U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

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Year:	**FY2001 (approx. May 01 – April 02)**
Grant Number:	**59-0790-9-035**
Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 94,206**

Project

Program Area	Project Title	Requested Amount
Epid/Dis. Mgt.	Forecasting Fusarium Head Blight Based on Weather and Pathogen and Population Dynamics	$ 96,774
	Total Amount Requested	**$ 96,774**

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Principal Investigator Date

Project 1: Forecasting Fusarium Head Blight Based on Weather and Pathogen and Population Dynamics

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

Management of Fusarium head blight (FHB) requires multiple approaches to cover production options thoroughly. Farmers in the northern Midwest have opted increasingly to apply fungicides to their small grains crops. Although fungicides are available for scab suppression, maximum economic return depends on making the right decision of if and when to spray. Chemical management effectiveness would be enhanced if a reliable FHB forecasting system were available. A risk assessment model from Ohio State University (the first-generation model) currently is undergoing comprehensive field tests.

The present research addresses data collection for a second-generation forecasting system. The first-generation forecasting system relies on prediction of FHB severity and is based on pre-anthesis environmental conditions. In addition, the second-generation system will overlay an infection period model developed from a daily bioassay data set from multiple locations.

This grant also seeks to fill important information gaps that may impact the reliability of a forecaster. Epidemiological issues needing clarification include inoculum spore type, timing and mode of spore dispersal, pathogen population dynamics, and interaction of *G. zeae* with other pathogenic fungal species on spikes.

2. What were the most significant accomplishments?

Experimental data collection for the second-generation model was completed insofar as the daily bioassay of infection is concerned. System development is poised to enter the analytical phase. Preliminary analysis of North Dakota data was completed and a collaborator compiled data from other states.

The relative contribution of conidia and ascospores was estimated under northern Midwest conditions. We found a ratio of about 2 ascospores:1 conidium on average during two seasons.

The timing of airborne dispersal was estimated relative to environmental variables under our field conditions. We found peaks in ascospore concentration most often approximately 12 hours after a rain.

The NDSU Small Grains Disease Forecasting System, which previously used spore counts exclusively for scab risk assessment, now includes prediction models from Ohio State University. The efficiency of the machine used for assaying spores was increased markedly by development of a collection protocol.

Stagonospora nodorum was found not to interact with *Gibberella zeae* to increase scab severity under an experimental protocol conducive to FHB development. This suggests that we need not take into account other pathogens that may be present on the spike when forecasting scab.

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.

Ali, S., and Francl, L.J. 2001. Progression of Fusarium species on wheat leaves from seedling to adult stages in North Dakota. Proceedings of the 2001 National Fusarium Head Blight Forum. December, 2001, Erlanger, KY.

Anon. 2001. Saving crops and money. 2001 Annual Highlights, ND Extension Service and NDAES, NDSU.

De Wolf, E.D., El-Allaf, S., Lipps, P., Francl, L. and Madden, L. 2001. Influence of environment on inoculum level and Fusarium head blight severity. Proceedings of the 2001 National Fusarium Head Blight Forum. December, 2001, Erlanger, KY.

Larson, C., Francl, L., and Friesen, T. 2001. Evaluation of the Burkard cyclone sampler for ascospore collection efficiency. Plant Disease 85:1249-1252.

Markell, S.G. and Francl, L.J. 2001. Dynamics of *Gibberella zeae* ascospore dispersal. Phytopathology 91:S58.

Markell, S.G. and Francl, L.J. 2001. Inoculum dynamics of Fusarium species and levels of *Gibberella zeae* spore-type recovered from wheat spike bioassays. Proceedings of the 2001 National Fusarium Head Blight Forum. December, 2001, Erlanger, KY.

Nickel, R.F. 2001. Wheat and the web. REC/RTC North Dakota Magazine (supplement), page 14.