USDA-ARS | U.S. Wheat and Barley Scab Initiative

FY22 Performance Progress Report

Due date: July 26, 2023

Cover Page

USDA-ARS Agreement ID:	59-0206-2-123
USDA-ARS Agreement Title:	Deoxynivalenol (DON) in Wheat and Barley
Principle Investigator (PI):	Zhao Jin
Institution:	North Dakota State University
Institution UEI:	EZ4WPGRE1RD5
Fiscal Year:	2022
FY22 USDA-ARS Award Amount:	$456,280
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Period of Performance:	May 1, 2022 – April 30, 2026
Reporting Period End Date:	April 30, 2023

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
FST-S	Deoxynivalenol (DON) Analysis in Wheat	$456,280
	FY22 Total ARS Award Amount	$456,280

I am submitting this report as an: ☒ Annual Report

I certify to the best of my knowledge and belief that this report is correct and complete for performance of activities for the purposes set forth in the award documents.

Zhao Jin — 06/30/2023

Principal Investigator Signature — Date Report Submitted

* BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
EC-HQ – Executive Committee-Headquarters
FST-R – Food Safety & Toxicology (Research)
FST-S – Food Safety & Toxicology (Service)
GDER – Gene Discovery & Engineering Resistance
HWW-CP – Hard Winter Wheat Coordinated Project
MGMT – FHB Management
MGMT-IM – FHB Management – Integrated Management Coordinated Project
PBG – Pathogen Biology & Genetics
TSCI – Transformational Science
VDHR – Variety Development & Uniform Nurseries
NWW –Northern Soft Winter Wheat Region
SPR – Spring Wheat Region
SWW – Southern Soft Red Winter Wheat Region

Project 1: Deoxynivalenol (DON) Analysis in Wheat

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1. **What are the major goals and objectives of the research project?**
   The goal of this project is to provide barley, wheat and durum breeders, plant pathologists, and other researchers working on the development of Fusarium resistant barley, wheat and durum with affordable, accurate and timely DON analysis.

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

   a) **What were the major activities?**
   Analysis of 18,568 samples, including 10,642 barley samples and 7,926 wheat samples for DON during this reporting period (exclusive of checks and standard curves) were analyzed for DON during the reporting period. Approximately 39 researchers from 13 US states (NC, ND, MN, SD, MT, CO, NE, KS, TX, ID, OH, CA and NY) were submitted the samples and the majority of them were from breeding and pathology programs. Some of the samples were from other researchers.

   b) **What were the significant results?**
   Completion of analyzing submitted samples largely within the reporting period. The results were submitted to and accepted by all cooperators involved in USWBSI research.

   c) **List key outcomes or other achievements.**
   Improvement in the intra-lab QC, as evidenced by lower check samples coefficients of variation.

3. **What opportunities for training and professional development has the project provided?**
   One graduate student and two undergraduate students assisted in the laboratory with the testing. The students have learned basic laboratory skills and laboratory quality control, and the graduate student has developed relevant research on Fusarium-produced mycotoxins in cereals.

4. **How have the results been disseminated to communities of interest?**
   Results have been sent directly to investigators. Lab protocol and allotments are posted on the USWBSI website.

Publications, Conference Papers, and Presentations

Please include a listing of all your publications/presentations about your FHB work that were a result of funding from your FY22 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period** should be included.

Did you publish/submit or present anything during this award period May 1, 2022 – April 30, 2023?

☒ Yes, I've included the citation reference in listing(s) below.

☐ No, I have nothing to report.

Journal publications as a result of FY22 award

List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like.

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published [include DOI#]; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Books or other non-periodical, one-time publications as a result of FY22 award

Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis, or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Other publications, conference papers and presentations as a result of FY22 award

Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication.

Jin Z. (2022). The Role of Fusarium Damaged Kernels in DON Accumulation during the Malting of FHB Infected Wheat. *Proceedings of the 2022 National Fusarium Head Blight Forum*; Tampa, FL. December 4-6, 2022. Retrieved from: https://scabusa.org/forum/2022/2022NFHBForumProceedings.pdf

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 Award Period (5/1/22 -4/30/23):

Table 1. Quality Control Data on **Wheat** DON Internal Checks

DON level	Low PPM	High PPM
ID#	1	2
Average	0.90	3.10
Std dev	0.60	1.80
cv	0.70	0.58
Min	0.39	1.11
Max	2.10	5.30
N	186	186

Table 2. Quality Control Data on **Barley** DON Internal Checks

DON level	Clean	Low PPM	Middle PPM	High PPM	High PPM	High PPM	High PPM
ID#	22	17	7	44/45	mix	50	51
Average	0.03	0.59	4.52	25.87	29.10	157.40	89.79
Std dev	0.03	0.21	0.81	2.94	4.27	34.53	17.60
cv	None	36.26	17.91	11.35	14.66	21.94	19.60
Min	0.00	0.37	3.71	22.93	24.83	122.87	72.20
Max	0.07	0.80	5.33	28.80	33.37	191.93	107.39
N	61	66	80	34	33	78	79

Table 3. Quality Control Data on **Barley Malt** DON Internal Checks

DON level	Low PPM	Middle PPM	Middle PPM	High PPM	High PPM	High PPM
ID#	20	5	31	29	15	32
Average	2.26	8.46	11.84	19.80	20.96	28.19
Std dev	0.57	1.49	1.68	3.28	3.92	4.76
cv	25.24	17.64	14.21	16.55	18.72	16.90
Min	1.69	6.97	10.16	16.52	17.03	23.43
Max	2.84	9.95	13.52	23.08	24.88	32.96
N	75	86	74	73	73	72