

FY21 Performance Progress Report

Due date: July 26, 2022

Cover Page


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Fiscal Year:	2021
USDA-ARS Agreement ID:	59-0206-0-115
USDA-ARS Agreement Title:	Fungicide Efficacy in FHB/DON Management for Hard Red Winter and Spring Wheat in SD
FY20 USDA-ARS Award Amount:	\$34,092
Recipient Organization:	South Dakota State University Plant Science Dept. 2380 Research Parkway, Brookings, SD 57006-0001
DUNS Number:	929929743
EIN:	46-6000364
Recipient Identifying Number or Account Number, if any:	SA2000527
Project/Grant Period:	5/6/21 - 5/5/23
Reporting Period End Date:	5/5/2022

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT-IM	Fungicide Timing Efficacy in the Management of FHB and DON of Wheat in South Dakota	\$34,092
FY21 Total ARS Award Amount		\$34,092

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.



Principal Investigator Signature

8/2/22

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: Fungicide Timing Efficacy in the Management of FHB and DON of Wheat in South Dakota

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

- I. Determine the efficacy of Miravis Ace® applied at heading for FHB and DON management.
- II. Determine the efficacy of Miravis Ace fungicide treatment at flowering for FHB and DON management in wheat; and
- III. Generate data to advance the FHB and DON risk prediction effort.

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?

Integrated FHB management trial (IMT): Three hard red spring wheat cultivars, Brick (FHB-resistant), Boost (FHB-moderately resistant) and Samson (FHB-susceptible) were planted at two locations: SDSU Volga Research Farm near Brookings, and Northeast Research Farm (NERF) near South shore in May of 2021. Treatments evaluated were: Miravis Ace 13.7 fl oz/ac applied at heading; Miravis Ace 13.7 fl oz/ac applied at half head out (Feekes 10.3), at the beginning of flowering (Feekes 10.5.1), Prosar®o 6.5 fl oz/ac applied at flowering, Sphaerex at 7.3 fl oz/ac at flowering and a non-treated check. *Uniform trial:* A uniform fungicide study was also set up at Volga and at NERF in 2021. A susceptible hard red spring wheat variety, Samson, was planted and treatments included Miravis Ace applied at half head out (Feekes 10.3), beginning of flowering (Feekes 10.5.1) and 4 to 6 days after beginning of flowering. Caramba and Prosaro were applied at the beginning of flowering at 13.5 and 6.5 fl oz/ac. Additionally, Caramba, Prosaro and Tebuconazole were applied 4 to 6 days after Miravis Ace application at Feekes 10.5.1. The plots at the Volga location for both experiments were inoculated with corn spawn infected with *Fusarium graminearum* at 3.33 g per square foot. An automated misting system was installed to increase FHB pressure. Plots at the NERF were left under natural infection. The IMT was set up as a randomized complete block design with a split-plot arrangement, where the cultivar was the main plot and fungicide the sub-plot. The uniform trial was laid out as a randomized complete block design. Treatments in both trials were replicated four times and plot size was 5 ft x 15 ft. at both locations. A CO₂-pressurized backpack sprayer (40 psi) with three nozzles (Twin Jet TJ- 60 8002) spaced 15" apart on a boom was used to deliver the fungicide at a spray volume of 18.6 gal/ac. Twenty-one days following treatment, plots were evaluated for FHB incidence, FHB head severity, and FHB field severity. Fusarium damaged kernels (FDK), DON content, and grain yield were assessed post-harvest.

b. What were the significant results?

Application of fungicides at the beginning of flowering reduced FHB index in all cultivars. However, fungicide efficacy was most pronounced in the susceptible cultivar. Although there were no statistically significant differences in FHB index among the fungicides, Miravis Ace applied at the beginning of flowering and followed by a Tebuconazole application 4 – 6 days later registered the lowest FHB index and FDKs. Miravis Ave applied at the beginning of flowering, Miravis + Tebuconazole and Sphaerex reduced DON more effectively in the resistant cultivars.

c. List key outcomes or other achievements.

Miravis Ace was as more effective when applied at the beginning of flowering than at half head out. Data from these plots have been shared with Dr. Pierce Paul to be incorporated into the modeling efforts.

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

Trained graduate student in FHB assessment

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

Information generated from these trials has been shared with growers, crop consultants, agronomists, extension field specialists during field days, webinars, grower meetings, Crop Newsletters, and radio talks. FHB updates and alerts were also shared on social media.

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.