USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY10 Final Performance Report
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Cover Page

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Fiscal Year:	FY10
USDA-ARS Agreement ID:	NA
USDA-ARS Agreement Title:	Epidemiology of Late FHB Infections in Wheat and Barley.
FY10 USDA-ARS Award Amount:	$ 39,894

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Epidemiology of Late FHB Infections in Wheat and Barley.	$ 39,894
	Total ARS Award Amount	**$ 39,894**

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 Soft Winter Wheat Region
SWW – Southern Soft Red Winter Wheat Region

Project 1: *Epidemiology of Late FHB Infections in Wheat and Barley.*

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:

   North Carolinians were over-represented among those subscribing to receive scab alerts by email or text-message in spring 2011. This was the result of promotion by Drs. Cowger and Weisz to North Carolina extension agents, growers, and seed producers.

   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, our research has led to a better understanding of the epidemiology of FHB that allows 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

Schmale, D., Wood-Jones, A., Cowger, C., Bergstrom, G., and Arellano, C. 2011. Trichothecene genotypes of *Gibberella zeae* from winter wheat fields in the eastern United States. Plant Pathology. DOI: 10.1111/j.1365-3059.2011.02443.x.

Extension and outreach publications

Weisz, R., and Cowger, C. 2011. 2011 Wheat Variety Performance & Recommendations. No. 29, July 2011, SmartGrains: The Small Grains Fact Sheet, North Carolina State University, Raleigh.

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.

Invited Talks

"Integrated Management of Head Scab Using North Carolina Wheat Varieties" at four field days sponsored by North Carolina State University: Robeson County (May 10, 2011), Beaufort (May 12, 2011), Perquimans County (May 19, 2011), and Union County (May 17, 2011). Total of 600 people reached directly.

"Managing Fusarium head blight in organic wheat" at bread wheat field day sponsored by USDA-ARS (May 20).

"Integrated approach of USDA Wheat & Barley Scab Initiative for managing Fusarium vomitoxin," Gordon Research Conference, June 16, 2011, Colby College, Waterville, ME.

"Managing Head Scab of Small Grains," North Carolina Small Grain Field Days in Robeson County (May 11, 2010), Beaufort County (May 13, 2010), and Union County (May 18, 2010). Total of 400 people reached directly.