

FY22 Performance Progress Report**Due date:** July 26, 2023**Cover Page**

USDA-ARS Agreement ID:	59-0206-2-117
USDA-ARS Agreement Title:	Genetic Resistance and Fungicide for Fusarium Head Blight (FHB) Control in Durum
Principle Investigator (PI):	Clair Keene
Institution:	North Dakota State University
Institution UEI:	EZ4WPGRE1RD5
Fiscal Year:	2022
FY22 USDA-ARS Award Amount:	\$16,107
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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
DUR-CP	The Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in ND	\$16,107
FY22 Total ARS Award Amount		\$16,107

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.



Principal Investigator Signature

July 26, 2023

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

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

The goal of this project is to provide farmers the data they need to adopt improved Fusarium Head Blight (FHB, also known as head scab) management practices in North Dakota-grown durum wheat.

Objectives of this project are:

- i.) Evaluate yield and DON in durum variety by fungicide trials under misted (i.e., high disease pressure) and dryland (i.e., low disease pressure) environments in Langdon and Prosper, respectively.
- ii.) Extend research data and conclusions to farmers and other durum industry stakeholders at extension meetings.

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?

- i.) The durum by fungicide trials were planted at Prosper under dryland conditions on May 19 and on May 22, 2023 at Langdon under misted conditions. Eight durum varieties, 7 named and released NDSU varieties and 1 unnamed experimental variety, were included in 2023 trials at both locations. Corn spawn inoculum carrying *Fusarium* fungus was applied at boot to early heading in both locations. Fungicide applications were made at approximately 7 days after early flowering at both locations.
- ii.) PI Dr. Clair Keene spoke at the Langdon Research Extension Center field day on July 20th and shared results of the 2020-2022 trials with attendees, totaling 80 people. Results from 2022 were shared with durum buyers, millers, and pasta company representatives at the Durum Forum meeting hosted by the ND Wheat Commission on November 2, 2022.

b) What were the significant results?

- i.) 2023 experiments are on-going and data has not yet been analyzed. At the Prosper dryland site in 2022, yields without fungicide were higher than with fungicide, at 65.3 and 60.6 bushels per acre, respectively. DON was higher without fungicide (2.9 ppm averaged across varieties) than with fungicide (2.5 ppm). It is an unexpected result that yields were higher without fungicide, despite the higher level of DON in this treatment. The yield results were driven by the varieties Carpio and ND Stanley, both of which had higher yields without fungicide than with it. In Langdon in 2022, yields were higher with fungicide than without, 87.3 and 81.1 bushels per acre, respectively. DON levels from Langdon were higher in untreated plots (2.5 ppm averaged across varieties) than in treated plots (0.4 ppm).
- ii.) Attendees at the annual Durum Forum meeting held in November 2022 found the varietal information useful and expressed support for

continuation of the work. After the 2023 LREC field day, durum growers in attendance expressed support for the work and commented knowing the level of scab resistance in unreleased varieties is helpful when considering future varietal selection options.

c) List key outcomes or other achievements.

- i.) Collaboration between the NDSU main campus extension small grain agronomy program and the LREC plant pathology research program remains strong as a result of this joint study. The 2022 data were provided to the NDSU durum wheat breeding program in an effort to refine scab resistance ratings provided to growers in the annual variety trial reports.
- ii.) Attendees at the 2022 Durum Forum and 2023 Langdon REC field day expressed appreciation for the useful information provided by these trials. PI Dr. Keene used results from the 2022 trials to help inform scab resistance ratings of durum varieties that appeared in the 2022 NDSU Durum Variety Selection Guide.

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

Co-PI Dr. Venkata Chapara presented data from previous year trials at the 2022 Langdon Research Extension Center Durum Grower's day in June 2022 to approximately 25 attendees.

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

- Results to date were shared directly with durum growers at the 2022 Langdon REC Durum Grower's field tour in June 2022.
- A summary of all previous years' data was discussed at the 2022 Durum Forum organized by the ND Wheat Commission in Minot, ND in November 2022.
- Results to date were shared directly with durum growers and other agricultural stakeholders such as agronomists and input suppliers at the Langdon Research Extension Center annual field day held in July 2023.

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.

Clair Keene et al. 2022. North Dakota Durum Wheat Variety Trial Results for 2022 and Selection Guide. NDSU Extension Bulletin A1067-22.