

**U.S. Wheat and Barley Scab Initiative  
Annual Progress Report  
September 15, 1999**

**Cover Page**

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<b>Year:</b>	<b>FY1999</b>
<b>Grant Number:</b>	<b>59-0790-9-038</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>Amount Granted:</b>	<b>\$34,146.00</b>

**Project**

<b>Program Area</b>	<b>Objective</b>	<b>Requested Amount</b>
Variety Development	Accelerate development of resistant varieties.	\$35,000
	<b>Requested Total</b>	<b>\$35,000<sup>1</sup></b>

\_\_\_\_\_  
Principle Investigator

\_\_\_\_\_  
Date

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

**Project 1: Accelerate development of resistant varieties.**

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

Among commercially available soft red winter wheat (SRW) cultivars, little is known in regards to the level of resistance or degree of susceptibility to Fusarium Head Scab. In 1998, scab epidemics were widespread in Virginia, state-wide wheat production was 3.4 million bushels less than the six-year average, and accounted for a fiscal loss of at least 8.5 million dollars. Production of wheat in a rotation following corn is beneficial both economically and environmentally; however, until effective and stable resistance to scab is incorporated into commercial wheat cultivars, the crop and world food supply are at grave risk. As a short-term solution to these problems, we have identified or confirmed the presence of moderate levels of scab resistance in SRW wheat cultivars and elite lines that are or soon will be available to producers. In an effort to improve the level of scab resistance in SRW wheat, new and diverse types of resistance, such as type II (invasion) resistance, have been identified and are being incorporated into SRW wheat. The ultimate goal is to pyramid different types of resistance into superior SRW wheat backgrounds.

2. Please provide a comparison of the actual accomplishments with the objectives established.

Among over 200 wheat lines tested in both greenhouse and field tests, we have identified or confirmed the presence of type IV (kernel infection) and type V (yield loss) resistance in SRW wheat cultivars such as Roane (Virginia), Freedom (Ohio), Ernie (Missouri), INW9824 (Indiana). Yield losses due to scab among 20 SRW wheat lines tested varied from 4 to 48% and percentage scabby seeds varied from 14 to 47%. Additional SRW wheat lines with these types of resistance have been identified in a multi-state, cooperative, winter wheat screening-nursery. Another objective is to identify and incorporate type II (invasion) resistance into SRW wheat. We have identified and confirmed high levels of type II resistance in 7 wheat lines from China, 5 from Canada and 2 from France. Resistance from these sources is being incorporated into SRW wheat via traditional breeding methods and also is being back-crossed into several diverse SRW wheat cultivars. To date, more than 350 crosses involving scab resistant parents have been produced and 2500 advanced lines are being evaluated for resistance and agronomic performance.

3. What were the reasons established objectives were not met? If applicable.

As far as expected progress on a temporal basis, all objectives were fully met. New research projects included: development of a 10 parent diallel population for studying the inheritance of scab resistance and use of a wheat by maize hybridization system to produce doubled-haploid, homozygous wheat lines to facilitate genetics studies and accelerate cultivar development.

4. What were the most significant accomplishments this past year?

Identifying SRW wheat genotypes with moderate resistance to scab will provide producers with an immediate source of cultivars, which will allow them to reduce losses due to scab. Good sources of type II resistance have been identified, confirmed and incorporated into the breeding program, and are being pyramided with other types of resistance already present in SRW wheat. Preliminary genetics

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studies indicate that type II resistance is governed by as few as two genes and, therefore, should be feasible to transfer. Efficient development of doubled-haploids was demonstrated and should greatly facilitate genetic studies and accelerate breeding efforts.

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.

Chen, J., C.A. Griffey, M. Chappell, J. Shaw, and T. Pridgen. 1999. Haploid production in twelve wheat F<sub>1</sub> populations via the wheat x maize hybridization method. In: Proceedings 1999 Joint Research Conference of the Eastern Wheat and Southern Small Grain Workers. Williamsburg, Virginia. 2-4 May 1999. (In press).

Griffey, C.A., J. Chen, T. Pridgen, M. Chappell, and E.L. Stromberg. 1999. Research on Fusarium head blight in the Virginia Tech small grains program. In: Proceedings 1999 Joint Research Conference of the Eastern Wheat and Southern Small Grain Workers. Williamsburg, Virginia. 2-4 May 1999. (In press).