

**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>	59-0206-9-074
<b>USDA-ARS Agreement Title:</b>	Diagnostic Services for DON.
<b>FY09- USDA-ARS Award Amount:</b>	\$ 232,663

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Adjusted Award Amount</b>
FSTU	Diagnostic Services for DON.	\$ 232,663
	<b>Total Award Amount</b>	<b>\$ 232,663</b>

\_\_\_\_\_  
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:** *Diagnostic Services for DON.*

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

Our laboratory provided deoxynivalenol (DON) and related mycotoxin diagnostic services for Fusarium Head Blight (Scab) research projects. From May 2009 to May 2010, we received samples from 35 scab research groups funded by the USWBSI in 15 states. The major issue that we dealt with was how to efficiently handle huge amounts of samples submitted by so many groups and ensure researchers to get their results in a timely manner. In general, we analyzed samples based on a first come, first served policy. In case we received large amounts of samples from a single group or received several submissions from different groups around same time, we contacted PI(s) about their desired dates of having DON results for each set of their samples and adjusted sample analysis schedules to make sure that each PI could receive their results in a reasonable time frame. By doing so, we were able to provide DON results to PIs within their desired dates.

**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:**

From May 2009 to May 2010, the Mycotoxin Diagnostic Laboratory at the University of Minnesota analyzed 29,350 samples (**Table 1**), which was about the same as the number of samples analyzed last crop year (28,799), but was 8.9% (2881) less than the estimate (32,231) presented in the proposal due to sample adjustments by PIs. The samples were submitted by 35 scab research groups from 15 states including Arkansas, Idaho, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Minnesota, Missouri, Nebraska, New York, North Carolina, North Dakota, and Ohio. They included 23,163 regular mature grain samples (6-100 g) and 6,187 small size samples such as grain samples less than 6 g, single kernels, single spikelets, single heads, small stems, fungal cultures extracts, and ground food diet. The target toxins included DON, 15-Acetyl-DON, 3-Acetyl-DON, nivalenol and zearalenone.

**Impact:**

The DON data has been used in all areas of scab research. By analyzing mycotoxins, the project provided support to barley and wheat breeding programs to develop resistant varieties, and to researchers to study disease mechanisms and to develop effective and economical chemical and biological disease controls. Mycotoxin data provided to scab researchers by our laboratory gave researchers a means to evaluate the effectiveness of their efforts in fighting Fusarium Head Blight.

**Table 1. Summary of 2009 DON samples**

PI	Number of Samples			Institution
	Analyzed	Estimated	Difference	
Anne McKendry	472	0	472	university of Missouri
Arvydas Grybauskas	344	0	344	University of Maryland
Brian Steffenson	0	2000	-2000	University of Minnesota
Carl Bradley	644	900	-256	University of Illinois at Urbana Champaign
Char Hollingsworth	1149	2500	-1351	University of Minnesota
Clay Sneller	516	800	-284	Ohio State University
Corby Kistler	2994	1200	1794	University of Minnesota
David Schisler	150	200	-50	USDA-ARS, Peorial, IL
David Van Sanford	2527	2500	27	University of Kentucky
Diane E. Brown-Rytlewski	175	200	-25	Michigan State University
Don Hershman	229	136	93	University of Kentucky
Elias Elias	594	600	-6	North Dakota State University
Eugene Milus	686	2000	-1314	University of Arkansas
Floyd Dowell	72	0	72	USDA-ARS, KS
Frances Trail	4	75	-71	Michigan State University
Frederic Kolb	2578	1200	1378	University of Illinois at Urbana Champaign
Gary Muehlbauer	0	500	-500	University of Minnesota
Gary Yuen	195	0	195	University of Nebraska, Lincoln
Gina Brown-Guedira	58	0	58	USDA-ARS, NC
Guihua Bai	763	500	263	USDA-ARS, KS
Herbert Ohm	447	500	-53	Purdue University
James Pestka	48	0	48	Michigan State University
Janet Lewis	778	1340	-562	Michigan State University
Jerry Johnson	0	100	-100	University of Georgia
Jim Anderson	968	1200	-232	University of Minnesota
Jinrong Xu	42	500	-458	Purdue University
Jochum Wiersma	0	100	-100	University of Minnesota
Jose Costa	2389	1500	889	University of Maryland
Juliet Windes	104	0	104	University of Idaho
June Hancock	57	0	57	AgriPro-COKER
Jyoti Shah	0	40	-40	University of North Texas
Kevin Smith	3373	2500	873	University of Minnesota
Kiesten Wise	404	200	204	Purdue University
Mark Sorrells	481	340	141	Cornell University
Mohamed Mergoum	1203	1000	203	North Dakota State University
Paul Murphy	280	250	30	North Carolina State University
Paul Schwarz	8	0	8	North Dakota State University
Pierce Paul	2041	3000	-959	Ohio State University
Ruth Dill-Macky	2153	3250	-1097	University of Minnesota
Stephen Harrison	0	400	-400	Louisiana State University
Willie Kirk	424	300	124	Michigan State University
Yang Yen	0	400	-400	South Dakota State University
<b>Total</b>	<b>29350</b>	<b>32231</b>	<b>-2881</b>	

**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.**

Costa, J.M.; Bockelman, H.E.; Brown-Guedira, G.; Cambron, S.E.; Chen, X.; Cooper, A.; Cowger, C.; Dong, Yanhong; Grybauskas, A.; Jin, Y.; Kolmer, J.; Murphy, J.P.; Sneller, C.; Souza, E. “Registration of the Soft Red Winter Wheat Germplasm MD01W233-06-1 Resistant to Fusarium Head Blight” *Journal of Plant Registrations*, **2010**, 4(3), 1-6.

Seong, Kye-Yong; Pasquali, Matias; Zhou, Xiaoying; Song, Jonwoo; Hilburn, Karen; McCormick, Susan; Dong, Yanhong; Xu, Jin-Rong; Kistler, H. Corby “Global gene regulation by Fusarium transcription factors Tri6 and Tri10 reveals adaptations for toxin biosynthesis” *Molecular Microbiology*, **2009**, 72(2), 354-367.

Liu, Y.; Delwiche, S. R.; Dong, Y. “Feasibility of FT-Raman Spectroscopy for Rapid Screening for DON Toxin in Ground Wheat and Barley” *Food Additives and Contaminants*, **2009**, 1-6.

Kang, J.; Clark, A.; Van Sanfor, D.A.; Griffey, C.; Brown-Guedira, G.; Dong, Y.; and Costa, J. 2009. “Evaluation of Exotic Scab Resistance Quantitative Trait Loci (QTL) Effects on Soft Red Winter Wheat.” In: Canty, S. M.; Clark, A.; Mundell, J.; Walton, E.; Ellis, D.; and Van Sanford, D. A. (Eds.), Proceedings of the National Fusarium Head Blight Forum; **2009** Dec. 7-9; Orlando, FL. Lexington, KY, University of Kentucky. pp128.

Peiris, K.H.S.; Pumphrey, M.O.; Dong, Y.; Wegulo, S.; Berzonsky, W.; Baenziger, P.S.; and Dowell, F.E. 2009. “Progress on Development and Application of Single Kernel NIR Sorting Technology for Assessment of FHB Resistance in Wheat Germplasm” In: Canty, S. M.; Clark, A.; Mundell, J.; Walton, E.; Ellis, D.; and Van Sanford, D. A. (Eds.), Proceedings of the National Fusarium Head Blight Forum; **2009** Dec. 7-9; Orlando, FL. Lexington, KY, University of Kentucky. pp141.

Souza, E.; Mundell, J. Sarti, D.; Balut, A.; Dong, Y.; and Van Sanford, D. A. 2009. “Can Host Plant Resistance Protect the Quality of Wheat from Fusarium Head Blight?” In: Canty, S. M.; Clark, A.; Mundell, J.; Walton, E.; Ellis, D.; and Van Sanford, D. A. (Eds.), Proceedings of the National Fusarium Head Blight Forum; **2009** Dec. 7-9; Orlando, FL. Lexington, KY, University of Kentucky. pp154.

**PI:** Dong, Yanhong

**Project:** Diagnostic Services for DON.

**FY09 FPR – USWBSI ADDENDUM  
DON Service Labs – Quality Control Data**

**Insert below Quality Control Data/Results from the FY09 Award Period (May 09-May 10):**

	<b>Check 1</b>	<b>Check 2</b>	<b>Check 3</b>
<b>N<sup>a</sup></b>	783	219	78
<b>Mean (ppm)</b>	18.58	11.18	13.85
<b>SD<sup>b</sup></b>	1.88	1.56	1.33
<b>% CV<sup>c</sup></b>	10.1	13.9	9.6

<sup>a</sup>Number of samples. <sup>b</sup>Standard deviation. <sup>c</sup>Coefficient of variance