USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY14 Final Performance Report
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Cover Page

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Fiscal Year:	FY14
USDA-ARS Agreement ID:	59-0206-4-023
USDA-ARS Agreement Title:	Diagnostic Services for DON.
FY14 USDA-ARS Award Amount:	$ 234,340

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FSTU	Diagnostic services for DON.	$ 234,340
	FY14 Total ARS Award Amount	**$ 234,340**

Principal Investigator Date

* MGMT – FHB Management
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
EC-HQ – Executive Committee-Headquarters
BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
HWW-CP – Hard Winter Wheat Coordinated Project
WES-CP – Western 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 provides deoxynivalenol (DON) and related mycotoxin diagnostic services for Fusarium Head Blight (Scab) research projects. From May 2014 to May 2015, we received samples from 39 scab research groups in 21 states, including two groups from Syngenta. 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 accomplishments and their impact (i.e. how are they being used) to minimize the threat of Fusarium Head Blight or to reduce mycotoxins. Complete both sections; repeat sections for each major accomplishment:**

   Accomplishment:

   For FY14 (May 2014 to May 2015), our Laboratory analyzed 25,888 samples (**Table 1**) for the USWBSI related projects, which was significantly less than the amount of samples we had analyzed for the past seven years (29,000 ~ 30,000). The reduction of DON samples might be due to the uncertainty of FY14 funding situation in the summer of 2013, causing some PIs to downsize their programs. For FY14, the samples were submitted by 39 scab research groups from 21 states, including Arkansas, Delaware, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, New York, North Carolina, North Dakota, Ohio, South Dakota, Tennessee, Texas, and Wisconsin. The samples included 22,465 regular mature grain samples (6-100 g) and 3,423 small size samples such as grain samples less than 6 g, single kernels, single spikeletes, single heads, wheat straw, 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 May 2014 - May 2015 samples				
PI	**Number of samples**			**Institution**
	Analyzed	**Estimated**	**Difference**	
Anne McKendry	423	800	-377	university of Missouri
Brian Steffenson	2684	3000	-316	University of Minnesota
Carl Bradley	2399	3200	-801	University of Illinois at Urbana Champaign
Clay Sneller	227	550	-323	Ohio State University
Corby Kistler	878	3000	-2122	University of Minnesota
Christina Cowger	48	500	-452	USDA-ARS, NC
Damon Smith	56	150	-94	University of Wisconsin-Masison
David Schisler	0	120	-120	USDA-ARS, Peoria, IL
David Van Sanford	1908	2500	-592	University of Kentucky
Elias Elias	400	1000	-600	North Dakota State University
Eric Olson	931	0	931	Michigan State University
Eugene Milus	597	1000	-403	University of Arkansas
Floyd Dowell	272	480	-208	USDA-ARS, KS
Frances Trail	99	50	49	Michigan State University
Frederic Kolb	2616	3050	-434	University of Illinois at Urbana Champaign
Gary Bergstrom	342	250	92	Cornell University
Gary Muehlbauer	401	250	151	University of Minnesota
Guihua Bai	393	1000	-607	USDA-ARS, KS
Herbert Ohm/Joseph Anderson	544	520	24	Purdue University
Heather Young	24	0	24	University of Tennessee
Jerry Johnson	62	150	-88	University of Georgia
Jianli Chen	387	0	387	University of Idaho
Jim Anderson	1072	1000	72	University of Minnesota
Jinrong Xu	0	100	-100	Purdue University
Jochum Wiersma/Madeleine Smith	100	250	-150	University of Minnesota
Jose Costa	144	1500	-1356	University of Maryland
Juliet Marshall	130	56	74	University of Idaho
Jyoti Shah	32	25	7	University of North Texas
Kevin Smith	2013	2500	-487	University of Minnesota
Kiesten Wise	216	300	-84	Purdue University
Mark Sorrells	240	290	-50	Cornell University
Martin Nagelkirk	26	0	26	Michigan State University
Mohamed Mergoum	959	1200	-241	North Dakota State University
Nathan Kleczewski	170	200	-30	University of Delaware
Paul Murphy	2115	1800	315	North Carolina State University
Pierce Paul	1442	700	742	Ohio State University
Ruth Dill-Macky	478	600	-122	University of Minnesota
Stephen Harrison	574	300	274	Louisiana State University
Sue Candy	27	0	27	QA samples
Yang Yen	14	100	-86	South Dakota State University
Jennifer Vonderwell	190	0	190	Syngenta
Michael Urwiler	255	0	255	Syngenta
Total	**25888**	**32491**	**-6603**	

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY14 award period. The term "support" below includes any level of benefit to the student, ranging from full stipend plus tuition to the situation where the student's stipend was paid from other funds, but who learned how to rate scab in a misted nursery paid for by the USWBSI, and anything in between.

1. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY14 award period?**
   No.

   If yes, how many?

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY14 award period?**
   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY14 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   None.

   If yes, how many?

4. **Have any post docs who worked for you during the FY14 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   None.

   If yes, how many?

Include below a list of all germplasm or cultivars released with full or partial support of the USWBSI during the FY14 award period. List the release notice or publication. Briefly describe the level of FHB resistance. *If not applicable because your grant did NOT include any VDHR-related projects, enter N/A below.*

N/A

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 FY14 grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

1. Kuhnem, P.R.; Del Ponte, E.M.; Dong, Y.; Bergstrom, G.C. "*Fusarium graminearum* Isolates from Wheat and Maize in New York Show Similar Range of Aggressiveness and Toxigenicity in Cross-Species Pathogenicity Tests", *Phytopathology,* **2015,** 105 (4), 441-448.

2. Varga, E.; Wiesenberger, G.; Hametner, C.; Ward, T.J.; Dong, Y.; Schöfbeck, D.; McCormick, S.; Broz. K.; Stückler, R.; Schuhmacher, R.; Krska, R.; Kistler, H.C.; Berthiller, F.; Adam, G. "New tricks of an old enemy: Isolates of *Fusarium graminearum* produce a novel type A trichothecene mycotoxin" Environ Microbiol. **2014** Nov 18, doi: 10.1111/1462-2920.12718.

3. Liang, J.; Xayamongkhon, H.; Broz, K.; Dong, Y.; McCormick, S.P.; Abramova, S.; Ward, T.J.; Ma, Z.H.; Kistler, H.C. "Temporal dynamics and population genetic structure of *Fusarium graminearum* in the upper Midwestern United States" Fungal Genetics and Biology, **2014,** 73, 83-92.

4. Jin, F.; Bai, G.H.; Zhang, D.D.; Dong, Y.; Ma, L.J.; Bockus, W.; Dowell, F. "*Fusarium* Damaged Kernels and Deoxynivalenol in Fusarium Infected U.S. Winter Wheat" *Phytopathology*, **2014,** 104(5), 472-478.

5. Bissonnette, K.M.; Ames, K.A.; Dong, Y.; Kolb, F.L.; Bradley, C.A. "Accumulation of *Fusarium graminearum* Mycotoxins in Wheat Straw at Various Intervals after Anthesis for Wheat Cultivars Ranging in Susceptibility to Fusarium Head Blight" In: Canty, S.; Clark, A.; Turcott, N.; Van Sanford, D. (Eds.), *Proceedings of the 2014 National Fusarium Head Blight Forum* (pp. 4). East Lansing, MI.Lexington, KY: U.S. Wheat & Barley Scab Initiative.

6. Dill-Macky, R.; Dong, Y.; Van Sanford, D.; Knott, C.A.; De Wolf, E.. "Examination of Commercial Grain Samples to Ascertain How Deoxynivalenol Contamination Exceeded Anticipated Levels in Some 2014 Wheat Crops from Western Kentucky" In: Canty, S.; Clark, A.; Turcott, N.; Van Sanford, D. (Eds.), *Proceedings of the 2014 National Fusarium Head Blight Forum* (pp.13 - 14). East Lansing, MI.Lexington, KY: U.S. Wheat & Barley Scab Initiative.

7. Varga, E; Wiesenberger, G., Hametner, C.; Ward, T.; Dong, Y.; Schöfbeck, D.; McCormick, S.; Broz, K.; Stückler, R.; Schmeitzl, C.; Michlmayr, H.; Schuhmacher, R.; Krska, R.; Kistler, H.C.; Berthiller, F.; Adam, G. "New Tricks of an Old Enemy: Isolates of *Fusarium graminearum* Produce a Type A Trichothecene Mycotoxin" In: Canty, S.; Clark, A.; Turcott, N.; Van Sanford, D. (Eds.), *Proceedings of the 2014 National Fusarium Head Blight Forum* (pp.48-49). East Lansing, MI.Lexington, KY: U.S. Wheat & Barley Scab Initiative.

8. Haas, M.; Laskowski, M.; Chao, S.; Dong, Y.; Szinyei, T.; and Steffenson, B. "Genetic Mapping of Quantitative Trait Loci for Fusarium Head Blight Resistance in Spring Barley 'Kutahya' and Wild Barley 'W-365'" " In: Canty, S.; Clark, A.; Turcott, N.; Van Sanford, D. (Eds.), *Proceedings of the 2014 National Fusarium Head Blight Forum* (pp.81). East Lansing, MI.Lexington, KY: U.S. Wheat & Barley Scab Initiative.

PI: Dong, Yanhong
Project: Diagnostic services for DON.

FY14 FPR – USWBSI ADDENDUM
DON Service Labs – Quality Control Data

Insert below Quality Control Data/Results from the FY14 Award Period (approx. May 2014-May 2015):

	Check 1	Check 2	Check 3
N[a]	582	370	53
Mean (ppm)	14.19	4.97	13.36
SD[b]	1.45	0.47	1.41
% CV[c]	10.2	9.5	10.6

[a]Number of check samples. [b]Standard deviation. [c]Coefficient of variance