

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page

Principle Investigator (PI):	Christina Cowger
Institution:	USDA-ARS
E-mail:	christina.cowger@usda.gov
Phone:	919-513-7388
Fiscal Year:	2021
USDA-ARS Agreement ID:	N/A
USDA-ARS Agreement Title:	Improvement and Adoption of FHB Management Techniques
FY20 USDA-ARS Award Amount:	\$21,500
Recipient Organization:	USDA-ARS NCSU Department of Entomology and Plant Pathology 3409 Gardner Hall PO Box 7616, CB7616 Raleigh, NC 27695-7616
DUNS Number:	N/A
EIN:	N/A
Project/Grant Period:	5/1/21 - 4/30/22
Reporting Period End Date:	4/30/2022

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT-IM	Efficacy of Miravis Ace for FHB and DON reduction in Winter Barley	\$21,500
FY21 Total ARS Award Amount		\$21,500

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.

Christina Cowger

Principal Investigator Signature

6/28/22
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: Efficacy of Miravis Ace for FHB and DON reduction in Winter Barley

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

The objective is to better understand profitability of integrating cultivar resistance and fungicide applications for scab reduction in Mid-Atlantic winter barley crops.

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?

In 2017-18, 2018-19, 2019-20, 2020-21, we conducted four years of a multi-year integrated management experiment using three winter barley cultivars with different levels of resistance to FHB: Violetta (MR), Thoroughbred (MR/MS), and Flavia (S). Inoculation was with *Fusarium*-infected corn spawn applied in three batches at one-week intervals. We used the six standard CP-IM fungicide treatments for Objective 1, plus four additional fungicide treatments, and all standard data were collected.

The treatments allow comparisons of the efficacy of Miravis Ace to that of Prosaro and Caramba, and comparisons of three fungicide timings (spikes half emerged, spikes just fully emerged, and 6 days after spikes fully emerged). These treatments also allow estimation of the mean benefits of fungicide application, cultivar resistance, and the combination of the two in terms of yield, test weight, and DON reduction.

b) What were the significant results?

We collected data on visual symptoms, DON, test weight, and yield.

c) List key outcomes or other achievements.

The experiment has shown that Miravis Ace is as effective as Prosaro or Caramba when applied at early full heading or 6 days later. However, efficacy of all three products was lower when applied at 50% barley spike emergence. This is one of the only replicated field experiments with winter barley to provide definitive information on fungicide choice and timing as well as barley resistance.

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

The project has helped train two technicians in management of FHB field experiments, including inoculum production and application, establishment of effective mist irrigation programs, disease assessment techniques, and sample processing for test weight and DON analysis. A graduate student is in his second year of working on FHB in our project.

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

We have presented the results at field days in North Carolina which draw hundreds of growers and crop consultants and county agents; presented a poster at the Joint Crops meeting which draws hundreds of farmers and crop advisors from the Mid-Atlantic region; and published a peer-reviewed article in *Plant Disease*.

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).

Cowger, C., Beccari, G., and Dong, Y. 2020. Timing of susceptibility to Fusarium head blight in winter wheat. *Plant Dis.* 104:2928-2939. <https://doi.org/10.1094/PDIS-03-20-0527-RE>; acknowledgement of federal support - yes.

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).

Cowger, C., 2021. Key challenges in breeding durable disease-resistant cereals: North America. In *Achieving Durable Disease Resistance in Cereals*. R. Oliver, ed. Burleigh-Dodds Science Publishing Ltd., Cambridge, UK. ISBN: Hardback 978-1-78676-601-4, ePub 978-1-78676-603-8, Mobi 978-1-78676-602-1, PDF 978-1-78676-604-5; acknowledgment of federal support - yes.

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.

Cowger, C. and Clark, L. (2021). Optimal Timing to Apply Fungicide to Winter Barley for FHB and DON Reduction. Proceedings of the 2021 National Fusarium Head Blight Forum; Virtual. December 6-7, 2021. Retrieved from: <https://scabusa.org/forum/2021/2021NFHBForumProceedings.pdf>