U.S. Wheat and Barley Scab Initiative
FY02 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:	**59-0790-1-068**
Grant Title:	**Fusarium Head Blight Research**
FY02 ARS Award Amount:	**$ 50,801**

Project

Program Area	Project Title	USWBSI Recommended Amount
EDM	Fusarium head blight prediction models and Gibberella zeae perithecia development.	$52,071
	Total Amount Recommended	**$52,071**

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Principal Investigator Date

Project 1: Fusarium head blight prediction models and Gibberella zeae perithecia development.

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

This project is designed to gather information about the epidemiology of Fusarium head blight, to evaluate the role of environment in the development of perithecial production, to develop disease prediction models and a user interface that can deliver these models. During the 2002 and 2003 term we have conducted a series of experiments in cooperation with researchers in Ohio, Indiana, North Dakota and South Dakota that will help to clarify the role of environment in the development of pathogen inoculum, dispersal and the development of disease. More specifically, we have been using volumetric spore traps and a bioassay to quantify the airborne inoculum of Gibberella zeae within replicated field plots located near State College, PA. The environment in this small wheat field environment is monitored by an automated weather station. We have also been monitoring perithecia development on corn residues placed within the wheat field environment, and have expanded our efforts to evaluate perithecia development under controlled environmental conditions. During the term of this grant we began working with the PA State Climatologist, Dr. Paul Knight, and the staff of the state climate office located here at Penn State. Dr. Knight has been instrumental in helping us to develop a user interface to deliver the disease forecasts for scab in PA, OH and NY. This forecasting system uses more than 100 weather stations from the tri-state area to provide small grain producers with timely and reliable disease forecasts.

2. What were the most significant accomplishments?

The project has made important steps toward obtaining our objectives during the '02 –03 grant term. Among our most significant accomplishments was the development of new generation of prediction models for scab. The new models, which are currently in the finial stages of development, make several important advances in the prediction of scab epidemics. These models have increased the prediction accuracy of scab forecasts based on pre-flowering weather variables from 70% to 80%. This modification and improvement in accuracy is important because growers must make disease management decisions prior-to, or during the flowering of the wheat crop. This generation of models also includes adjustments to the temperatures that are considered favorable for the development of perithecia and inoculum production. These adjustments were possible because of our research on perithecia development where results have indicated that 15EC is not the lower limit for perithecial development of *Gibberella zeae* as had been previously reported. Our results indicate that perithecia development at 15EC was not significantly different from 25EC, and that perithecia development is limited by temperatures of 30EC or higher. Results of our current research indicate that the lower limit for perithecial development may be 8EC. Another significant accomplishment during the term of this grant was the testing of a user interface development in cooperation with the PA State Climate Office. This interface allows the delivery of scab risk assessment models via the internet and provided the first multi-state forecasts for scab. The interface can be viewed at the URL: http://wcg08.met.psu.edu/wheat/wheathome/ (note this URL is subject to change). In the future we hope to expand the domain of these predictions to include additional wheat production areas.

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.

De Wolf, E. D., Madden, L.V. and Lipps, P. E. 2003. Risk assessment models for wheat Fusarium head blight epidemics based on within-season weather data. Phytopathology 93:428-435.

De Wolf, E., Lipps, P., Madden, L. and Francl, L. 2002. Influence of corn residue and cultivar susceptibility on the accuracy of Fusarium head blight risk assessment models. Pages 137-139 in: 2002 National Fusarium Head Blight Proceedings. Erlanger, KY. Dec. 7-9.

Dufault, N., De Wolf, E., Lipps, P. and Madden, L. 2002. Identification of environmental variables that affect perithecial development of *Gibberella zeae*. Page 141 in: 2002 National Fusarium Head Blight Proceedings. Erlanger, KY. Dec. 7-9.

Dufault, N. S., De Wolf, E. D. Lipps, P. E. and Madden, L.V. 2002. Influence of temperature and moisture on *Gibberella zeae* perithecial development on corn residue. in : 2002 NE-APS Meeting Proceedings. Bromont, Quabec Oct. 2-4.

Dufault, N, De Wolf, E., Lipps, P. and Madden, L. 2002. Relationship of temperature and miosture to *Gibberella zeae* perithecial development in a controlled environment. Pages 142-144. in: 2002 National Fusarium Head Blight Proceedings. Erlanger, KY. Dec. 7-9.

Dufault, N. S., De Wolf, E. D., Lipps, P. E. and Madden, L. V. 2002. Weather variables related to *Gibberella zeae* perithecia development. Phytopathology 92:S21.

Lipps, P., De Wolf, E., Mills, D. and Madden, L. Practical application of Fusarium head blight risk predictions. Pages 167-170 in: 2002 National Fusarium Head Blight Proceedings. Erlanger, KY. Dec. 7-9.

Lipps, P., Mills, D., De Wolf, E. and Madden, L. 2002. Fusarium head scab risk forecasting for Ohio, 2002. Page 166 in: 2002 National Fusarium Head Blight Proceedings. Erlanger, KY. Dec. 7-9.