


USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY19 Final Performance Report
Due date: July 24, 2020

Cover Page

| | |
|--|---|
| Principle Investigator (PI): | Joel Ransom |
| Institution: | North Dakota State University |
| E-mail: | joel.ransom@ndsu.edu |
| Phone: | 701-730-0384 |
| Fiscal Year: | 2019 |
| USDA-ARS Agreement ID: | 59-0206-6-002 |
| USDA-ARS Agreement Title: | Value of Genetic Resistance and Fungicides on FHB Control in Durum |
| FY19 USDA-ARS Award Amount: | \$ 10,500 |
| 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: | FAR0025286 |
| Project/Grant Reporting Period: | 5/1019 - 5/9/20 |
| Reporting Period End Date: | 5/9/2020 |

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 | \$ 10,500 |
| FY19 Total ARS Award Amount | | \$ 10,500 |



Principal Investigator

7/7/2020

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

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 practice 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 plot-level.

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

a) What were the major activities?

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

b) What were the significant results?

Due to very excessive moisture during the growing season, so yield data was discarded at both locations. DON values, however, were collected and summarized. Somewhat surprising, DON levels were higher at the Prosper location (average = 8.1 ppm), which was not misted, than at Carrington which was misted (average = 3.6). Two experimental lines (D151346 and D151343) averaged across treatments and locations had the lowest DON levels. Fungicide reduced DON levels from 10.8 to 5.4 ppm averaged across genotypes at Prosper and from 4.2 to 3.0 ppm at Carrington. It is not clear why fungicide was so much more effective at Prosper than at Carrington. Fungicide applied at Prosper to D151343 resulted in 1.3 ppm DON, the only treatment resulting in DON levels acceptable in the market.

c) List key outcomes or other achievements.

The information on the relative performance of the released varieties will provided practical guidance to growers who are likely to see FHB damage on their farms. These data also provide information to farmers on the type of FHB control they can expect when using fungicides. The results were useful to the breeding program as it showed how new genotypes performed relative to widely grown varieties.

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

No. The trials planned for 2020 were planted without serious delay and will be treated with fungicide without any negative impact.

FY19 Final Performance Report
PI: Ransom, Joel
USDA-ARS Agreement #: 59-0206-6-002
Reporting Period: 5/1019 - 5/9/20

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

Five graduate students gained experience on how to evaluate FHB damage and on how to apply fungicides and evaluate their effectiveness

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

In general terms the results were used to update variety information in the durum variety selection guide published by NDSU Extension. Because of the poor growth in the plots however, the specific results were not published or presented elsewhere.

FY19 Final Performance Report
PI: Ransom, Joel
USDA-ARS Agreement #: 59-0206-6-002
Reporting Period: 5/1019 - 5/9/20

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY19 award period (5/1019 - 5/9/20). 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 FY19 award period?** No
2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY19 award period?** Yes, part funding.

If yes, how many? 1

3. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?** None.
4. **Have any post docs who worked for you during the FY19 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

FY19 Final Performance Report
 PI: Ransom, Joel
 USDA-ARS Agreement #: 59-0206-6-002
 Reporting Period: 5/1019 - 5/9/20

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 FY19 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

FY19 Final Performance Report
PI: Ransom, Joel
USDA-ARS Agreement #: 59-0206-6-002
Reporting Period: 5/1019 - 5/9/20

Publications, Conference Papers, and Presentations

Instructions: Refer to the FY19-FPR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY19 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (5/1019 - 5/9/20)** 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:

De Wolf, E., D. Shah, P. Paul, L. Madden, S. Crawford, D. Hane, S. Canty, R. Dill-Macky, D. Van Sanford, K. Imhoff and D. Miller. 2019. "Impact of Prediction Tools for Fusarium Head Blight in the US, 2009-2019." In: S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Macky (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum*, Milwaukee, WI; December 8-10. University of Kentucky, Lexington, KY. p. 12.

Status: Abstract Published and Poster Presented

Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Cowger, C., C. Bradley, J. Ransom, G. Bergstrom. 2020. Managing a destructive, episodic crop disease: A national survey of wheat and barley growers' experience with Fusarium Head Blight. *Plant Disease*. <https://doi.org/10.1094/PDIS-10-18-1803-SR> .

Status: Published

Acknowledgement of Federal Support: YES

McKee, G., C. Cowger, R. Dill-Macky, A. Friskop, Pravin Gautam, J. Ransom and W. Wilson. 2019. Disease management and estimated effects on DON (Deoxynivalenol) contamination in *Fusarium* infested barley. *Agriculture* 9(7): 155;

<https://doi.org/10.3390/agriculture9070155>.

Status: Published

Acknowledgement of Federal Support: YES

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

Other publications, conference papers and presentations.