

**USDA-ARS**  
**U.S. Wheat and Barley Scab Initiative**  
**FY18 Performance Report**  
**Due date: September 23, 2019**

**Cover Page**

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<b>Fiscal Year:</b>	2018
<b>USDA-ARS Agreement ID:</b>	58-5062-8-017
<b>USDA-ARS Agreement Title:</b>	Diagnostic Services for DON.
<b>FY18 USDA-ARS Award Amount:</b>	\$ 265,513
<b>Recipient Organization:</b>	Regents of the University of Minnesota Suite 450 Sponsored FIN RPT-P100100001 Minneapolis, MN 55455-2003
<b>DUNS Number:</b>	555917996
<b>EIN:</b>	41 -6007513
<b>Recipient Identifying Number or Account Number:</b>	CON000000075991
<b>Agency PI:</b>	H. Corby Kistler
<b>Project/Grant Reporting Period:</b>	9/1/18 - 8/31/19
<b>Reporting Period End Date:</b>	08/31/19

**USWBSI Individual Project(s)**

<b>USWBSI Research Category*</b>	<b>Project Title</b>	<b>ARS Award Amount</b>
FST	Diagnostic Services for DON.	\$ 265,513
	<b>FY18 Total ARS Award Amount</b>	<b>\$ 265,513</b>



09/19/2019

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; derivatized DON for GC-MS analysis; 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 September 2018 to August 2019, our laboratory analyzed 29,073 samples (**Table 1**) submitted by 35 scab research groups from 19 states including Arkansas, Georgia, Idaho, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin. The samples included 27,131 regular mature grain samples (4-100 g) and 1,942 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, Dr. Dill-Macky's and Dr. Paul's projects. For the past six years, the numbers of samples submitted to our lab were 79 - 85% of the anticipated numbers based on the surveys conducted before submitting the proposals, except last year, which is very close to the estimate (94%).

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.

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**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.

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<b>Table 1. Summary of FY18 samples (9/1/18 - 8/31/19)</b>				
<b>PI</b>	<b>Number of Sample</b>			<b>Institution</b>
	<b>Analyzed</b>	<b>Estimated</b>	<b>difference</b>	
Alyssa Collins	0	216	-216	Pennsylvania State University
Andrew Green	1005	1000	5	North Dakota State University
Anne McKendry	0	1000	-1000	University of Missouri
Arielle Abt/Jana Murche	305	0	305	KWS Cereals/Uniform scab nurseries, IL
Brian Steffenson	2223	1800	423	University of Minnesota
Carl Bradley	546	800	-254	University of Kentucky
Clay Sneller	207	150	57	Ohio State University
Corby Kistler	1411	3500	-2089	USDA-ARS, St Paul, MN
Christina Cowger	92	300	-208	USDA-ARS, Raleigh, NC
Damon Smith	519	250	269	University of Wisconsin-Madison
Darcy Telenko	104	0	104	Purdue University
David Van Sanford	2552	3000	-448	University of Kentucky
Elias Elias	1400	1500	-100	North Dakota State University
Eric DeWolf	0	350	-350	Kansas State University
Eric Olson	1375	1500	-125	Michigan State University
Eric Stockinger	0	500	-500	Ohio State University
Floyd Dowell	0	100	-100	USDA-ARS, KS
Frances Trail	66	150	-84	Michigan State University
Frederic Kolb	673	1800	-1127	University of Illinois at Urbana Champaign
Gary Bergstrom	488	750	-262	Cornell University
Gary Muehlbauer	0	300	-300	University of Minnesota
Guihua Bai	0	1000	-1000	USDA-ARS, KS
Gongshe Hu	291	0	291	USDA-ARS, ID
Heather Kelly	0	100	-100	University of Tennessee
Jerry Johnson	98	0	98	University of Georgia
Jianli Chen	450	600	-150	University of Idaho
Jim Anderson	345	1000	-655	University of Minnesota
Jinrong Xu	0	100	-100	Purdue University
Jochum Wiersma	0	100	-100	University of Minnesota
Juliet Marshall	450	435	15	University of Idaho
Jyoti Shah	74	100	-26	University of North Texas
Kaitlyn Bissonnette	95	0	95	University of Missouri
Kevin Smith	2238	1000	1238	University of Minnesota
Madeleine Smith	36	200	-164	University of Minnesota
Mark Sorrells	748	400	348	Cornell University
Martin Chilvers	127	600	-473	Michigan State University
Martin Nagelkirk	0	220	-220	Michigan State University
Mohamed Mergoum	0	700	-700	University of Georgia

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	<b>Analyzed</b>	<b>Estimated</b>	<b>difference</b>	
Mohsen Mohammadi	655	0	655	Purdue University
Nathan Kleczewski	0	500	-500	University of Delaware
Nidhi Rawat	497	350	147	University of Maryland
Pau Esker	88	0	88	Pennsylvania State University
Paul Murphy	916	1000	-84	North Carolina State University
Pierce Paul	2315	2700	-385	Ohio State University
Richard Esten Mason	1982	1500	482	University of Arkansas
Ruth Dill-Macky	912	2000	-1088	University of Minnesota
Sharyar Kiannian	0	514	-514	USDA-ARS, St Paul, MN
Stephen Harrison	3577	1200	2377	Louisiana State University
Yang Yen	195	200	-5	South Dakota State University
QA	18	0	18	Trilogy QA samples
<b>Total</b>	<b>29073</b>	<b>35485</b>	<b>-6412</b>	

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### **Training of Next Generation Scientists**

**Instructions:** Please answer the following questions as it pertains to the FY18 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 FY18 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 FY18 award period?**  
No  
**If yes, how many?**
  
3. **Have any post docs who worked for you during the FY18 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 FY18 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?**

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**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 FY18 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations.

*NOTE: 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

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### **Publications, Conference Papers, and Presentations**

**Instructions:** Refer to the FY18-FPR\_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY18 grant. Only include citations for publications submitted or presentations given during your award period (9/1/18 - 8/31/19). 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. "Targeting the pattern-triggered immunity pathway for enhancing resistance to *Fusarium graminearum*", *Molecular Plant Pathology*, **2019**, 20(5), 626-640 (DOI: 10.1111/mpp.12781).

Status: Published

Acknowledgement of Federal Support: Yes

Tessman, E., Dong, Y., Van Sanford, D., Anthony, D. "GWAS for Fusarium Head Blight Traits in a Soft Winter Wheat Mapping Panel", *Crop Science*, **2019**, 59 (5), 1823-1837 (DOI:10.2135/cropsci2018.08.0492).

Status: Published

Acknowledgement of Federal Support: Yes

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

#### **Other publications, conference papers and presentations.**

Arcibal, S.S., Jackson, C.A., Dong, Y., Marshall, J.M. 2018. *Efficacy of a new fungicide (MIRAVIS® ACE) for managing FHB and DON in southern Idaho*. In: Canty, S.; Hoffstetter, A.; Wiermer, B.; Dill-Macky, R. (Eds.), *Proceedings of the 2018 National Fusarium Head Blight Forum* (P. 7). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (poster), NO (abstract)

O'Mara, S., Dong, Y., Kistler, H.C. (2018). *Mutations in genes for Fusarium transporters result in reduced DON accumulation and virulence*. In: Canty, S.; Hoffstetter, A.; Wiermer, B.; Dill-Macky, R. (Eds.), *Proceedings of the 2018 National Fusarium Head Blight Forum* (P.89). East Lansing, MI/Lexington, KY: U.S. Wheat & Barley Scab Initiative.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (poster), NO (abstract)



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**Project:** Diagnostic Services for DON.

**FY18 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 FY18 Award Period (9/1/18 - 8/31/19):**

	<b>Check 1</b>	<b>Check 2</b>	<b>Check 3</b>
<b>N<sup>a</sup></b>	265	773	51
<b>Mean (ppm)</b>	4.10	4.40	2.96
<b>SD<sup>b</sup></b>	0.37	0.44	0.30
<b>% CV<sup>c</sup></b>	9.0	10.0	10.1

<sup>a</sup>Number of check samples. <sup>b</sup>Standard deviation. <sup>c</sup>Coefficient of variance



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