

**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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<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>FY01 ARS Award Amount:</b>	<b>\$ 40,886</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Variety/Uniform	Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties	\$ 42,000
	<b>Total Amount Requested</b>	<b>\$ 42,000</b>

\_\_\_\_\_  
 Principal Investigator

\_\_\_\_\_  
 Date

## **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 issue being resolved is the lack of resistance to Fusarium head blight in soft red winter wheat. Most cultivars today are susceptible to FHB. Wheat growers are therefore at risk for severe economic losses due to this disease. Our approach is to characterize existing SRW germplasm and breeding lines as parents in terms of their ability to contribute FHB resistance genes to crosses. We are also evaluating populations that contain Chinese spring wheats at a low frequency so that resistance is maintained without adaptation being compromised. Evaluation of this material occurs through extensive greenhouse and field screening. For the period covered by this grant, in our SRW diallel study we made approximately 1600 injections in the greenhouse and 2400 injections in the field for Type II resistance to FHB. Although we continue to evaluate 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?

One hundred forty four F<sub>1</sub> 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 and in the field. Significant differences among parents and among F<sub>1</sub>'s were observed for severity of infection and for DON concentration. All of these crosses involved adapted parents, rather than Chinese spring wheats, although one parent, Pioneer Brand 25R18 is believed to contain the FHB resistance allele on chromosome 3B from Sumai 3. The rationale behind this study 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. These crosses have been targeted for recurrent selection. Although 25R18 had the best general combining ability for reduced severity of infection, other SRW wheats did not differ significantly from 25R18 in this regard.

We evaluated three populations in which Sumai 3 or one of its derivatives was a parent contributing no more than 25% of the gametes to the cross. S<sub>1</sub> lines from these populations were evaluated in the field near Lexington, KY. Narrow sense heritability of (Type I + Type II) resistance ranged from 0.39 to 0.69 on a family mean basis. Whether these estimates reflected only the Sumai 3 alleles or additional alleles from other non-Sumai parents is unclear. In any case, this demonstrates that one can make progress breeding for FHB resistance even when the Sumai 3 alleles are at a very low frequency.

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.

Brenda Kennedy and Dave Van Sanford. 2001. Fusarium Head Blight of Wheat: Breeding for Resistance. Presentation at the 2001 Wheat Science Field Day, May 14, Princeton, KY.

Brenda Kennedy, Marla Hall, Liu Hua, and Dave Van Sanford. 2001. Breeding for Resistance to Fusarium Head Blight in Soft Red Winter Wheat. Proceedings of the 2001 National Fusarium Head Blight Forum, December, 8-10, Cincinnati, OH.

Marla Hall, Brenda Kennedy, David Van Sanford. 2001. Diallel Analysis of Resistance to Fusarium Head Blight in Soft Red Winter Wheat. Proceedings of the 2001 National Fusarium Head Blight Forum, December, 8-10, Cincinnati, OH.

M.D. Hall, B.S. Kennedy, H. Liu, and D.A. Van Sanford. 2001. Diallel Analysis of Resistance to Fusarium Head Blight in Soft Red Winter Wheat. 2001 Agronomy Abstracts.