

**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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Year:	FY2000 (approx. May 00 – April 01)
Grant Number:	
Grant Title:	Fusarium Head Blight Research
2000 ARS Award Amount:	\$43,707

Project

Program Area	Project Title	Requested Amount
Epidemiology & Disease Management	Invasion pathways and pathogenesis in FHB.	\$44,800.00
	Requested Total	\$44,800.00¹

Principal Investigator

Date

¹ Note: The Requested Total and the Award Amount are not equal.

Project 1: Invasion pathways and pathogenesis in FHB.

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

Fusarium head blight emerged in the 1990s in the U.S. as an extremely destructive disease of wheat and barley. Efforts to develop resistant varieties have been only partially successful. Furthermore, the initial stages of infection in heads of wheat and barley are poorly understood. Accordingly, we are using microscope techniques to investigate how the head blight fungus initiates infection in the florets of developing wheat and barley heads. Understanding infection pathways will favorably impact virtually all aspects of Fusarium head blight research, including screening of breeding lines for resistance, disease management in farmers' fields, and use of genetic transformation (biotechnology) to develop disease resistance.

2. What were the most significant accomplishments?

Development of the head blight fungus (*Fusarium graminearum*) was observed on surfaces of inoculated barley heads, showing that the fungus did not usually enter or penetrate directly into the floret surfaces (into the epidermis of the lemma or palea), but instead, grew laterally over the floret surface into the crevice between the palea and lemma, thereby gaining entry in to the interior of individual florets. This result serves to direct future research to infection processes within florets, i.e, how does the fungus penetrate and colonize interior tissues? Results with a detached leaf model system confirmed that the head blight fungus initially grows between living leaf cells for 1-2 days before the cells begin to lose chlorophyll and before the fungus enters and kills cells. This opens the possibility of developing resistant plants by introducing genetic, physiological, or chemical factors that interfere with the initial "biotrophic" relationship between the fungus and the living plant cells.

PI: Bill Bushnell

Grant:

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

Bushnell, W.R. 2000. The need for uniformity in designating types of scab resistance. Proc. National Head Blight Forum. Erlanger KY, Dec 10-12, 2000. p. 245

Bushnell, W.R., R.W. Skadsen, S. Lewandowski, T. Seeland and D.E. Krueger. 2000. Development of *Fusarium graminearum* in detached segments of barley leaves. Proceedings 2000 National Fusarium Head Blight Forum. Erlanger KY, Dec. 10-12, 2000. p.129

Hilburn, K.L.B, G.D. Baldrige, W.R. Bushnell and R.J. Zegen. 2001. A visible fungal growth approach to rapid antifungal protein gene pretesting . Proceedings 2000 National Fusarium Head Blight Forum. Erlanger KY Dec 10-12, 2000. p. 33-36.

C. Pritsch,, C.P. Vance, W.R. Bushnell, D.A. Somers, T.M. Hohn and G.J. Muehlbauer. Systemic expression of defense response genes in wheat spikes as a response to *Fusarium graminearum* infection. *Physiol. and Mol. Plant Pathol.* 58:1-12.

R.J. Zeyen, G.D. Baldrige, W.R. Bushnell, K.L. B. Hilburn. 2000. A Microassay approach to rapid antifungal protein gene pretesting. Proc. National Fusarium Head Blight Forum. Erlanger, KY, Dec. 10-12. p.64-67

W.R. Bushnell. 2000. Presentation to Midwest Barley Scab Workshop on "Histology of Scab Infection." Sept. 21, University of Minnesota, St. Paul.