

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

Cover Page

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Year:	FY1999

Project

Program Area	Objective	Requested Amount
Epidemiology	To investigate pathways of head invasion by <i>Fusarium graminearum</i> .	\$30,000
	Requested Total	\$30,000 ¹

Principal Investigator

Date

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

Project 1: To investigate pathways of head invasion by *Fusarium graminearum*.

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

Fusarium head blight emerged in the 1990's 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 the 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. Please provide a comparison of the actual accomplishments with the objectives established.

Toward the broad objective of determining what tissues and cells in barley and wheat heads serve as invasion pathways for the head blight fungus, we have taken the following initial steps: A) Anatomy of head spikelets was investigated to locate thin-walled cells suspected to be susceptible to initial fungus invasion; B) A mutant strain of the fungus which carries a gene for green fluorescent protein (GFP) was evaluated for viewing the fungus in head tissues; and C) Methods were developed for microscopic examination of fungal invasion in living leaf tissues.

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

Progress was excellent in relation to the time available (about six months).

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

A GFP labeled fungus strain (a fluorescent strain) was shown to be useful for microscope investigation of infection pathways in *Fusarium* head blight. The fungus was shown to establish itself initially by developing within living plant tissues (growing "biotrophically") for about two days before becoming destructive to plant cells.

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Progress Report

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., R.W. Skadsen, T.N. Goff, and T.M. Hohn. 1999. Use of a GFP strain of *Fusarium graminearum* for histological investigation of infected barley. Poster presentation at 16th American Barley Researchers' Workshop, Idaho Falls, ID. July 11-15.

Wood, M., D. Comis, B. Hardin, L. McGraw and K.B. Stelljes. 1999. Fighting fusarium. *Agricultural Research*, pp. 19-21.