

USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: July 29, 2021

Cover Page

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Fiscal Year:	2020
USDA-ARS Agreement ID:	59-0206-0-157
USDA-ARS Agreement Title:	Value of Genetic Resistance and Fungicides on FHB Control in Durum
FY20 USDA-ARS Award Amount:	\$ 14,013
Recipient Organization:	North Dakota State University Office of Grant & Contract Accounting NDSU Dept 3130, PO Box 6050 Fargo, ND 58108-0650
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number:	FAR0031914
Project/Grant Reporting Period:	5/10/20 - 5/9/21
Reporting Period End Date:	5/9/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
DUR-CP	Value of Genetic Resistance and Fungicides on FHB Control in Durum	\$ 14,013
FY20 Total ARS Award Amount		\$ 14,013



7-17-2021

Principal Investigator

Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
R- Research
S – Service (DON Testing Labs)
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

Project 1: *Value of Genetic Resistance and Fungicides on FHB Control in Durum*

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

The level of genetic resistance to FHB in durum wheat varieties is lower than is found in spring wheat varieties. Therefore, the integration of fungicides with the best genetic resistance is critical if FHB losses in durum are to be minimized. The objective of this research was to quantify the effect of currently available durum cultivars when combined with the best fungicide practices on the control of FHB and DON. This research was conducted under misted and inoculate conditions and under natural levels of inoculum without misting. A few promising advanced lines were included in order to obtain data on how they perform at the yield-plot-level.

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?

Variety by fungicide trials were conducted at the REC in Langdon under misted conditions and at Prosper under natural conditions.

b) What were the significant results?

Conditions were favorable for the development of high yield (averaged across genotypes yield with fungicide was greater than 80 bu/acre in both locations) in 2020, so we were able to get good information on the agronomic performance of the cultivars and lines tested. In Prosper (not misted), when averaged over all genotypes, fungicides increased yields by 5 bu/acre and reduced DON by 0.7 ppm. The yield and DON levels in genotypes when grown without fungicides ranged from 67.9 to 87.6 bu/acre and 1.7 and 4.5 ppm, respectively. The lowest overall DON level (0.8 ppm) was achieved with the advanced line SX189GL04 was treated with fungicide. Under misted conditions at Langdon, fungicide increased yield by 11 bu/acre and reduced DON by 4.4 ppm on average. The range in yield and DON for the genotypes without fungicide was 66.0 to 80.2 bu/acre and 5.5 and 11.6 ppm, respectively. The combination of fungicide and the best genotype resulted in a DON level of 1.8 ppm. There are two advanced lines that have promising levels of FHB resistance, though their yield was somewhat lower than the best cultivars.

c) List key outcomes or other achievements.

The information from these trials demonstrates the relative value of fungicides in controlling FHB and in enhancing yield in two distinct environments. The data were also very helpful in categorizing varieties as to their relative resistance to FHB. This information is published in the variety selection guide and is used by growers when

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selecting new varieties. Data on yield and DON levels of advanced lines has also been helpful to the breeding programs.

3. Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns and/or restrictions, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.

There were no major constraints to the implementation of the work in 2020 and the planned trials have also been planted in 2021 at two locations.

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

One graduate student gained experience with testing fungicides on a range of varieties and on evaluating them for FHB resistance.

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

The results were used to update variety information in the durum variety selection guide published by NDSU Extension. The data from the experiments were also shared with the two breeders that developed the lines included in the trial.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/10/20 - 5/9/21). 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 FY20 award period?**

Yes No

If yes, how many? [Click to enter number here.](#)

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY20 award period?**

Yes No

If yes, how many? 1

3. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**

Yes No

If yes, how many? [Click to enter number here.](#)

4. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**

Yes No

If yes, how many? [Click to enter number here.](#)

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Publications, Conference Papers, and Presentations

Instructions: Refer to the PR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY20 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (5/10/20 - 5/9/21)** should be included. If you did not publish/submit or present anything, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each citation, you **must** indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in the publication/presentation. See example below for a poster presentation with an abstract:

Winn, Z.J., Acharya, R., Lyerly, J., Brown-Guedira, G., Cowger, C., Griffey, C., Fitzgerald, J., Mason R.E., and Murphy, J.P. (2020, Dec 7-11). Mapping of Fusarium Head Blight Resistance in NC13-20076 Soft Red Winter Wheat (p. 12). In: Canty, S., Hoffstetter, A. and Dill-Macky, R. (Eds.), *Proceedings of the 2020 National Fusarium Head Blight Forum*. https://scabusa.org/pdfs/NFHB20_Proceedings.pdf.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Nothing to report.

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

Nothing to report.

Other publications, conference papers and presentations.

Nothing to report.