

**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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Year:	FY2002 (approx. May 02 – April 03)
Grant Number:	59-0790-9-057
Grant Title:	Fusarium Head Blight Research
FY02 ARS Award Amount:	\$ 74,307

Project

Program Area	Project Title	USWBSI Recommended Amount
VDUN	Improvement of Soft Winter Wheat for Resistance to Fusarium Head Blight.	\$76,165
	Total Amount Recommended	\$76,165

Principal Investigator

Date

Project 1: Improvement of Soft Winter Wheat for Resistance to Fusarium Head Blight.**1. What major problem or issue is being resolved and how are you resolving it?**

Fusarium head blight (FHB) causes moderate to severe production and grain quality losses to soft winter wheat in Indiana most seasons, especially with the widespread practice since the late 1980s of reduced tillage. Wheat varieties with more effective resistance to FHB than current varieties would significantly reduce these crop losses. The goal of this research is to accelerate the development of FHB resistant and low-FHB incidence wheat varieties that are adapted in Indiana by identifying, incorporating and pyramiding diverse types of resistance into elite soft winter wheat genotypes.

Specific objectives: 1) Develop FHB resistant and low-FHB incidence wheat cultivars that are adapted in Indiana, 2) determine inheritance of low-FHB incidence, and 3) determine inheritance of type 2 FHB resistance of several resistance source lines.

2. What were the most significant accomplishments?

The soft winter wheat line, 97395, was approved for seed increase and 30 bu Breeder Seed was produced. This line has FHB type 2 resistance similar to the variety Ernie, but has stronger straw and resistance to other important diseases of wheat in Indiana. Two lines, 97397 and 96169, have been approved for initial seed increase in 2003-2004 for release. Line 97397 has type 2 FHB resistance similar to 97395 combined with low-FHB incidence of the variety Goldfield (typically $\frac{1}{4}$ the incidence of the variety Patterson under field conditions). Line 96169 has type 2 resistance of variety Freedom plus 1 gene for resistance from Ning7840 (typically 1 to 3 spikelets of 96169 become diseased, compared to 3 to 6 spikelets of Freedom in field tests). Lines with higher levels of type 2 resistance combined with low-FHB incidence are needed, but the lines 97395, 97397 and 96169 are a beginning step to effectively reduce economic losses to FHB.

Over 400 experimental lines that are in our yield nurseries plus the Uniform Eastern Soft Winter Wheat Nursery and the Uniform Northern Fusarium Nursery were screened by inoculation and natural infection at Lafayette, IN.

Over 12,000 head rows were screened for FHB under mist-irrigated conditions.

A RI population was extensively characterized for FHB incidence at three locations in Indiana with moderate to severe FHB infection. Characterization for degree and duration of flower opening in one test in a greenhouse and one test in the field has been done and two additional tests in the greenhouse will be carried out.

Approximately 150 lines were performance tested in replicated trials at six locations throughout Indiana, 250 lines additional lines were tested in replicated trials at Lafayette, IN, 10 lines were submitted for testing in regional performance trials, and 6 lines were submitted to the Uniform Northern Fusarium Nursery.

Over 350 crosses were effected to pyramid different sources of FHB resistance into genotypes that are adapted to Indiana and with resistance to other important diseases, viruses and Hessian fly.

Two QTLs for type 2 resistance of the variety Fundulea 201R were identified on chromosome 1B near Xbarc8 and on chromosome 3A near Xgwm674. Our breeding lines that have Xgwm296 on 2AS of Freedom combined with Xgwm674 on 3A of 201R, have a higher level of type 2 resistance than Freedom. Other combinations of FHB resistance QTLs are being identified that result in enhanced resistance.

FY02 (approx. May 02 – April 03)
PI: Ohm, Herbert
Grant: 59-0790-9-057

FY02 Final Performance Report

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.

Bourdoncle W and Ohm H. 2002. Identification of DNA markers for Fusarium head blight resistance of wheat line Huapei 57-2. American Society of Agronomy Meeting. Indianapolis, IN. Agronomy Abstracts 94:P728.

Bourdoncle W and Ohm H. 2002. Identification of DNA markers for Fusarium head blight resistance of wheat line Huapei 57-2. p.229 *In*: Canty SM, Lewis J, Siler L, Ward RW (eds). 2002 National Fusarium Head Blight Forum Proceedings. Available at <http://www.scabusa.org>.

Bourdoncle W and Ohm H. 2003. Quantitative trait loci for resistance to Fusarium head blight in recombinant inbred wheat lines from the cross Huapei 57-2/Patterson. *Euphytica* 131:131-136.

Bourdoncle W and Ohm H. 2003. Fusarium head blight-resistant wheat line ‘Bizel’ does not contain rye chromatin. *Plant Breeding* 122:281-282.

Shen, X, Ittu M, and Ohm HW. 2003. Quantitative trait loci conditioning resistance to Fusarium head blight in wheat line F201R. *Crop Sci.* 43:850-857.

Shen X, Kong L, and Ohm H. 2002. Novel source of type II resistance to Fusarium head blight. p. 212 *In*: Canty SM, Lewis J, Siler L, Ward RW (eds). 2002 National Fusarium Head Blight Forum Proceedings. <http://www.scabusa.org>.

Shen X and Ohm H. 2002. Detection of QTLs conditioning FHB resistance in two wheat germplasm lines. American Society of Agronomy Annual Meeting. Indianapolis, IN. Agronomy Abstracts 94:P838.

Shen X, Zhou M, Lu W, and Ohm H. 2003. Detection of Fusarium head blight resistance QTL in a wheat population using bulked segregant analysis. *Theor Appl Genet* 106:1041-1047.