USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY15 Final Performance Report
Due date: July 15, 2016

Cover Page

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Fiscal Year:	2015
USDA-ARS Agreement ID:	59-0206-4-023
USDA-ARS Agreement Title:	Diagnostic Services for DON.
FY15 USDA-ARS Award Amount:	$ 235,828
Recipient Organization:	Regents of the University of Minnesota Suite 450 Sponsored FIN RPT-P100100001 Minneapolis, MN 55455-2003
DUNS Number:	555917996
EIN:	41 -6007513
Recipient Identifying Number or Account Number:	CON000000048310
Project/Grant Reporting Period:	05/19/15-05/18/16
Reporting Period End Date:	05/18/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST-S	Diagnostic services for DON.	$ 235,828
	FY15 Total ARS Award Amount	**$ 235,828**

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
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
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 are the major goals and objectives of the project?

The goal of this project is to provide rapid, cost-effective and accurate mycotoxin analysis - especially deoxynivalenol (DON) - for Fusarium Head Blight (FHB or scab) research projects.

2. What was accomplished under these goals?

3.

1) major activities:
Analyzed DON and related mycotoxins in wheat, barley and fungal culture extract using GC-MS; grinded grain seeds; extracted DON from grain samples; and prepared purification columns.

2) specific objectives:
Provided reliable DON analysis services to the projects funded by the USWBSI and ensured PIs to get their results in a timely manner.

3) significant results:
From July 2015 to May 2016, our laboratory analyzed 27,456 samples (**Table** 1) submitted by 37 scab research groups from 19 states including Arkansas, Delaware, Georgia, Idaho, Illinois, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, New York, North Carolina, North Dakota, Ohio, Pennsylvanian, South Dakota, Texas, and Wisconsin. The samples included 22,988 regular mature grain samples (4-100 g) and 4,468 small size samples such as grain samples less than 4 g, single kernel, single spikelet, single head, small stem, and fungal culture extract. The target toxins included DON, 15-Acetyl-DON, 3-Acetyl-DON, and nivalenol. Zearalenone was analyzed for those samples submitted by Dr. Carl Bradley's project with an approval from the Executive Committee. Although we analyzed more samples this year compared with last year (25,888), the number of samples submitted to our lab was still less than the amount of samples that we anticipated to receive based on the survey (32,491) that we conducted before submitting the proposal.

4) key outcomes or other achievements:
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 chemical and biological disease controls. Mycotoxin data provided to scab researchers by our laboratory gave them a means to evaluate the effectiveness of their efforts in fighting Fusarium Head Blight.

3. What opportunities for training and professional development has the project provided?

Nothing to report.

4. How have the results been disseminated to communities of interest?

The results were emailed to researchers, and were then disseminated to communities of interest via conference papers and presentations, and journal publications.

Table 1. Summary of 2015/2016 samples

PI	Number of samples			Institution
	Analyzed	Estimated	Difference	
Alyssa Collins	167	0	167	Pennsylvania State University
Anne McKendry	1060	800	260	university of Missouri
Brian Steffenson	270	3000	-2730	University of Minnesota
Carl Bradley	1639	3200	-1561	University of Kentucky
Christina Cowger	295	500	-205	USDA-ARS, Raleigh, NC
Clay Sneller	230	550	-320	Ohio State University
Corby Kistler	1011	3000	-1989	University of Minnesota
Damon Smith	124	150	-26	University of Wisconsin-Madison
David Schisler	0	120	-120	USDA-ARS, Peorial, IL
David Van Sanford	2529	2500	29	University of Kentucky
Elias Elias	354	1000	-646	North Dakota State University
Eric Olson	1036	0	1036	Michigan State University
Floyd Dowell	281	480	-199	USDA-ARS, KS
Frances Trail	0	50	-50	Michigan State University
Frederic Kolb	2060	3050	-990	University of Illinois at Urbana Champaign
Gary Bergstrom	895	250	645	Cornell University
Gary Muehlbauer	1695	250	1445	University of Minnesota
Guihua Bai	150	1000	-850	USDA-ARS, KS
Herbert Ohm	0	520	-520	Purdue University
Jerry Johnson	73	150	-77	University of Georgia
Jianli Chen	770	0	770	University of Idaho
Jim Anderson	1607	1000	607	University of Minnesota
Jinrong Xu	0	100	-100	Purdue University
Jose Costa	0	1500	-1500	USDA-ARS, Beltsvilles, Maryland
Juliet Marshall	230	56	174	University of Idaho
Jyoti Shah	18	25	-7	University of North Texas
Kevin Smith	2472	2500	-28	University of Minnesota
Kiersten Wise	0	300	-300	Purdue University
Madeleine Smith/Jochum Wiersma	136	250	-114	University of Minnesota
Mark Sorrells	720	290	430	Cornell University
Martin Chivers	204	0	204	Michigan State University
Martin Nagelkirk	160	0	160	Michigan State University
Nathan Kleczewski	250	200	50	University of Delaware
Paul Murphy	280	1800	-1520	North Carolina State University
Pierce Paul	3198	700	2498	Ohio State University
Ruth Dill-Macky	781	600	181	University of Minnesota
Richard Esten Mason/Eugene Milus	988	1000	-12	University of Arkansas
Richard Horsley/Jesse Underdahl	1020	1200	-180	North Dakota State University
Shahryar Kianian	256	0	256	USDA/CDL, MN
Stephen Harrison	345	300	45	Louisiana State University
Yang Yen	0	100	-100	South Dakota State University
Duane Auch	41	0	41	Syngenta, South Dakota
Roger Irwin	36	0	36	Syngenta, South Dakota
Victor Mascarenhas	48	0	48	Syngenta, North Carolina
QA	27	0	27	Trilogy QA samples
Total	27456	32491	-5035	

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY15 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 FY15 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 FY15 award period?**

   No.

   If yes, how many?

3. **Have any post docs who worked for you during the FY15 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 FY15 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?

Release of Germplasm/Cultivars

Instructions: In the table below, list all germplasm and/or cultivars released with full or partial support through the USWBSI during the FY15 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations. *Leave blank if you have nothing to report or if your grant did NOT include any VDHR-related projects.*

Name of Germplasm/Cultivar	**Grain Class**	**FHB Resistance** (S, MS, MR, R, where R represents your most resistant check)	**FHB Rating** (0-9)	**Year Released**

Add rows if needed.

NOTE: List the associated release notice or publication under the appropriate sub-section in the 'Publications' section of the FPR.

Abbreviations for Grain Classes

Barley - BAR
Durum - DUR
Hard Red Winter - HRW
Hard White Winter - HWW
Hard Red Spring - HRS
Soft Red Winter - SRW
Soft White Winter - SWW

Publications, Conference Papers, and Presentations

Refer to the FY15-FPR_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Journal publications.

1. Arruda, M.P.; Brown, P.J.; Krill, A.M.; Thurber, C.; Brown-Guedira, G.; Dong, Y.; Foresman, B.J.; Kolb, F.L. "Comparing genomic selection and marker-assisted selection for Fusarium head blight resistance in wheat (*Triticum aestivum* L.)", *Molecular Breeding,* **2016,** 36:84 (DOI 10.1007/s11032-016-0508-5).
   Status: Published.
   Acknowledgement of federal support: Yes.
2. Clark, A.J.; Sarti-Dvorjak, D.; Brown-Guedira, G.; Dong, Y.; Baik, Byung-Kee,; Van Sanford, D.A. "Identifying rare FHB-resistant transgressive segregants in intransigent backcross and F2 winter wheat populations", *Front. Microbilology*, **2016,** 7:277 (DOI: 10.3389/fmicb.2016.00277).
   Status: Published.
   Acknowledgement of federal support: Yes.
3. Islam, M.S.; Brown-Guedira, G.; van Sanford, D.; Ohm, H.; Dong, Y.; McKendry, A.L. "Novel QTL associated with the Fusarium head blight resistance in Truman soft red winter wheat", *Euphytica,* Sep 3 **2015**. (http://dx.doi.org/10.1007/s10681-015-1550-9)
   Status: Published.
   Acknowledgement of federal support: Yes.
4. 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.
   Status: Published.
   Acknowledgement of federal support: Yes.
5. Petersen, S.; Lyerly, J.H.; McKendry, A.L.; Islam, M.S.; Brown-Guedira, G.; Cowger, C.; Dong, Y.; Murphy, J.P. "Validation of Fusaruim head blight resistance QTL in U.S. winter wheat", Submitted to *Crop Science,* **2015.**
   Status: Submitted.
   Acknowledgement of federal support: Yes.

Books or other non-periodical, one-time publications.

Other publications, conference papers and presentations.

1. Bissonnette, K.M., Kolb, F.L., Dong, Y., Ames, K.A., Bradley, C.A. (2015). Effectiveness of FHB Indices in Estimating Straw DON Accumulation in Winter Wheat Cultivars. In: Canty, S., Clark, A., Vukasovich, S., Van Sanford, D. (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum* East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 3.

Status: Abstract published and poster presented.
Acknowledgement of federal support: Yes.

2. Peiris, K.H.S., Dong, Y., Bockus, W.W., Dowell, F.E. (2015) Moisture Content of Grain Samples Affects the Performance of Near-infrared Spectroscopic Calibration for Estimation of DON Levels in Wheat. In: Canty, S., Clark, A., Vukasovich, S., Van Sanford, D. (Eds.), *Proceedings of the 2015 National Fusarium Head Blight Forum* East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 99.
Status: Abstract published and poster presented.
Acknowledgement of federal support: Yes.

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

FY15 FPR – USWBSI ADDENDUM
DON Service Labs – Quality Control Data

Insert below Quality Control Data/Results from the FY15 Award Period (05/19/15-05/18/16):

	Check 1	Check 2	Check 3
N[a]	344	369	333
Mean (ppm)	12.31	10.91	4.08
SD[b]	1.62	1.60	0.55
% CV[c]	13.2	14.7	13.5

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