

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY07 Final Performance Report (approx. May 07 – April 08)  
July 15, 2008**

**Cover Page**

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<b>Fiscal Year:</b>	2007
<b>USDA-ARS Agreement ID:</b>	59-0790-7-072
<b>USDA-ARS Agreement Title:</b>	Prediction Models and Improved Pre-Harvest Estimates of Deoxynivalenol.
<b>FY07 ARS Award Amount:</b>	\$ 34,695

**USWBSI Individual Project(s)**

<b>USWBSI Research Area*</b>	<b>Project Title</b>	<b>ARS Adjusted Award Amount</b>
EEDF	Prediction Models and Improved Pre-Harvest Estimates of Deoxynivalenol.	\$34,695
	<b>Total Award Amount</b>	<b>\$ 34,695</b>

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Principal Investigator

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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  
 IIR – Integrated/Interdisciplinary Research  
 PGG – Pathogen Genetics & Genomics  
 VDUN – Variety Development & Uniform Nurseries

**Project 1:** *Prediction Models and Improved Pre-Harvest Estimates of Deoxynivalenol.*

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

Wheat producers need a reliable disease prediction system to help evaluate the risk of disease and potential need for fungicide applications. Fungicides are an important part of the integrated management for head scab, but are not needed when the disease risk is low. Making the correct decision to apply or not apply improve the potential profit for growers, and helps ensure the grain has lowest possible levels of DON.

**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 deployed in 24 states where head scab epidemics have occurred.

Accuracy of the prediction models has been stable at approximately 75 to 80% depending on the type of wheat and production region. We are now testing the first generation of a new type model that should allow us to address parts of the pathogen biology that are not currently part of the prediction system. These new models incorporate a module to predict DON for the first time.

**Impact:**

Wheat growers in 24 states have access to prediction models for head scab. Growers use these models to assess the risk of disease and respond with fungicides if needed or avoid pesticide use when the risk of disease is low.

The new modeling approach should be able to improve the accuracy of disease predictions. The new models will also incorporate DON into the predictions. These enhancements will increase the value of the prediction models as decision tools used by growers.

**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 growers in 24 states have access to prediction models the help them make disease management decisions based on real-time weather information.

**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. Paul, P.A., Lipps, P.E., De Wolf, E.D., Shaner, G., Buechley, G., Adhikari, T., Ali, S., Stein, J., Osborne, L. and Madden, L.V. 2007. A distributed lag analysis of the relationship between *Gibberella zeae* inoculum density on wheat spikes and weather variables. *Phytopathology* 97:1608-1624.
2. De Wolf, E.D. and Isard, S.A. 2007. Disease cycle approach to plant disease prediction. *Annual Review of Phytopathology* 45:9.1-9.18.