

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY06 Preliminary Final Performance Report (April 06 – April 07)
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Cover Page

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Fiscal Year:	2006
USDA-ARS Agreement ID:	59-0790-6-074
USDA-ARS Agreement Title:	Improved and Continued Deployment of Prediction Models for FHB and Integration of Inoculum and Host Resistance into Prediction Models.
FY06 ARS Award Amount:	\$ 76,974

USWBSI Individual Project(s)

USWBSI Research Area *	Project Title	ARS Award Amount
EEDF	Improved and Continued Deployment of Prediction Models for Fusarium Head Blight.	\$ 38,248
EEDF	Integrating Inoculum and Host Resistance into Prediction Models for Head Scab.	\$ 38,726
	Total Award Amount	\$ 76,974

Principal Investigator

Date

* CBCC – Chemical, Biological & Cultural Control
EEDF – Etiology, Epidemiology & Disease Forecasting
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GET – Genetic Engineering & Transformation
HGR – Host Genetics Resources
HGG – Host Genetics & Genomics
PGG – Pathogen Genetics & Genomics
VDUN – Variety Development & Uniform Nurseries

(Form – PFPR06)

Project 1: *Improved and Continued Deployment of Prediction Models for Fusarium Head Blight.*

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

The current management for Fusarium head blight requires an integrated approach that includes growing varieties with the best available disease resistance, rotation with non-host crops and timely fungicide applications when weather is favorable for disease development. The funding provided by the USWBSI has enabled the development of disease prediction models that helps growers evaluate the need for a fungicide application. The goal of this project is to deliver the disease prediction models for growers in 24 states that experience scab epidemics.

**2. List the most important accomplishment and its impact (how is it being used?).
Complete all three sections (repeat sections for each major accomplishment):**

Accomplishment: Disease prediction models were delivered to growers in 24 states that have been devastated by Fusarium head blight during recent epidemics. The daily predictions of disease risk are available via an Internet website (www.wheatscab.psu.edu). Specific accomplishments in this tool during this grant cycle include: transition from 20km to 5 km resolution in disease predictions, incorporation of tools that enable 24 and 48 hour forecasts of disease risk, and the addition of supplemental weather station observations from North Dakota, and Michigan. We also added a special feature in 2007 that allows growers to view state commentary provided by the state extension specialists for their area. This advancement provides growers with a local interpretation of the model results and advice on how to use the information.

Impact: Growers in 24 states have access to daily model predictions of disease risk in their area. In most areas these model predictions were accompanied by interpretations of model results, and recommendations regarding the need for timely fungicide applications that can suppress disease development, yield losses and mycotoxin contamination.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

Wheat and barley growers have access to information and advice that helps them evaluate the need for a fungicide application as part of the integrated management for Fusarium head blight.

Project 2: *Integrating Inoculum and Host Resistance into Prediction Models for Head Scab.*

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

Prediction models for Fusarium head blight are able to correctly identify approximately 75% to 80% of the major disease epidemics. This level of accuracy allows the models to function as a useful management tool, but additional accuracy is highly desirable. We are working to incorporate additional variables into the model that will help improve the accuracy of the models. We are focusing on the major sources of variation within the system including the disease reaction of the cultivar and information regarding local sources of inoculum.

**2. List the most important accomplishment and its impact (how is it being used?).
Complete all three sections (repeat sections for each major accomplishment):**

Accomplishment: We have developed new models for spring wheat that considers cultivar resistance as a factor in the model. The accuracy of this model is stable at ~78%. These models are also more consistent with the current understanding of disease biology than previous models. Winter wheat models that consider local inoculum sources and cultivar resistance are currently being evaluated.

Impact: The next generation of prediction models for Fusarium head blight have been developed and are now deployed for spring wheat.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

The public now has access to a new disease prediction model for spring wheat. This model allows growers to customize their predictions of disease risk for the cultivars grown on their farm.

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.

1. Dufault, N.S., De Wolf, E.D., Lipps, P.E., Madden, L.V. 2006. Role of temperature and moisture in the production and maturation of *Gibberella zae* peritheica. Plant Disease 90:637-644.
2. De Wolf, E. D. 2006. Effects of Wet Weather on the Wheat Crop. Field Crop News 06:10. URL: fcn.agronomy.psu.edu
3. De Wolf, E. D. 2006. Monitoring Wheat for Symptoms of Head Scab. Field Crop News 06:07. URL: fcn.agronomy.psu.edu
4. De Wolf, E. D. 2006. Impact of Wet Weather on Wheat Head Scab. Field Crop News 06:04. URL: fcn.agronomy.psu.edu
5. De Wolf, E. D. 2006. Evaluating the Risk of Wheat Head Scab. Field Crop News 06:03. URL: fcn.agronomy.psu.edu