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

Cover Page

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Fiscal Year:	2017
USDA-ARS Agreement ID:	59-0206-7-155
USDA-ARS Agreement Title:	Deoxynivalenol (DON) Analysis in Wheat.
FY17 USDA-ARS Award Amount:	$ 253,884
Recipient Organization:	North Dakota State University Office of Grant & Contract Accouting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0028208
Project/Grant Reporting Period:	8/1/17 - 7/31/18
Reporting Period End Date:	07/31/18

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST	Deoxynivalenol (DON) Analysis in Wheat	$ 253,884
	FY17 Total ARS Award Amount	$ 253,884

Dr. Senay Simsek — July 31 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: *Deoxynivalenol (DON) Analysis in Wheat*

1. What are the major goals and objectives of the project?

Goal 1. Set up funds would be used to purchase major equipment and other laboratory supplies to establish large scale DON testing laboratories in Loftsgard Hall where Plant Sciences Department is housed.

Goal 2. After laboratory is prepared, Wheat Quality Laboratories in Plant Sciences Department at North Dakota State University will provide DON analyses on approximately 10,000+ wheat samples/year for about 16 to 20 scientists from central USA. The gas chromatography/mass spectrometry (GC/MS) method would be used for DON analysis. The Wheat Quality group has previous experience with the analysis method.

Goal 3. The Wheat Quality Laboratory is capable of analysis if DON derivatives upon request.

2. What was accomplished under these goals? *Address items 1-4) below for each goal or objective.*

1) major activities

The set up funds were used to purchase a GC-MS instrument and all other laboratory equipment (shakers, evaporator, glassware, consumables) needed to run the mycotoxin analysis lab and analyze the samples sent by the cooperators. DON analysis was provided for 7849 wheat samples sent by 13 cooperators. Our laboratory was capable of determining DON derivatives. However, analysis of DON derivatives was not requested by any of the cooperators.

2) specific objectives

Our laboratory was set up as quickly and efficiently as possible to ensure a timely start to analysis of samples. GC-MS analysis was successfully completed for samples sent from 13 cooperators. Analysis of samples from 2 cooperators are still in progress and scheduled to be completed in August 2018. The late completion of samples is due to the late startup date of the laboratory. Our laboratory was able to analyze DON and it's derivatives in wheat using GC-MS.

3) significant results

Results for DON content of samples sent by cooperators were obtained and provided to the cooperators. The results were obtained for 7849 samples. QC samples were also analyzed 145 times through the year to keep track of the quality of data and accuracy of the DON analysis. The mean DON contents of the low and high QC samples were 0.72 and 2.42 ppm, respectively. The DON content measured for the low QC sample ranged from 0.57 to 0.87 ppm, while the DON content measured for the high QC sample ranged from 1.97 to 2.87. The standard deviation for the low QC was 0.15 and the standard deviation for the high QC was 0.45. The C.V values for the low and high QC samples were 21.5% and 18.8%, respectively.

4) key outcomes or other achievements

The major outcome of this project for FY17 was that we were able to effectively start up a brand new laboratory for the analysis of DON for cooperators involved in USWBSI research. Even though our lab had a late start we were able to analyze the majority of samples for most of the cooperators. There are 2 projects samples in progress with one small project set to be completed for FY17, with a projected completion in August 2018.

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

There were several opportunities for training and professional development provided by this project. The technician involved in this project gained new knowledge about DON analysis by GC-MS. This project has provided opportunities for training and professional development of an undergraduate student laboratory assistant and one graduate student researcher. The students funded by this project were able to learn valuable laboratory skills. They were also able to gain knowledge about wheat and mycotoxins and the importance of the management of *fusarium* head blight and mycotoxins in wheat crops.

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

The results of the DON analysis have been provided with written and/or electronic copies of the analytical data. The scientists received reports of analytical data which was interpreted and analyzed according to their experiments. Check samples for DON were be utilized in participation with other designated USWBSI laboratories and reported as such.

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?** Yes

   If yes, how many? One

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?** yes

   If yes, how many? one

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 (8/1/17 - 7/31/18). 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.

Nothing to report.

Journal publications.

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

Other publications, conference papers and presentations.

PI: Simsek, Senay
Project: Deoxynivalenol (DON) Analysis in Wheat

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 (8/1/17 - 7/31/18):

Sample	Low PPM QC	HI PPM QC
Mean	0.72	2.42
Standard Dev.	0.15	0.45
C.V.	21.54%	18.78%
Low	0.57	1.97
High	0.87	2.87
Number	145	145

Researcher	University	Sample Type	Number of Samples	Completed
Wegulo	U of Neb-L	wheat	896	yes
Friskop	NDSU PP	wheat	128	yes
Schatz	NDSU Carrington	wheat	64	yes
Green	NDSU PLSC	wheat	250	yes
Wegulo	UofNeb Lin	wheat	136	yes
Green	NDSU PLSC	wheat	500	yes
Hongbin	NDSU PP	HRW	179	yes
Wegulo	U of Neb-L	wheat	160	yes
Green	NDSU PLSC	wheat	500	yes
Schatz	NDSU Carrington	durum	36	yes
Schatz	NDSU Carrington	wheat	72	yes
Green	NDSU PLSC	wheat	500	yes
Yabwalo	SDSU	wheat	345	yes
Green	NDSU PLSC	wheat	500	yes
Yabwalo	SDSU	wheat	500	yes
Elias	NDSU PLSC	Durum	1066	in progress
Glover	SDSU	wheat	1116	in progress
Simsek	NDSU	wheat	95	yes
Sebgal	SDSU	wtr wheat	433	no
Shoabin	NDSU	wheat	373	no
Total			7849	