USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY08 Final Performance Report (May 09 - May 10) - NCE
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Cover Page

PI:	Gretchen Kuldau
Institution:	Pennsylvania State University
Address:	Dept. of Plant Pathology 321 Buckhout Laboratory University Park, PA 16802
E-mail:	kuldau@psu.edu
Phone:	814-863-7232
Fax:	814-863-7217
Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-5-079
USDA-ARS Agreement Title:	Factors and Mechanisms Favoring Deoxynivalenol Presence in Asymptomatic Wheat.
FY08 ARS Award Amount:	$ 9,688

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
FY08-KU-031	Deoxynivalenol Accumulation and Loss in Wheat with Fusarium Head Blight.	$ 9,688
	Total Award Amount	**$ 9,688**

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

Project 1: *Deoxynivalenol Accumulation and Loss in Wheat with Fusarium Head Blight.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

Our work aims to understand the host, pathogen and environmental factors that lead to unacceptably high levels of deoxynivalenol (DON) in wheat grain. This year we investigated the role of temperature and cultivar on development of DON in wheat grain and floral tissues. Two spring wheat varieties, Alsen, which is moderately resistant, and Wheaton, which is susceptible, were inoculated at a central spikelet during mid-anthesis with a mixture of conidia from three isolates of *F. graminearum* and in placed in a growth chamber at either 15 C or 22 C. Wheat heads were harvested at various times after inoculation and the individual spikelets were collected. One floret from each spikelet was extracted and analyzed by gas chromatography for the fungal biomarker ergosterol, and DON.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete all three sections (repeat sections for each major accomplishment):

Accomplishment:

Our results indicate that during early stages of infection under cold conditions (15 C) *F. graminearum* produced higher levels of DON than at 22 C. However fungal growth at 15 C was more limited than at 22 C as measured by ergosterol, indicating a lack of correlation between fungal growth and DON at the cooler temperature.

Impact:

This knowledge will impact development of models to predict DON levels that use weather variables as inputs. It is possible that when flowering occurs during cool wet conditions that DON levels will be higher than current models would predict. These results may help to explain the situation when disease levels are low but DON levels exceed those that are acceptable to industry since we observed stimulated levels of DON but less growth of the fungus.

These results also impact breeders. Standard field screening of new lines is necessary but may not be sufficient. Since temperature appears to have a significant impact on DON levels promising lines should also be screened under temperature controlled conditions to evaluate the range under which resistance and DON production occurs.

Accomplishment:

We observed that while DON occurred more frequently in Wheaton florets, the Alsen florets contained higher concentrations of DON.

Impact:

These results suggest that DON production is cultivar specific. While this is not a new finding the result that the resistant variety can contain higher levels than the susceptible at early times after infection warrants further investigation to determine if the high levels persist until harvest.

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.

Willyerd, K. T. and **Kuldau, G. A.** 2009. Trichothecene dynamics and *Fusarium graminearum* infection patterns in wheat heads. *Phytopathology* 99: S199.