USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY11 Final Performance Report
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Cover Page

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Fiscal Year:	FY11
USDA-ARS Agreement ID:	59-0206-9-074
USDA-ARS Agreement Title:	Diagnostic Services for DON.
FY11 USDA-ARS Award Amount:	$ 316,722

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FSTU	Diagnostic Services for DON.	$ 316,722
	Total ARS Award Amount	**$ 316,722**

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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 Soft Winter Wheat Region
SWW – Southern Soft Red Winter 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 2011 to April 2012, we received samples from 36 scab research groups funded by the USWBSI in 20 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 receive 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 the 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 2011 to April 2012, the Mycotoxin Diagnostic Laboratory at the University of Minnesota analyzed 29,440 samples (**Table 1**), which was about the same to the number of samples analyzed last crop year (29,066). Although the estimates varied from year to year, the real amounts of samples analyzed were very similar for the past five crop years, e.g., 29,217 for 2007, 28,799 for 2008, 29,350 for 2009, 29,066 for 2010 and 29,440 for 2011, which indicated that the real demands of DON analysis were pretty constant, i.e., 29,000 ~ 30,000 samples per year for our lab. For this year, the samples were submitted by 36 scab research groups from 20 states, including Arkansas, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Minnesota, Missouri, Nebraska, New York, North Carolina, North Dakota, Ohio, South Dakota, Texas, Virginia and Wisconsin. The samples included 22,584 regular mature grain samples (6-100 g) and 6,856 small size samples such as grain samples less than 6 g, single kernels, single spikeletes, single heads, and fungal cultures extracts. The target toxins included DON, 15-Acetyl-DON, 3-Acetyl-DON, and nivalenol. Zearalenone was analyzed for the samples from Dr. Carl Bradley's project with an approval from the Executive committee.

   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 2011 DON samples

PI	Number of Samples			Institution
	Analyzed	Estimated	Difference	
Anne McKendry	383	1500	-1117	university of Missouri
Arvydas Grybauskas	0	600	-600	University of Maryland
Bill Laskar	26	0	26	Pioneer Whear Research
Brian Steffenson	1450	1200	250	University of Minnesota
Carl Bradley	1088	900	188	University of Illinois at Urbana Champaign
Christina Cowger	1043	900	143	USDA-ARS, North Carolina State University
Clay Sneller	412	400	12	Ohio State University
Corby Kistler	1180	1500	-320	University of Minnesota
David Schisler	0	65	-65	USDA-ARS, Peorial, IL
David Schmale	4	0	4	Virginia Polytechnic Institute & State University
David Van Sanford	2803	2000	803	University of Kentucky
Don Hershman	198	300	-102	University of Kentucky
Elias Elias	0	700	-700	North Dakota State University
Eugene Milus	752	1300	-548	University of Arkansas
Floyd Dowell	364	400	-36	USDA-ARS, KS
Frances Trail	0	50	-50	Michigan State University
Frederic Kolb	1579	2750	-1171	University of Illinois at Urbana Champaign
Gary Bergstrom	462	650	-188	Cornell University
Gary Muehlbauer	36	300	-264	University of Minnesota
Gary Yuen	35	200	-165	University of Nebraska, Lincoln
Gina Brown-Guedira	0	200	-200	USDA-ARS, NC
Guihua Bai	1836	1500	336	USDA-ARS, KS
Herbert Ohm	325	450	-125	Purdue University
James Pestka	0	100	-100	Michigan State University
Janet Lewis	3469	1837	1632	Michigan State University
Jerry Johnson	60	200	-140	University of Georgia
Jianli Chen	0	300	-300	University of Idaho
Jim Anderson	1291	1200	91	University of Minnesota
Jinrong Xu	159	500	-341	Purdue University
Jochum Wiersma	681	300	381	University of Minnesota
Jose Costa	1710	2000	-290	University of Maryland
Juliet Windes	56	55	1	University of Idaho
June Hancock	0	75	-75	AgriPro-COKER
Jyoti Shah	111	75	36	University of North Texas
Kevin Smith	2764	3500	-736	University of Minnesota
Kiesten Wise	311	500	-189	Purdue University
Mark Sorrells	388	850	-462	Cornell University
Mohamed Mergoum	1051	2000	-949	North Dakota State University
Paul Esker	233	0	233	University of Wisconsin
Paul Murphy	872	900	-28	North Carolina State University
Paul Schwarz	11	0	11	North Dakota State University (QA)
Pierce Paul	1010	700	310	Ohio State University
Ruth Dill-Macky	741	5300	-4559	University of Minnesota
Stephen Harrison	0	300	-300	Louisiana State University
William Berzonsky	252	0	252	South Dakota State University
William Kirk	168	500	-332	Michigan State University
Xiwen Cai	120	0	120	North Dakota State University
Yang Yen	0	100	-100	South Dakota State University
Sue Canty	6	0	6	QA
Total	**29440**	**39157**	**-9717**	

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.

1. Jonkers, W.; Dong, Y.; Broz. K.; Kistler, H. C. "The Wor 1-like Protein Fgp1 Regulates Pathogenicity, Toxin Synthesis and Reproduction in the Phytopathogenic Fungus Fusarium Graminearum" *PloS Pathogens*, **2012**, 8 (5), e1002724.
2. Makandar, R.; Nalam, V.J.; Lee, H.; Trick, H.N.; Dong, Y.; Shah, J. "Salicylic Acid Regulates Basal Resistance to Fusarium Head Blight in Wheat" *MPMI,* **2012,** 25 (3), 431-439.
3. Chu C.; Niu, Z.; Zhong, S.; Chao, S.; Friesen, T.L.; Halley, S.; Elias, E.M.; Dong, Y.; Faris, J.D.; Xu, S.S "Identification and molecular mapping of two QTLs with major effects for resistance to Fusarium head blight in wheat" *Theor. Appl. Genet.,* **2011,** 123, 1107-1119.
4. Balut, A.; Clark, A.; Brown-Guedira, G.; Dong, Y.; Souza, E.; Van Sanford, D. 2011. "Effects of *Fhb 1* and *QFhs.nau-2DL* on Fusarium Head Blight and Agronomic Traits in SRW Wheat" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, D. and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 7). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
5. Conway, B.; Gao, J.; Wang, Y.; Murphy, J.P.; Brown-Guedira, G.; Griffey, C.; Dong, Y.; Costa, J. 2011. "Mapping Scab Resistance in the Winter Wheat Line MD01W233-06-1" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 15). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
6. Islam, Md.S.; Brown-Guedira, G.; Ohm, H.; Van Sanford, D.; Dong, Y.; McKendry, A.L. 2011. "QTL Associated with Kernel Quality Retention and DON in Truman Soft Red Winter Wheat" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 28). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
7. Peiris, K.H.S.; Dong, Y.; Bockus, W.W.; Dowell, F.E. 2011. "A Single Kernel Near-Infrared (SKNIR) Technique for Comprehensive Evaluation of Fusarium Head Blight (FHB) Resistance in Wheat Germplasm and for Evaluation of Fungicide Treatments for Managing FHB in Wheat" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 43). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
8. Sarti, D.; Clark, A.; Brown-Guedira, G.; Dong, Y. Van Sanford, D. 2011. "Evaluation of FHB Resistance and Agronomic Performance in Backcross and Forward Cross Populations" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D.

(Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 48). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.

9. Mishra, S.; Siler, L.; Hammar, S.; Dong, Y.; Lewis, J. 2011. "Comparison of DON Accumulation in Bran and Flour Fractions of FHB Infected Winter Wheat" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 108). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
10. Bradley, C.A.; Ames, K.A.; Dong, Y.; Brucker. E.A.; Kolb, F.L. 2011. "Influence of Fusarium Head Blight Management Practices on Mycotoxins in Wheat Straw" In: Canty, S.; Clark, A.; Anderson-Scully, A.; Ellis, and Van Sanford, D. (Eds.), *Proceedings of the 2011 National Fusarium Head Blight Forum* (pp. 127). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.