates at NDSU, enhanced dramatically the uniformity of infection in the field nursery.
- (3) We have created several hundred hybrids and selectable populations (F2, F3, F4 and BC1 and BC2) by crossing local superior cultivars to FHB resistance lines. F3-F6 families with FHB resistant parentage continue to be advanced in the field breeding program.
- (4) During this year, we evaluated about 430 American varieties and advanced lines for FHB resistance (Type II) in the greenhouse and field.
- (5) The inheritance of FHB resistance (Type II) in new germplasm lines CJ 9306 and CJ 9403 has been characterized with parents, F1, F2, back-cross and F6:7 generations. We found that the FHB resistance in these lines was a qualitative-quantitative trait. The

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number of genes and best-fit genetic model varied depending on specific crosses. The results were presented at the National Scab Forum, and will be submitted to the journal Crop Science for publication.

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.

Guo-Liang Jiang and Richard W. Ward. 2003. Inheritance of Fusarium head blight resistance and molecular markers for the QTLs in wheat I. Genetic analysis of new lines CJ 9306 and CJ 9403 for Type II resistance. *Crop Science* (to be submitted).

Sayler, Tracy, S. Canty, and R. Ward. Spring 2003. *Scab News*. U.S. Wheat & Barley Scab Initiative. Volume 4, Issue 2.

Canty, Susan, R. Ward, J. Lewis, and L. Siler. 2002. Proceedings from the 2002 National Fusarium Head Blight Forum, Erlanger, Kentucky. Michigan State University, East Lansing, MI.

Guo-Liang Jiang and Richard Ward. 2002. Inheritance of Fusarium head blight resistance (Type II) in new wheat germplasm CJ 9306 and CJ 9403. in: S.M. Canty et al. (eds.), 2002 National Fusarium Head Blight Forum Proceedings, Erlanger, KY. p. 201.

Sayler, Tracy, S. Canty, and R. Ward. Fall 2002. *Scab News*. U.S. Wheat & Barley Scab Initiative. Volume 4, Issue 1.

Ward, Richard, L. Siler, J. Lewis and L.P. Hart. 2002. Michigan State Wheat Variety Trial: 2002. Michigan State University, East Lansing, MI.