

**USDA-ARS/  
U.S. Wheat and Barley Scab Initiative  
FY09 Final Performance Report  
July 15, 2010**

**Cover Page**

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<b>Fiscal Year:</b>	2009
<b>USDA-ARS Agreement ID:</b>	NA
<b>USDA-ARS Agreement Title:</b>	Effects of Post-anthesis Moisture, Late Infection and Cultivar on DON in Wheat.
<b>FY09- USDA-ARS Award Amount:</b>	\$ 38,322

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Adjusted Award Amount</b>
MGMT	Effects of Post-anthesis Moisture, Late Infection and Cultivar on DON in Wheat.	\$ 38,322
	<b>Total Award Amount</b>	<b>\$ 38,322</b>

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Principal Investigator

\_\_\_\_\_  
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  
DUR-CP – Durum 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:** *Effects of Post-anthesis Moisture, Late Infection and Cultivar on DON in 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. As one aspect of that, we are identifying the factors that give rise to healthy-looking grain with over-threshold DON concentrations. We are also more precisely identifying the period when wheat is maximally susceptible to FHB infection, which is important in order to protect the crop during that entire period. We are determining the effects of post-anthesis moisture on disease symptoms, kernel damage, and DON. Our findings will be useful in efforts to forecast disease and DON. They will also help growers and their advisors determine when conditions may be conducive to late infection and/or elevated disease and DON levels resulting from post-flowering rainfall.

**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:**

Along with other knowledge about reducing scab risk, our findings have been presented to 3,000 growers and crop advisors in North Carolina through a newsletter article, a brochure, and field day talks. A leading seedsman in eastern North Carolina remarked on our May 13, 2010, field day talk: “Have had a lot of favorable comments on the scab overview presented at the Beaufort County field day. I think it helped a lot of us get a better understanding of the development of the spores and their sources.”

For the scab community generally, our research is leading to a better understanding of the epidemiology of FHB that will allow us to more accurately forecast DON risk. We have shown that “late” infection is an important factor leading to grain with low FDK but excessive DON content. We have shown that rain soon after anthesis likely also favors the low-symptom, high-DON scenario.

**Impact:**

Our results and our outreach are giving growers and their advisors a clearer picture of what gives rise to FHB risk and how to manage that risk. We have more clearly established when wheat is susceptible to FHB attack. 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.

**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.**

#### Peer-reviewed article

Cowger, C., and Arrellano, C. 2010. Plump kernels with high deoxynivalenol linked to late *Gibberella zeae* infection and marginal disease conditions in winter wheat. *Phytopathology* 100:719-728.

#### Extension and outreach publications

Weisz, R., and Cowger, C. 2010. 2010 Wheat Variety Performance & Recommendations. No. 28, July 2010, SmartGrains: The Small Grains Fact Sheet, North Carolina State University, Raleigh.

Cowger, C., Murphy, P., and Weisz, R. 2009. “Avoiding wheat and barley head scab.” North Carolina Small Grain Growers Association Newsletter, Vol. 2, Issue 3, October 2009.

Cowger, C., and Weisz, R. 2009. “Avoid wheat & barley head scab.” Brochure mailed to 3,000 North Carolina small-grain growers and supplied in bulk to 50 North Carolina county extension agents.

#### Conference proceedings

Cowger, C., and Arellano, C. 2009. “Infection timing and moisture effects on DON and FDK in wheat.” In: Canty, S. M., Clark, A., Mundell, J., Walton, E., Ellis, D., and Van Sanford, D. (eds). Proceedings of the National Fusarium Head Blight Forum; Dec. 7-9, 2009; Orlando, FL. Lexington: University of Kentucky. Pp. 36-38.

#### Invited Talks

- “Managing Head Scab of Small Grains,” North Carolina Small Grain Field Days in Robeson County (May 11), Beaufort County (May 13), and Union County (May 18), 2010. Total attendance: 400 people.
- Distance-learning for North Carolina county extension agents and extension directors: two distance-learning trainings conducted via Elluminate at the invitation of R. Weisz
  - Head Scab Biology & Management; Dec 1, 2009, 1.5 hrs;
  - Head Scab Prediction and Prevention Now!, April 6, 2010 1 hr.
- “Reducing Losses to Wheat and Barley Head Scab,” Tri-County Corn/Soybean/Wheat Production Meeting (200 participants), Monroe, NC, February 11, 2010

- “Diseases Limiting Wheat Production in the Southeast,” Southern Field Crop Alliance (70 participants), Tunica, MS, January 13-14, 2010.
- “Infection Timing and Moisture Effects on DON and FDK in Wheat,” USWBSI Forum (250 participants), Orlando, FL, December 7, 2009
- “Small Grain Disease Identification,” Certified Crop Advisor Training (100 participants), Winston-Salem, 11/16/09

#### Posters

- Cowger, C, and Weisz, R. “Minimizing Losses to Wheat and Barley Scab,” 21<sup>st</sup> Annual Joint Conference, NC Soybean Growers, Corn Growers, and Small Grain Growers Associations. 1/14-15/10, New Bern, NC.