

**U.S. Wheat and Barley Scab Initiative  
 FY00 Final Performance Report (approx. May 00 – April 01)  
 July 30, 2001**

**Cover Page**

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<b>Year:</b>	<b>FY2000 (approx. May 00 – April 01)</b>
<b>Grant Number:</b>	<b>59-0790-9-073</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>2000 ARS Award Amount:</b>	<b>\$36,098</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Variety Development & Uniform Nurseries	Accelerating the development of FHB-resistant soft red winter wheat varieties.	\$35,000.00
	<b>Requested Total</b>	<b>\$35,000.00<sup>1</sup></b>

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Principal Investigator

Date

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<sup>1</sup> Note: The Requested Total and the Award Amount are not equal.

**Project 1: Accelerating the development of FHB-resistant soft red winter wheat varieties.**

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

The major problem that is being resolved is the lack of resistance to Fusarium head blight in soft red winter wheat. Most of the varieties available today are susceptible to FHB. Wheat farmers are therefore at risk for severe economic losses due to this disease. Our approach is to: identify diverse and distinct sources of resistance in adapted and exotic germplasm, and incorporate that resistance into adapted, elite genetic backgrounds. Identification of these sources of resistance occurs through extensive greenhouse and field screening. For the period covered by this grant we screened a total of 1559 lines in the greenhouse and field for Type I and Type II resistance to FHB. The field screen included 1420 exotic lines, primarily from central and eastern Europe. Although we are evaluating exotic germplasm, our objective is to rely as completely as possible on adapted material so that we can recover the adapted type much more readily.

## 2. What were the most significant accomplishments?

In terms of the objectives of the project, our most significant accomplishment was the identification of a number of lines, which show the potential for FHB resistance based on greenhouse and field screening. Beyond this, we had significant accomplishments related to the methodology and technology of screening for FHB resistance. Our irrigation system was completely revamped and increased in size. Misting nozzles and a programmable solenoid valve led to a more efficient, effective disease-screening environment. In the greenhouse, increasing the number of replications to 8 has reduced our error variance and increased our confidence in ratings. Our method of producing inoculum for the field was streamlined and spore development was verified. Our ability to read infected spikes consistently has improved.

One hundred forty four  $F_1$  progeny from two 9 x 9 diallel series of crosses were evaluated for Type II resistance (via injection of spores into single florets) in the greenhouse. Significant differences among parents and among  $F_1$ 's were observed for severity of infection. All of these crosses involved adapted parents, rather than Chinese spring wheats. The significance of this fact is that breeding FHB resistant wheats will be accomplished much more rapidly if we do not have to go outside the SRW market class. Promising crosses were identified which should have immediate application in our breeding program.

In another study, four populations of  $F_{2,3}$  lines were evaluated in the greenhouse for Type I resistance using a spraying procedure. In one population, significant genetic variation was observed and some lines with potential Type I resistance were identified for further testing.

In another greenhouse screen, approximately 3000 pots containing uniform scab nursery entries, breeding lines, state variety test entries, and exotic material were screened for Type II resistance via injection. A number of promising lines were identified.

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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.

Van Sanford, David , James Anderson, Kimberly Campbell, Josè Costa, Perry Cregan, Carl Griffey, Patrick Hayes, and Richard Ward. 2001. Discovery and Deployment of Molecular Markers Linked to Fusarium Head Blight Resistance: An Integrated System for Wheat and Barley. *Crop Sci* 41: 638-644.

D. A. Van Sanford, B. Kennedy, M. Hall, and C. Swanson. 2000. Fusarium head blight research at the University of Kentucky. Proceedings of the 2000 National Fusarium Head Blight Forum, December, 10-12, Cincinnati, OH.

Brenda Kennedy, Marla Hall, Hua Liu, Jason Agyris, Dennis TeKrony, and Dave Van Sanford. 2000. Fusarium Head Blight of Wheat: Breeding for Resistance and Assessing Seed Quality. Presentation at the 2000 All Commodities Field Day, July 18, Princeton, KY.

Marla Hall, Brenda Kennedy, and Dave Van Sanford. 2000. Identifying resistance and the relationship between spikelet symptoms and kernel infections in fusarium graminearum infected soft red winter wheat. Proceedings of the 2000 National Fusarium Head Blight Forum, December, 10-12, Cincinnati, OH.