

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY12 Final Performance Report
July 16, 2013**

Cover Page

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Fiscal Year:	FY12
USDA-ARS Agreement ID:	59-0206-9-074
USDA-ARS Agreement Title:	Diagnostic Services for DON.
FY12 USDA-ARS Award Amount:	\$ 211,876*

USWBSI Individual Project(s)

USWBSI Research Category**	Project Title	ARS Award Amount
FSTU-S	Diagnostic Services for DON.	\$ 211,876
	Total ARS Award Amount	\$ 211,876

Principal Investigator

Date

* Partial funding for this research is under ARS agreement # 59-0206-9-070

** 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 2012 to May 2013, we received samples from 28 scab research groups funded by the USWBSI in 17 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 2012 to May 2013, the Mycotoxin Diagnostic Laboratory at the University of Minnesota analyzed 28,205 samples (**Table 1**), which was slightly less than the number of samples analyzed last crop year (29,440). However, it was about 14.5% less than the estimated number (32,978) based on the survey. This might be due to low scab severity in 2012 as we observed that some groups only submitted small amount of pilot samples for DON analysis while others didn't submit any samples. Although the estimates varied from year to year, the real amounts of samples analyzed were very similar for the past six crop years, e.g., 29,217 for 2007, 28,799 for 2008, 29,350 for 2009, 29,066 for 2010, 29,440 for 2011 and 28,205 for 2012, 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 28 scab research groups from 17 states, including Arkansas, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, North Carolina, North Dakota, Ohio, South Dakota and Wisconsin. The samples included 23,957 regular mature grain samples (6-100 g) and 4,248 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 2012/2013 samples

PI	Number of samples			Institution
	Analyzed	Estimated	Difference	
Anne McKendry	549	1500	-951	university of Missouri
Arvydas Grybauskas	0	500	-500	University of Maryland
Barton Fogleman	0	200	-200	Syngenta, Bay, AR
Brian Steffenson	3707	2000	1707	University of Minnesota
Carl Bradley	1047	1300	-253	University of Illinois at Urbana Champaign
Clay Sneller	661	550	111	Ohio State University
Corby Kistler	2003	1000	1003	University of Minnesota
Christina Cowger	422	0	422	USDA-ARS, NC
David Schisler	0	120	-120	USDA-ARS, Peorial, IL
David Van Sanford	2799	2500	299	University of Kentucky
Don Hershman	0	144	-144	University of Kentucky
Elias Elias	464	600	-136	North Dakota State University
Eugene Milus	1144	1264	-120	University of Arkansas
Frances Trail	18	50	-32	Michigan State University
Frederic Kolb	510	2000	-1490	University of Illinois at Urbana Champaign
Gary Bergstrom	526	0	526	Cornell University
Gary Muehlbauer	288	100	188	University of Minnesota
Guihua Bai	618	1500	-882	USDA-ARS, KS
Herbert Ohm	0	1000	-1000	Purdue University
James Pestka	0	20	-20	Michigan State University
Jerry Johnson	83	200	-117	University of Georgia
Jim Anderson	1382	1400	-18	University of Minnesota
Jinrong Xu	0	300	-300	Purdue University
Jochum Wiersma	0	200	-200	University of Minnesota
Jose Costa	1673	2400	-727	University of Maryland
Juliet Marshall	54	0	54	University of Idaho
Jyoti Shah	0	150	-150	University of North Texas
Kevin Smith	2967	2800	167	University of Minnesota
Kiesten Wise	96	400	-304	Purdue University
Mark Sorrells	401	679	-278	Cornell University
Mohamed Mergoum	996	1000	-4	North Dakota State University
Paul Esker	0	250	-250	University of Wisconsin
Paul Murphy	1730	1300	430	North Carolina State University
Pierce Paul	1334	900	434	Ohio State University
Russ Freed/Janet Lewis	1361	2871	-1510	Michigan State University
Ruth Dill-Macky	1165	1080	85	University of Minnesota
Shawn Conley	96	0	96	University of Wisconsin
Stephen Harrison	0	200	-200	Louisiana State University
Sue Candy	15	0	15	QA samples
William Berzonsky	96	0	96	South Dakota State University
Willie Kirk	0	500	-500	Michigan State University
Total	28205	32978	-4773	

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. Lewis, J.M.; Siler, L.; Ellis, D.; Souza, E.; Ng, P.K.W; Dong, Y.; Jiang, G.L.; Ward, R.W. “Registration of ‘Jupiter’ Wheat” *Journal of Plant Registrations*, **2012**, 6(3), 315-323.
2. Lewis, J.M.; Siler, L.; Ellis, D.; Souza, E.; Ng, P.K.W; Dong, Y.; Brown-Guedira, G.; Jiang, G.L.; Ward, R.W. “Registration of ‘MSU E5024’ Wheat” *Journal of Plant Registrations*, **2012**, 6(3), 333-341.
3. Lewis, J.M.; Siler, L.; Ellis, D.; Souza, E.; Ng, P.K.W; Dong, Y.; Brown-Guedira, G.; Marshall, D.; Kolmer, J.; Jiang, G.L.; Ward, R.W. “Registration of ‘Red Ruby’ Wheat” *Journal of Plant Registrations*, **2012**, 6 (3), 324-332.
4. Menke, J.; Broz, K.; Dong, Y.; Kistler, H. C. “Fusarium graminearum Tri12p Influences Virulence to Wheat and Trichothecene Accumulation” *Molecular Plant-Microbe Interactions*, **2012**, 11, 1408-1418.
5. Bradley, C.A; Ames, K.A.; Dong, Y.; Brucker, E.A.; Kolb, F.L. 2012. “Influence of Management Practices on *Fusarium* Mycotoxins in Wheat Straw” In: Canty, S.; Clark, A.; Anderson-Scully, A. and Van Sanford, D. (Eds.), *Proceedings of the 2012 National Fusarium Head Blight Forum* (pp. 8). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
6. Conway, B.; Murphy, J.P.; Brown-Guedira, G.; Dong, Y.; Chao, S.; Griffey, C. and Costa, J. 2012. “Mapping Resistance to Fusarium Head Blight in a Double Haploid Wheat Population from the Cross MD01W233-06-1/SS8641” In: Canty, S.; Clark, A.; Anderson-Scully, A. and Van Sanford, D. (Eds.), *Proceedings of the 2012 National Fusarium Head Blight Forum* (pp. 56). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
7. Menke, J.; Beaubien, K.; Szinyei, T.; Dong, Y.; Chao, S.; Olivera, P.; Alsop, B.; Dahl, S.; Smith, K. and Steffenson, B. 2012. “Mapping of Fusarium Head Blight Resistance in Wild Barley Accession PI 466423” In: Canty, S.; Clark, A.; Anderson-Scully, A. and Van Sanford, D. (Eds.), *Proceedings of the 2012 National Fusarium Head Blight Forum* (pp. 69). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.
8. Sarti, D.; Clark, A.; Brown-Guedira, G.; Dong, Y.; Van Sanford, D. 2012. “Soft Winter Wheat Responses to *Fhb1* and *Qfhs.Nau-2DL* QTL for Fusarium Head Blight Resistance in F₂ Derived Populations” In: Canty, S.; Clark, A.; Anderson-Scully, A. and Van Sanford, D. (Eds.), *Proceedings of the 2012 National Fusarium Head Blight Forum* (pp. 95). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.