

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page

Principle Investigator (PI):	Clair Keene
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Fiscal Year:	2021
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 Department of Plant Sciences Dept 7670, PO Box 6050 Fargo, ND 58108-6050
DUNS Number:	80-388-2299
EIN:	45-6002439
Recipient Identifying Number or Account Number, if any:	FAR0031914
Project/Grant Period:	5/10/21 - 5/9/23
Reporting Period End Date:	5/9/2022

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
FY21 Total ARS Award Amount		\$14,013

I am submitting this report as an: Annual Report Final 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.

7/18/2022

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

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

- 1) Evaluate genetic resistance and use of fungicides as FHB management strategies in durum wheat under high and moderate disease pressure environments.
- 2) Share research findings with durum growers in North Dakota to promote best management practices and inform variety selection.

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?

Objective 1: Durum variety by fungicide field trials were planted at Prosper under prevailing environmental conditions, i.e. dryland, and at the Langdon Research Extension Center under misted conditions in 2021 and 2022. Eight varieties were included in both years. Trials were managed as a split-plot design with fungicide as the main plot and variety as the subplot. Data collected included disease ratings, yield, protein, and DON.

Objective 2: Trial results were included in the annual NDSU Extension bulletin *North Dakota Durum Wheat Variety Trial Results and Selection Guide* and discussed at winter Extension grower meetings.

b) What were the significant results?

Objective 1: In 2021, there was no significant difference between durum yield with and without fungicide at the non-misted Prosper site nor were there any significant differences among varieties. The average yield for plots was 88.1 and 84.9 bushels per acre without and with fungicide, respectively. 2021 was marked by wide-spread drought conditions in North Dakota which were not favorable for FHB infection. DON was not detected in grain samples from the Prosper location.

Under misted conditions at Langdon, there was a significant interaction of fungicide by variety in 2021. In 5 out of 8 varieties tested, fungicide increased yield an average of 27.9 bushels, but in 3 varieties, fungicide did not increase yield. Across varieties, fungicide treated plots yielded an average of 67.6 bushels per acre and no fungicide plots 51.1 bushels per acre; an increase of 16.5 bushels. Fungicide decreased DON in all durum varieties at Langdon in 2021. In 7 out of 8 varieties tested, fungicide reduced DON from 3-7 ppm down to 1 or less ppm. There were no significant differences in DON level by variety, however.

At the time of this report, 2022 durum variety by fungicide trials were planted at Prosper and Langdon as described above but neither yield nor DON data were available for analysis.

Objective 2: When discussing 2021 results at winter meetings, data were presented from Prosper in which no return on investment in fungicide was observed and from Langdon where there was a high ROI on fungicide. This provided a good opportunity to highlight how persistent drought conditions made the environment low-risk for FHB and did not merit a fungicide application.

c) List key outcomes or other achievements.

Project data is shared with Dr. Elias the NDSU durum wheat breeder to provide him with insight into variety performance and FHB resistance in multiple environments.

2021 data was of great interest to growers who wanted to know if fungicide application provided a return on investment in the dry growing conditions of 2021.

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

The project PI Dr. Clair Keene started in her current position in July 2021. This project has introduced her to others in the USWBSI and facilitated new collaborations for her.

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

Published in the *North Dakota Durum Wheat Variety Trial Results for 2021 and Selection Guide* and distributed through NDSU Extension Research Extension Centers, county extension offices, and extension winter meetings. Also available online

<https://www.ndsu.edu/agriculture/ag-hub/publications/north-dakota-durum-wheat-variety-trial-results-2021-and-selection-guide>

Dr. Keene presented trial results at various winter meetings including the annual Durum Forum, North Dakota Wheat Commission Annual Meeting, and Prairie Grains conference.

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 grant 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 FY21 grant 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 FY21 grant award

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

Keene C, Elias E, Friskop A, Friesen T, Liu Z, Zhong S, Manthey F, Schatz B, Ostlie M, Martin G, Hanson B, Rickertsen J, Eriksmoen E, Pradhan G. North Dakota Durum Wheat Variety Trial Results for 2021 and Selection Guide:. NDSU Extension bulletin A1067-21.

Keene, C. Wheat management in drought. Prairie Grains Conference. Grand Forks, ND 12/9/2021. Oral presentation.

Keene, C. Small grain agronomy research at NDSU. ND Wheat Commission Annual Meeting. Bismarck, ND 12/15/2021. Oral presentation.