

USDA-ARS | U.S. Wheat and Barley Scab Initiative

**FY22 Performance Progress Report**

**Due date:** July 26, 2023

**Cover Page**

<b>USDA-ARS Agreement ID:</b>	59-0206-2-159
<b>USDA-ARS Agreement Title:</b>	Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties for Kentucky
<b>Principle Investigator (PI):</b>	David Van Sanford
<b>Institution:</b>	University of Kentucky
<b>Institution UEI:</b>	H1HYA8Z1NTM5
<b>Fiscal Year:</b>	2022
<b>FY22 USDA-ARS Award Amount:</b>	\$113,252
<b>PI Mailing Address:</b>	University of Kentucky, Department of Plant Science 327 Plant Science Bldg., Lexington, KY 40546-0312
<b>PI E-mail:</b>	dvs@uky.edu
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<b>Period of Performance:</b>	May 1, 2022 – April 30, 2026
<b>Reporting Period End Date:</b>	April 30, 2023

**USWBSI Individual Project(s)**

USWBSI Research Category*	Project Title	ARS Award Amount
VDHR-NWW	Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.	\$113,252
<b>FY22 Total ARS Award Amount</b>		<b>\$113,252</b>

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

072423

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:** Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.

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

1) Develop and release improved scab resistant varieties; 2) Develop and release improved scab resistant germplasm; 3) generate new knowledge on the inheritance of FHB resistance to expedite the breeding process and 4) communicate the importance of BMP to all stakeholders in the wheat industry: growers, crop consultants, extension agents, millers, bakers and consumers.

**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?**

- 1) Screening: Screening: More than 3500 individual headrows were planted to be screened in the scab nursery at Lexington, KY. Material screened included breeding lines, uniform scab nurseries, other cooperative nurseries, released cultivars, segregating populations and genetic studies. We had better scab pressure than in the preceding season but hot dry weather at the wrong time limited infection in some material.
- 2) Breeding: Approximately 400 crosses were made during this period, all of which involved at least one scab resistant parent. Breeding populations from F<sub>2</sub> through F<sub>5</sub> were selected for advancement. Preliminary lines were selected for testing based on genomic predictions. Advanced lines were tested in KY and multi state nurseries and tests.
- 3) Collaboration – grew uniform scab nurseries, other collaborative nurseries and shared genomic selection ideas and information with breeders in the region.
- 4) Outreach – communicated findings to stakeholders through newsletters, web and at meetings and field days

**b) What were the significant results?**

- We observed significant differences among breeding lines in the resistance to FHB as indicated by FHB index. We will soon be grinding samples to submit for mycotoxin testing.
- We obtained genomic FHB resistance predictions for all of our preliminary lines: DON, rating, FDK which we will consider in selection of lines to continue testing in agronomic trials and in the scab nursery.

**c) List key outcomes or other achievements.**

- Identified new moderately new resistant lines based largely on genomic predictions
- Predicted FHB resistance was validated in some breeding lines, particularly those in the uniform scab nurseries grown in other states
- Several breeding lines had the lowest level of scab symptoms in the uniform scab nurseries

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

We have been able to provide good opportunities for professional development of graduate and undergraduate students. During this period 1 graduate student in our breeding program has learned about scab resistance breeding from the ground up: designing crosses, scoring material in the field, harvesting and processing. Professional development opportunities have been limited but one of the students, Joyce Robinson attended the national FHB forum in FL and interacted with peers and PI's from other universities.

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

Our scab data is posted on our website (<https://ukwheatbreeding.ca.uky.edu/research-projects>) , the variety testing website (<http://www.uky.edu/Ag/wheatvarietytest/>).

## 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.