USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY17 Preliminary Final Performance Report
Due date: July 31, 2018

Cover Page

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Fiscal Year:	2017
USDA-ARS Agreement ID:	59-0206-4-023
USDA-ARS Agreement Title:	Diagnostic Services for DON.
FY17 USDA-ARS Award Amount:	$ 317,220
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:	5/19/17 - 5/18/18
Reporting Period End Date:	5/18/2018

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST	Diagnostic Services for DON.	$ 317,220
	FY17 Total ARS Award Amount	$ 317,220

Yanhong Dong 9/14/2018
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

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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?** *Address items 1-4) below for each goal or objective.*

   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
   For 2017/2018 crop year, our laboratory analyzed 29,344 samples (**Table** 1) submitted by 38 scab research groups from 19 states including Arkansas, Delaware, Georgia, Idaho, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, New York, North Carolina, North Dakota, Ohio, South Dakota, Virginia, and Wisconsin. The samples included 26,150 regular mature grain samples (4-100 g) and 3,194 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 some samples submitted by Dr. Bergstrom's and Dr. Dill-Macky's projects. For the past four years, the samples submitted to our lab were 80 ~ 85% of the numbers that we anticipated based on the survey conducted before submitting the proposal. For this year, it reached to 94%, very close to the number from the survey.

   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 2017/2018 samples

PI	Number of Sample			Institution
	Analyzed	Estimated	difference	
Alyssa Collins	0	216	-216	Pennsylvania State University
Andrew Green	1095	1100	-5	North Dakota State University
Anne McKendry	988	1200	-212	University of Missouri
Brian Steffenson	1390	700	690	University of Minnesota
Carl Bradley	602	600	2	University of Kentucky
Clay Sneller	186	120	66	Ohio State University
Corby Kistler	500	3500	-3000	UDSA-ARS, St Paul, MN
Christina Cowger	347	300	47	USDA-ARS, Raleigh, NC
Damon Smith	207	150	57	University of Wisconsin-Madison
David Van Sanford	3418	2500	918	University of Kentucky
Elias Elias	1372	500	872	North Dakota State University
Eric DeWolf	733	0	733	Kansas State University
Eric Olson	1355	1000	355	Michigan State University
Eric Stockinger	401	0	401	Ohio State University
Floyd Dowell	0	480	-480	USDA-ARS, KS
Frances Trail	112	110	2	Michigan State University
Frederic Kolb	0	2900	-2900	UIUC
Gary Bergstrom	1165	400	765	Cornell University
Gary Muehlbauer	10	1000	-990	University of Minnesota
Guihua Bai	1490	800	690	USDA-ARS, KS
Heather Kelly	0	50	-50	University of Tennessee
Jerry Johnson	195	100	95	University of Georgia
Jianli Chen	548	400	148	University of Idaho
Jim Anderson	1744	1800	-56	University of Minnesota
Jinrong Xu	0	50	-50	Purdue University
Jochum Wiersma	0	240	-240	University of Minnesota
Juliet Marshall	452	256	196	University of Idaho
Jyoti Shah	0	125	-125	University of North Texas
Kevin Smith	852	2000	-1148	University of Minnesota
Kiesten Wise	80	180	-100	Purdue University
Madeleine Smith	85	200	-115	University of Minnesota
Mark Sorrells	806	586	220	Cornell University
Martin Chilvers	577	204	373	Michigan State University
Martin Nagelkirk	187	200	-13	Michigan State University
Mohsen Mohammadi	0	1200	-1200	Purdue University
Nathan Kleczewski	293	800	-507	University of Delaware
Nathan Kleczewski/Bob Kratochvil	192	0	192	University of Maryland
Nathan Kleczewski/Jason Wight	207	0	207	University of Maryland
Nathan Kleczewski/Steven Rideout	36	0	36	Virginia Tech
Paul Murphy	527	400	127	North Carolina State University
Pierce Paul	1222	2700	-1478	Ohio State University
Richard Esten Mason	2417	1000	1417	University of Arkansas
Ruth Dill-Macky	1837	600	1237	University of Minnesota
Sharyar Kiannian	506	0	506	USDA-ARS, St Paul, MN
Stephen Harrison	1138	400	738	Louisiana State University
Yang Yen	45	100	-55	South Dakota State University
QA	27	0	27	Trilogy QA samples
Total	29344	31167	-1823	

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY17 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 FY17 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 FY17 award period?**
   No
   If yes, how many?

3. **Have any post docs who worked for you during the FY17 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   No
   If yes, how many?

4. **Have any post docs who worked for you during the FY17 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   No
   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 FY17 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

Instructions: Refer to the FY17-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY17 grant. Only include citations for publications submitted or presentations given during your award period (5/19/17 - 5/18/18). If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each reference/citation, you must indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in publication/ presentation.

Journal publications.

Sarowar, S., Alam, S., Makandar, R., Lee, H., Trick, H. N., **Dong, Y.**, Shah, J. (2018). Targeting the pattern-triggered immunity pathway for enhancing resistance to *Fusarium graminearum*. *Molecular Plant Pathology.*
Status: Submitted
Acknowledgement of Federal Support: Yes

Winter, M., Samuels, P., **Dong, Y.**, Dill-Macky, R. (2018). Trichothecene production is detrimental to early root colonization by *Fusarium culmorum* and *F. graminearum* in *Fusarium* crown and root rot of wheat. *Plant Pathology.* DOI: 10.1111/ppa.12929
Status: Published
Acknowledgement of Federal Support: NO

Van Sanford, D. A., Clark, A. J., Bradley, C., Brown-Guedira, G. L., Cowger, C., **Dong, Y.**, Baik, B. (2018). Registration of 'Pembroke 2016' soft red winter wheat. *Journal of Plant Registrations.* DOI: 10.3198/jpr2017.12.0089crc
Status: Published
Acknowledgement of Federal Support: Yes

Lofgren, L. A., Riddle, J., **Dong, Y**., Bergstrom, G. C., Kistler, H. C. (2018). A high proportion of NX-2 genotype strains are found among *Fusarium graminearum* isolates from northeastern New York State. *European Journal of Plant Pathology,* 150, 791-796. DOI: 10.1007/s10658-017-1314-6
Status: Published
Acknowledgement of Federal Support: Yes

Lofgren, L. A., LeBlanc, N. R., Certano, A. K., Nachtigall, J., LaBine, K. M., Riddle, J., Broz, K., **Dong, Y**., Bethan, B., Kafer, C. W., Kistler, H. C. (2018). *Fusarium graminearum*: Pathogen or endophyte of North American grasses? *New Phytologist,* 217, 1203-1212. DOI**:**10.1111/nph.14894
Status: Published
Acknowledgement of Federal Support: Yes

Wang, R., Chen, J., Anderson, J. A., Zhang, J., Zhao, W., Wheeler, J., Klassen, N., See, D. R., **Dong, Y.** (2017). Genome-wide association mapping of Fusarium head blight resistance in spring wheat lines developed in Pacific Northwest and CIMMYT. *Phytopathology,* 107, 1486-1495. DOI: 10.1094/PHYTO-02-17-0073-R
Status: Published
Acknowledgement of Federal Support: Yes

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

Nothing to report

Other publications, conference papers and presentations.

O'Mara, S., Broz, K., Boenisch, M.J., **Dong, Y.**, Kistler, H.C. (2017). *Fusarium* transporters for enhanced resistance to FHB. In: Canty, S., Clark, A., Wiermer, B., Van Sanford, D. (Eds.), *Proceedings of the 2017 National Fusarium Head Blight Forum.* East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative. p. 69.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (poster), NO (abstract)

Arcibal, S. S., Jackson, C. A., Shelman, T. L., **Dong, Y.**, Marshall, J. M. (2017). Integrated FHB management of spring wheat in Idaho. In: Canty, S., Clark, A., Wiermer, B., Van Sanford, D. (Eds.), *Proceedings of the 2017 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 (poster), NO (abstract)

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

FY17 FPR – USWBSI ADDENDUM
DON Service Labs – Quality Control (QC) Data

Note: What is being requested is the across lab quality control data (separate QC from Trilogy).

Insert below Quality Control Data/Results from the FY17 Award Period (5/19/17 - 5/18/18):

	Check 1	Check 2	Check 3
N[a]	454	579	140
Mean (ppm)	6.67	9.43	3.96
SD[b]	0.66	1.03	0.24
% CV[c]	9.9	10.9	6.1

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

9/14/2018