

**FY21 Performance Progress Report****Due date:** July 26, 2023**Cover Page**

<b>USDA-ARS Agreement ID:</b>	59-0206-0-120
<b>USDA-ARS Agreement Title:</b>	Developing 6- and 2-rowed Malting Barley Cultivars with Reduced FHB and DON
<b>Principle Investigator (PI):</b>	Richard Horsley
<b>Institution:</b>	North Dakota State University
<b>Institution UEI:</b>	EZ4WPGRE1RD5
<b>Fiscal Year:</b>	2021
<b>FY21 USDA-ARS Award Amount:</b>	\$203,584
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<b>Period of Performance:</b>	5/3/21 - 5/2/23
<b>Reporting Period End Date:</b>	5/2/2024

**USWBSI Individual Project(s)**

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON	\$203,584
<b>FY21 Total ARS Award Amount</b>		<b>\$203,584</b>

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.*



7/5/2023

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: Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON

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

The overall goal of this project is to develop two-rowed malting barley cultivars with enhanced resistance to FHB and reduced DON accumulation. Our goals for this project were: 1) continued development and screening of two-rowed barley lines in our breeding program for reduced FHB and DON, 2) growing the North American Barley Scab Evaluation Nursery (NABSEN) at our Osnabrock, ND research site, and 3) collect FHB and DON data on cultivars and advanced breeding lines that can be used by growers for making decisions on what cultivar(s) to grow.

### 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?

Made 123 crosses to incorporate improved agronomic performance, end-use quality, and reduced DON accumulation.

Evaluated 985 experimental barley lines in replicated yield trials at five locations in North Dakota.

About 12,612 F<sub>3</sub> and F<sub>4</sub> head rows were grown that included material that had at least one parent in its pedigree that had reduced DON accumulation.

#### b) What were the significant results?

The two-rowed lines 2ND38344, 2ND39010, 2ND39092, 2ND39256, and 2ND39424 were submitted to the AMBA's Pilot Scale evaluation system. All lines except 2ND38344 were in their first year of Pilot Scale evaluation. 2ND38344 was in its second year of Pilot Scale evaluation. All lines were rated satisfactory. Lines found satisfactory in two years of Pilot Scale evaluation are eligible for Plant Scale evaluation. DON levels of all five lines was less than that of AAC Synergy, one of the most widely grown cultivars in ND.

#### c) List key outcomes or other achievements.

The two-rowed line 2ND36638 is undergoing its first year of Plant Scale evaluation by Rahr Malting in 2023. Cultivars found satisfactory in this final stage of evaluation are eligible for addition to the AMBA Recommended list of Malting Varieties. DON accumulation of 2ND36638 is intermediate to that of AAC Synergy and ND Genesis.

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

Makenson Maisonneuve, an MS student from Haiti, is conducting research to update our genomic selection model for DON accumulation.

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

Results are disseminated via articles in peer-reviewed journals and popular press, field day presentations, and presentations to stakeholder groups at local and regional meetings.

## 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 FY21 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?**

- Yes, I've included the citation reference in listing(s) below.  
 No, I have nothing to report.

### Journal publications as a result of FY21 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).

Nothing to report

### Books or other non-periodical, one-time publications as a result of FY21 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).

Nothing to report

### Other publications, conference papers and presentations as a result of FY21 award

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

Nothing to report

*In addition to the required inclusion in this report, to increase the visibility of your work we encourage you to also submit your publications in the new [USWBSI ScabSource Publication Database](#), an open-access resource for all FHB researchers to reference.*