

USDA-ARS | U.S. Wheat and Barley Scab Initiative
FY23-YR2 Performance Progress Report

Due date: July 25, 2024

Cover Page

USDA-ARS Agreement #:	N/A
USDA-ARS Agreement Title:	Database and Analysis Tools to Improve Data Management and Crossing Decision Support
Principle Investigator (PI):	Jean-Luc Jannink
Institution:	USDA-ARS
Institution UEI:	N/A
Institution EIN:	N/A
Fiscal Year:	2023
FY23-YR2 USDA-ARS Award Amount:	\$10,250
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Period of Performance:	May 1, 2022 - April 30, 2024
FY23-YR2 Performance Reporting Period:	May 1, 2023 - April 30, 2024
Reporting Period End Date:	April 30, 2024

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	USDA-ARS Award Amount
EC-HQ	Database and Analysis Tools to Improve Data Management and crossing Decision Support	\$10,250
FY23-YR2 Total USDA-ARS Award Amount		\$10,250

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. Digitally signed by

Jean-Luc Jannink
 Digitally signed by Jean-Luc Jannink
 Date: 2024.07.08
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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: Database and Analysis Tools to Improve Data Management and crossing Decision Support

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

- Establish comprehensive list of USDA-coordinated cooperative nurseries: Nov. 2023
- Contact coordinators, communicate, and establish nursery data transmission. Identify sources for historical data Jan. 2024
- Plan and administer survey on T3 accessibility and useability May 2024
- Obtain and upload data June 2024
- Develop lists of wheat lines needing DNA marker genotype data July 2024
- Begin canvassing wheat breeding programs to determine which of those wheat lines are still in existence as seed Aug. 2024
- Prepare proposal for genotyping Sept. 2024

2. What was accomplished under these goals or objectives? (For each major goal/objective, address these three items below.)

1. We have the comprehensive list of USDA-coordinated cooperative nurseries. See addendum.
2. We have started contacting nursery coordinators. Among others, that has led to the following additions to T3:

Table: Cooperative Nursery additions to T3 in the past 12 months

Crop	Cooperative Nursery	Number of Trials	Trial Years	New Accessions in T3	
				With Genotype	Without Geno
Wheat	Uniform Regional Scab	147	1995 - 2023	297	163
	Southern Regional Performance	16	2023		
	Northern Regional Performance	5	2023		
Barley	North American Barley Scab Evaluation	7	2022	23	152
	Western Regional Spring Barley	79	2016 - 2023		
	Winter Malting Barley Trial	20	2023		
Oat	Uniform Early Oat Performance	10	2023	46	155
	Uniform Midseason Oat Performance	11	2023		
	Uniform Winter Oat Yield	95	2004 - 2023		

Notably, for many nurseries we are now up to date in terms of having the most recent years of data. We are still in the condition of contacting Nursery coordinators on an *ad hoc* basis as opposed to having an automated calendar-based approach to getting the data. The T3 queries for this Table also show us what accessions we have Cooperative Nursery phenotypes but no genotypes (accessions are not broken out on a per-nursery basis, just per crop). We now need to develop an approach to identify which of those accessions have genotypes available but have not been uploaded to T3 and which still need to be genotyped.

3. We do not have a survey on T3 useability. That needs to happen.

What were the major activities?

The major activities were communicating with Nursery coordinators and obtaining and uploading data.

What were the significant results?

We now have significantly more Cooperative Nursery data up on T3.

List key outcomes or other achievements.

1. We are continuing to work with our stakeholders to understand pain points with using T3. We have a “T3 Advisory User Group” (TAUG) of ~20 stakeholders and have met with them twice (late Nov. 2023 and late May 2024). Reports from these meetings are in the addendum.
2. We continue to make improvements in T3 useability based on the feedback of our stakeholders. In particular over the past six months, we have been working on new data structures and functionality surrounding documenting and searching alleles present at major loci. This is a feature that users very much want and so has come up during our T3 Advisory User Group meetings.

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

We have significant interaction with WheatCAP students and regularly help them with T3 operations. We have also provided workshops to those students.

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

All T3 Users receive a newsletter documenting new features. This newsletter last went out in May 2024.

There are video tutorials on the T3 site. A recent addition gives details for downloading genotype data:

<https://wheatcap.triticeaetoolbox.org/guides/videos>

5. What do you plan to do during the next reporting period to accomplish the goals and objectives?

We will continue to work with Cooperative Nursery Coordinators to develop processes that make all of this data wrangling easier. For example, the SunGrains group uses a standard data collection template. We will discuss with Coordinators whether they think using such a template could reduce formatting burdens for them. For T3 it would have clear benefits in that data we receive in standard templates can be uploaded through common pipelines and reduce the need for bespoke pipelines.

We will first communicate our lists of wheat and barley accessions that need genotypes with the small grains genotyping labs. It may well be that they have genotyped those accessions and it’s just a question of uploading those data to T3.

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 FY23-YR2 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (May 1, 2023-April 30, 2024)** should be included.

Did you publish/submit or present anything during this award period?

Mark your response with an "X":

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> | Yes, I've included the citation reference in listing(s) below. |
| <input checked="" type="checkbox"/> | No, I have nothing to report. |

Journal publications as a result of FY23-YR2 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 FY23-YR2 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 FY23-YR2 award

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

Addendum: List of Wheat, Barley, and Oat Cooperative Nurseries coordinated by USDA.

Wheat	Barley	Oat	T3 Nursery Name	T3 Missing Years	Nursery	Uniform Yield Trial? Yes/no
x			Southern Regional Performance Nursery	none	Winter-Southern plains regional-elite-HWW	Yes
x			Northern Regional Performance Nursery	none	Winter-Northern plains-elite-HWW	Yes
x					Winter-Both northern and southern plains-HWW	No
x					Sun Preliminary Late-Southern Soft Winter Wheat	
x					Sun Preliminary Early-Southern Soft Winter Wheat	
x					Southern Uniform Nursery-Soft Winter Wheat	
x			Gulf Atlantic Wheat Nursery	2010 - present	Southern Atlantic Soft Winter Wheat	
x			Mason-Dixon Yield Trials	2015, 2018 - 2020, 2021 - present	Mason-Dixon Soft Winter Wheat	
x			Uniform Southern Soft Red Winter Wheat Nurs	2010 - present (we have a few locatio	Uniform Southern Soft Red Winter Wheat Nursery	Yes
x			Uniform Eastern Soft Red Winter Wheat Nurser	2010 - present (we have a few locatio	Uniform Eastern Soft Red Winter Wheat Nursery	Yes
x					Uniform Bread Wheat-Eastern Hard Winter Wheat	Yes
x					Western Regional Soft Winters-Northwestern	
x					Western Regional Hard Winter Wheat-Northwestern	
x					Hard Red Spring Wheat Uniform Regional Nursery	
x			Uniform Regional Scab Nursery	2018 - present	Uniform Regional Scab Nursery	
	x				Uniform Winter Barley Nursery	Yes
x			Is this an actual nursery?		Oregon State University-Barley	
x			Is this an actual nursery? Are these the MAT and MIT trials?		UMN Malting Barley Trial	
x			Winter Malting Barley Trials (University of Minn	none	Winter Malting Barley Trial	
x			NABSEN Trials	2023	North American Barley Scab Evaluation Nursery	
x					Winter North American Barley Scab Evaluation Nursery	
x					Mississippi Valley Barley Nursery	Yes
x	?				Regional FHB nursery	
x	x		Are these the StemRust... trials?		East Africa Stem Rust nursery winter wheat and barley	
		x	Uniform Winter Oat Yield Nursery	2022	Uniform Winter Oat Nursery	Yes
x	x		Are these the StemRust... trials?		East Africa Stem Rust nursery spring wheat and barley	No
	x				Barley leaf rust nursery	No
		x			Uniform Northern Oat Crown Rust Nursery	No
		x			Uniform Midwest Oat Crown Rust Nursery	No
		x			Uniform Winter Oat Crown Rust Nursery	No
		x			The Southern Uniform Oat (SUN Oat) Crown Rust Nurser	No
		x			The Minnesota Variety Oat Crown Rust Nursery	No
		x	Uniform Midseason Oat Performance Nursery	none, but there could be unknown I	Uniform Midseason Oat Performance Nursery	Yes
		x	Uniform Early Oat Performance Nursery	none, but there could be unknown I	Uniform Early Oat Performance Nursery	Yes
	x		Western Regional Spring Barley Nursery	Pre-2021, (2022-2023 emailed from	Western Regional Spring Barley Nursery	

Germplasm Observation	Genotyping? Yes/No	Other Primary Trait	Standard MTA?	Nursery Acro	Affiliation	Regional Nursery Coordinator	E-mail
	Yes HWWGRU		Yes-ARS	SRPN	USDA-ARS Lincoln, Nebraska	Jeff Boehm	jeffrey.boehm@usda.gov
	Yes HWWGRU		Yes-ARS	NRPN	USDA-ARS Lincoln, Nebraska	Jeff Boehm	jeffrey.boehm@usda.gov
Yes	Yes HWWGRU		Yes-ARS	RGON	USDA-ARS Lincoln, Nebraska	Jeff Boehm	jeffrey.boehm@usda.gov
				SUN-PRELIM	Texas A&M	Russell Sutton	r-sutton@tamu.edu
					Texas A&M	Russell Sutton	r-sutton@tamu.edu
				SUN	Louisiana State University	Stephen A. Harrison/Noah	<sharrison@agctr.lsu.edu>;
				GAWN	Louisiana State University	Stephen A. Harrison/Noah	<sharrison@agctr.lsu.edu>;
				MDXN	University of Kentucky	David Van Sanford	dvs@uky.edu
	Yes			USSRWWN	USDA-ARS-Raleigh	Tan Tuong	tan.tuong@usda.gov
	Yes			UESRWWN	USDA-ARS-Raleigh	Tan Tuong	tan.tuong@usda.gov
	Yes			UBWN	USDA-ARS-Raleigh	Tan Tuong	tan.tuong@usda.gov
				23 WRSWWN	USDA-ARS-Pullman, WA	Kim Campbell/Jianli Chen	kgcamp@wsu.edu
				23 WRHWN	USDA-ARS-Pullman, WA	Kim Campbell/Jianli Chen	kgcamp@wsu.edu
				HRSWURN	USDA-ARS Saint Paul, MN	Andrew Read	andrew.read@usda.gov
		FHB		URSN	USDA-ARS Saint Paul, MN	Andrew Read	andrew.read@usda.gov
	No			UWBN	USDA-ARS-Raleigh	Tan Tuong	tan.tuong@usda.gov
					Oregon State University	Pat Hayes	patrick.m.hayes@oregonstate.edu
					University of Minnesota	Kevin Smith	smith376@umn.edu
					University of Minnesota	Kevin Smith	smith376@umn.edu
		FHB/DON		NABSEN	North Dakota State University	Thomas Baldwin	thomas.t.baldwin@ndsu.edu
		FHB/DON			Oregon State University	Eric Stockinger	stockinger.4@osu.edu
					USDA-ARS Fargo	Shengming Yang	shengming.yang@usda.gov
		FHB	Yes-ARS		Kansas State University	Jessica Rupp	jrupp@ksu.edu
		Stem rust			USDA-ARS Lincoln, NE	Jeff Boehm	jeffrey.boehm@usda.gov
	No				USDA-ARS-Raleigh	Tan Tuong	tan.tuong@usda.gov
No	Yes Fargo	stem rust	Yes-ARS		USDA-ARS Saint Paul, MN	Matt Rouse	matthew.rouse@usda.gov
No	No	barley leaf rust			USDA-ARS Saint Paul, MN	Matt Rouse	matthew.rouse@usda.gov
		Crown Rust			USDA-ARS Saint Paul, MN	Shahryar Kianian	shahryar.kianian@usda.gov
		Crown Rust			USDA-ARS Saint Paul, MN	Shahryar Kianian	shahryar.kianian@usda.gov
		Crown Rust			USDA-ARS Saint Paul, MN	Shahryar Kianian	shahryar.kianian@usda.gov
		Crown Rust			USDA-ARS Saint Paul, MN	Shahryar Kianian	shahryar.kianian@usda.gov
		Crown Rust			USDA-ARS Saint Paul, MN	Shahryar Kianian	shahryar.kianian@usda.gov
			?	UMOPN	USDA-ARS Saint Paul, MN	Roger Caspers	roger.caspers@usda.gov
			?	UEOPN	USDA-ARS Saint Paul, MN	Roger Caspers	roger.caspers@usda.gov
				WRSBN	USDA Aberdeen	Chris Evans	chris.evans@usda.gov