

**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>59-0790-9-061</b>
<b>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>2000 ARS Award Amount:</b>	<b>\$73,171</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Variety Development & Uniform Nurseries	Accelerate development of Fusarium resistant barley varieties.	\$69,463.00
	<b>Requested Total</b>	<b>\$69,463.00<sup>1</sup></b>

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

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 Date

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

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

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

The major problem is developing genetic resistance to FHB in barley varieties adapted to the Midwest that are acceptable in agronomics and malting quality. We are approaching this problem by enhancing our understanding of disease resistance to FHB, developing technologies for screening and selecting FHB resistant lines and breeding FHB resistant varieties.

## 2. What were the most significant accomplishments?

Three "Expected Results" were outlined in the proposal.

**i. clarify the relationship between "type I" and "type III" resistance in barley and characterize a diverse set of "type I" resistant germplasm for "type III" resistance;**

We have evaluated a mapping population derived from a cross between an unadapted two-rowed variety with partial resistance to FHB (Frederickson) and a Midwest variety (Stander) in a greenhouse assay to quantify the accumulation of deoxynivalenol (DON) in kernels which have been injected with *Fusarium graminearum*. We observed segregation for this trait in the population and a preliminary analysis has identified a single QTL that explains a major portion of the variation for this trait. We repeated the experiment and recovered only very low or non-detectable levels of DON in our samples and therefore the data were not useful. We are investigating whether the strain of *F. graminearum* used has become attenuated and will repeat the experiment with a new tested strain during the 2001/2001 funding period. We also screened a set of eight parental sources of FHB resistance along with some lines derived from each source for FHB severity and accumulation of DON in the greenhouse. Several of the parents that are sources of FHB resistance accumulate high levels of DON when single kernels are injected. However, several other resistant sources had lower levels of DON accumulation. This experiment will be repeated in the 2001/2002 funding period.

**ii. test the utility of early generation selection for FHB resistance;**

In the summer of 2000, we selected F<sub>2</sub> plants from two crosses developed from resistant lines derived from Chevron and the variety Lacey. We selected 25 resistant and 25 random plants at each of two locations in FHB screening nurseries. This summer (2001), we evaluated F<sub>4:5</sub> lines derived from those F<sub>2</sub> plants for resistance to FHB. Preliminary analysis indicates that little or no gain from selection was made from early generation selection in these crosses.

**iii. identify resistant barley lines that can be used as parents in second or third cycle crosses and identify resistant barley lines with good agronomic and malting quality characteristics that can be more rigorously evaluated as variety candidates**

We identified 60 new lines that demonstrated resistance to FHB in our summer 2000 screening nurseries some of which were used as new parents for crossing last fall. These lines have been planted in preliminary yield trials for the summer of 2001. These lines trace back to 8 different parental sources of resistance other than Chevron.

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.

**Smith, K. P. Breeding FHB Resistant Malting Barley in Minnesota. 2001 Barley Improvement Conference. San Antonio, TX.**

**Smith, K., Schwarz, P., and Barr, J. 2001. Impact of Fusarium Head Blight disease management on malting barley. *Brewers Digest* 76(3):41.**