U.S. Wheat and Barley Scab Initiative
FY02 Preliminary Final Performance Report (approx. May 02 – April 03)
July 15, 2003

Cover Page

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Year:	**FY2002 (approx. May 02 – April 03)**
Grant Number:	**59-0790-9-035**
Grant Title:	**Fusarium Head Blight Research**
FY02 ARS Award Amount:	**$ 88,780**

Project

Program Area	Project Title	USWBSI Recommended Amount
EDM	Pathogen Population Dynamics, Inoculation, and Temporal Progress of FHB.	$91,000
	Total Amount Recommended	**$91,000**

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Principal Investigator Date

Project 1: Pathogen Population Dynamics, Inoculation, and Temporal Progress of FHB.

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

Research on the epidemiology of FHB is crucial because it creates a foundation for scientific disease management strategies. Understanding all facets of the epidemiology of this disease will assist in developing accurate disease forecasting models so that preventative measures can be taken in a timely fashion, and also provide information on the impacts of cultural practices on disease management. Understanding inoculum sources will assist in disease forecasting and crop sequencing and spacing decisions. Questions that need to be resolved for developing an accurate forecasting and cultural management system include: quantification of the relationship between weather factors and FHB development; determination of kinds and importance of inoculum sources; determination of predominate inoculum type; and determination of effects of microbial co-occupants in the infection court on disease development. Answers to these questions were sought through collaborative work on: 1) development of an FHB forecasting system for wheat, durum, and barley by participation in a uniform experiment; 2) *G. zeae* population dynamics; and 3) interaction of *G. zeae* with other *Fusarium* species commonly found on wheat spikes.

2. What were the most significant accomplishments?

Meteorological data from multiple ND locations, monitoring of inoculum with a Burkard spore sampler at multiple ND locations, and bioassays of inoculum at Fargo, all provided information on the risk of FHB and an assessment of inoculum potential and disease development. This information helped validate the empirical models developed at Ohio State Univ. The empirical models were made available to ND producers in 2002 via a NDSU web site. Data from approximately 50 ND weather stations were used to drive the models; FHB incidence and field severity corresponded well with the model predictions in 2002. Similar weather data and disease occurrence data were collected in Manitoba, Canada, by sub-contractor, Dr. Jeanie Gilbert.

Wheat leaf tissue was evaluated as a potential inoculum source. In 2002, the experiment on the *F. graminearum* population dynamics in ND had sixteen treatments. Treatments that had no foliar fungicide sprays and which had the presence of fungal leaf spot pathogens also had more *Fusarium graminearum* on the leaves. Preliminary results indicated that managing foliar diseases may help in decreasing FHB severity.

The relative importance of *Fusarium graminearum* ascospores and conidia as inoculum sources for FHB was examined in field and greenhouse experiments in 2002. Preliminary results indicated that ascospores were dominant in early stages of spore trapping, but conidia dominated 9 days after commencement of trapping. Conidia caused a higher mean FHB severity than ascospore inoculum. These preliminary results were at variance with earlier published reports (Stack, 1989; Markell and Francl, 2003) and thus deserve greater attention in the future. *Fusarium graminearum* was inoculated separately with *Stagonospora nodorum*, *F. poae, and F. sporotrichoioides* on susceptible, moderately susceptible, and resistant spring wheat cultivars grown in a growth chamber environment. Pre-,co-, and post-inoculations failed to alter significantly head blight severity or incidence.

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.

Publications

Ali, S. and Francl, L. 2001. Progression of Fusarium species on wheat leaves from seedling to adult stages in North Dakota. 2001. Page 99 in: Proceedings of the 2001 National Fusarium Head Blight Forum, Dec. 8-10, Erlanger, KY. U.S. Wheat and Barley Scab Initiative, Michigan State Univ., East Lansing, MI.

Francl, L. 2001. Past, present, and future of forecasting small grain diseases. Pages 123-125 in: Proceedings of the 2001 National Fusarium Head Blight Forum, Dec. 8-10, Erlanger, KY. U.S. Wheat and Barley Scab Initiative, Michigan State Univ., East Lansing, MI.

Lipps, P., DeWolf, E., Mills, D., and Madden, L. 2002. Practical application of Fusarium head blight risk predictions. Pages 167-170 in: Proceedings of the 2002 National Fusarium Head Blight Forum, Dec. 7-9, Erlanger, KY. U.S. Wheat and Barley Scab Initiative, Michigan State Univ., East Lansing, MI.

Mitter, V., Francl, L., Chakraborty, S., and Ali, S. 2003 (*In review*). Relative importance of *Fusarium graminearum* ascospores and conidia as inoculum sources for Fusarium head blight and crown rot of wheat.

NDSU Web site on disease forecasting: http://www.ag.ndsu.nodak.edu/cropdisease/