

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY08 Final Performance Report (approx. May 08 – April 09)  
July 15, 2009**

**Cover Page**

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<b>Fiscal Year:</b>	2008
<b>USDA-ARS Agreement ID:</b>	NA
<b>USDA-ARS Agreement Title:</b>	Factors Influencing the Accumulation of DON in Fusarium-Infected Wheat.
<b>FY08 USDA-ARS Award Amount:</b>	\$ 41,494

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Adjusted Award Amount</b>
MGMT	Factors Influencing the Accumulation of DON in Fusarium-Infected Wheat.	\$41,494
	<b>Total Award Amount</b>	<b>\$ 41,494</b>

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Principal Investigator

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Date

\* MGMT – FHB Management  
 FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain  
 GDER – Gene Discovery & Engineering Resistance  
 PBG – Pathogen Biology & Genetics  
 BAR-CP – Barley Coordinated Project  
 HWW-CP – Hard Winter Wheat Coordinated Project  
 VDHR – Variety Development & Uniform Nurseries – Sub categories are below:  
     SPR – Spring Wheat Region  
     NWW – Northern Winter Wheat Region  
     SWW – Southern Sinter Wheat Region

**Project 1:** *Factors Influencing the Accumulation of DON in Fusarium-Infected Wheat.*

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

Our work is clarifying the environmental factors that determine levels of DON in wheat grain. In particular, we are identifying the factors that give rise to healthy-looking grain with over-threshold DON concentrations. We are quantifying the changes in measurable DON content throughout the period of grain-fill, harvest, and post-harvest. Our findings will offer growers an additional tool for managing high-DON situations by allowing them to adjust harvest timing in order to minimize 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 both sections (repeat sections for each major accomplishment):**

**Accomplishment:**

Our work is leading to a better understanding of the epidemiology of FHB that will allow us to more accurately forecast DON risk, and give growers another tool (adjustment of harvest timing) in managing high-DON situations. We have shown that post-flowering moisture increases both scab and DON levels in winter wheat (Phytopathology paper, below). Our work is also showing that the window of infection for FHB in North Carolina extends from mid-anthesis to something close to 10 days after mid-anthesis, but that environmental factors that spread out anthesis can extend the window of scab vulnerability (manuscript in preparation). Our findings lend support to the hypothesis that “late” infections coupled with elevated moisture levels can lead to sound-appearing grain with excessive DON content. Finally, we are showing that DON declines during the growing season, and apparently continues to decline during and after harvest-ripeness (2008 USWBSI Forum abstract, below).

**Impact:**

Our results are giving growers and their advisors a clearer picture of how DON changes during grain-fill and harvest time. If an FHB epidemic develops, knowing how DON varies in response to post-flowering moisture helps us more accurately forecast DON risk. Knowing which conditions most favor asymptomatic grain with high DON will put us on the alert for that scenario. Growers will also be able to adjust harvest timing to minimize DON once we fully understand how DON levels change during and after physiological maturity under various moisture scenarios.

**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.**

Cowger, C., Patton-Özkurt, J., Brown-Guedira, G., and Perugini, L. 2009. Post-anthesis moisture increased Fusarium head blight and deoxynivalenol levels in North Carolina winter wheat. *Phytopathology* 99:320-327.

Cowger, C., Navarro, R., Ambrose, G., Bowman, D., and Murphy, J. P. Scab Resistance in North Carolina Wheat Varieties. 20<sup>th</sup> Annual Joint Conference, NC Soybeans, Corn Growers, and Small Grain Growers Associations. January 15-16, 2009, Durham, NC.

Weisz, R., and Cowger, C. 2009. 2009 Wheat Variety Recommendations. No. 22, July 2009, SmartGrains: The Small Grains Fact Sheet, North Carolina State University, Raleigh.

Cowger, C., Weisz, R., and Wood, A. 2008. Effect of Winter Wheat Harvest Timing on Deoxynivalenol (DON). In: Canty, S.M., Walton, E., Clark, A., Ellis, D., Mundell, J., and Van Sanford, D. A. (Eds). *Proceedings of the National Fusarium Head Blight Forum*; 2008 Dec. 2-4; Indianapolis, IN. Lexington, KY: University of Kentucky. Pp. 17.

**If your FY08 USDA-ARS Grant contained a VDHR-related project, include below a list all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance. If this is not applicable (i.e. no VDHR-related project) to your FY08 grant, please insert ‘Not Applicable’ below.**

Not applicable.