USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY20 Annual Performance Progress Report
Due date: July 29, 2021

Cover Page

Principle Investigator (PI):	Jean-Luc Jannink
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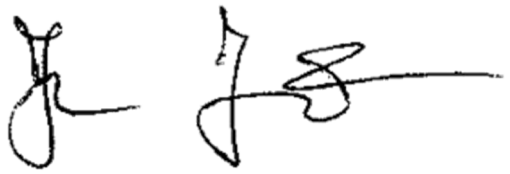
Fiscal Year:	2020
USDA-ARS Agreement ID:	N/A
USDA-ARS Agreement Title:	Database and Analysis Tools to Improve Data Management and Crossing Decision Support
FY20 USDA-ARS Award Amount:	$ 28,519
Project/Grant Reporting Period:	5/1/20 - 4/30/21
Reporting Period End Date:	4/30/2021

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
EC-HQ	US Wheat & Barley Scab Initiative's Networking & Facilitation Office and Website	$ 9,301
BAR-CP	Optimizing Parent Combinations to Improve FHB/DON Resistance in Barley	$ 19,218
	FY20 Total ARS Award Amount	**$ 28,519**



7/28/21

Principal Investigator Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
R- Research
S – Service (DON Testing Labs)
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
EC-HQ – Executive Committee-Headquarters
BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
HWW-CP – Hard Winter Wheat Coordinated Project
VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
SPR – Spring Wheat Region
NWW – Northern Soft Winter Wheat Region
SWW – Southern Soft Red Winter Wheat Region

FY20 Annual Performance Progress Report
PI: Jannink, Jean-Luc
USDA-ARS Agreement #: N/A
Reporting Period: 5/1/20 - 4/30/21

Project 1: *US Wheat & Barley Scab Initiative's Networking & Facilitation Office and Website*

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

   Develop a web-based database containing public sector breeding data, facilitating collaboration and data-sharing across programs since FY10. This database is called The Triticeae Toolbox (T3)
   https://barley.triticeaetoolbox.org
   https://wheat.triticeaetoolbox.org

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?**
   We have continued to upload data from cooperative nurseries to the database.

   In wheat, we currently have 487 trials with Fusarium incidence data and 273 trials with DON content data.

   In barley, we currently have 198 trials with Fusarium severity data and 250 trials with DON content data.

   b) **What were the significant results?**
   Results are available to the public and specifically to other breeders. The data are in an environment that includes analysis tools

   c) **List key outcomes or other achievements.**
   In total, T3/Wheat Breedbase contains 26,612 accessions with phenotype data and 16,375 with genotype data. A total of 3,086 phenotype trials (containing 898,949 observations) and 40 genotype trials have been uploaded to T3/BreedBase.

   T3/Barley Breedbase contains 30,905 accessions with phenotype data and 15,981 with genotype data. A total of 1,199 phenotype trials (containing 803,179 observations) and 26 genotype trials have been uploaded to T3/BreedBase.

3. **Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns and/or restrictions, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.**

   The work is primarily computational and therefore has not been strongly affected by COVID

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

The T3 curator, David Waring, gave a training on the use of the database in September 2020. Recordings of that training, split into manageable segments, is posted on YouTube.
https://www.youtube.com/channel/UC3jrvvzGKKEHzOriDBgnj0A
The introduction has been viewed over 200 times.

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

Main dissemination is through the web:
https://barley.triticeaetoolbox.org
https://wheat.triticeaetoolbox.org

See also the YouTube channel link above.

Project 2: *Optimizing Parent Combinations to Improve FHB/DON Resistance in Barley*

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

   We work on the third objective of the overall proposal:
   Develop tools for the T3 database to make parent selection for genetic variance and trait correlations accessible to all wheat and barley breeders.

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 the proposal, we discussed a computer simulation approach to identify crosses that will have large variation or favorable covariation in traits. We have now developed analytical approaches for this identification that is much faster. That will be important because it will enable us to explore a broader range of possible crosses.

   b) **What were the significant results?**
   There is now an R package to perform these calculations that we need now to adapt and integrate to the database.

   c) **List key outcomes or other achievements.**
   Not yet really a key outcome: our work is not yet accessible to breeders

3. **Was this research impacted by the COVID-19 pandemic (i.e. university shutdowns and/or restrictions, reduced or lack of support personnel, etc.)? If yes, please explain how this research was impacted or is continuing to be impacted.**

   The research is computational and could be done remotely.

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

   None

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

   The current community of interest are other geneticists. Results have been disseminated as a journal article publication (see below) and by making an R package available.
   https://github.com/wolfemd/PredictOutbredCrossVar

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY20 award period (5/1/20 - 4/30/21). The term "support" below includes any level of benefit to the student, ranging from full stipend plus tuition to the situation where the student's stipend was paid from other funds, but who learned how to rate scab in a misted nursery paid for by the USWBSI, and anything in between.

1. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY20 award period?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY20 award period?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

3. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

4. **Have any post docs who worked for you during the FY20 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   ☐Yes ☒No
   If yes, how many? Click to enter number here.

Release of Germplasm/Cultivars

Instructions: In the table below, list all germplasm and/or cultivars released with full or partial support through the USWBSI during the FY20 award period (5/1/20 - 4/30/21). All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations.

NOTE: Leave blank if you have nothing to report or if your grant did NOT include any VDHR-related projects.

Name of Germplasm/Cultivar	Grain Class	FHB Resistance	FHB Rating (0-9)	Year Released
Note applicable to this project.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
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Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year
Click here to enter text.	Select Grain Class	Select what represents your most resistant check	Enter as text 0-9 rating	Select Year

NOTE: List the associated release notice or publication under the appropriate sub-section in the 'Publications' section of the FPR.

Publications, Conference Papers, and Presentations

Instructions: Refer to the PR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY20 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (5/1/20 - 4/30/21**) should be included. If you did not publish/submit or present anything, state 'Nothing to Report' directly above the Journal publications section.

NOTE: Directly below each citation, you **must** indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in the publication/ presentation. See example below for a poster presentation with an abstract:

Z.J. Winn, R. Acharya, J. Lyerly, G. Brown-Guedira, C. Cowger, C. Griffey, J. Fitzgerald, R.E. Mason and J.P. Murphy. 2020. "Mapping of Fusarium Head Blight Resistance in NC13-20076 Soft Red Winter Wheat." In: S. Canty, A. Hoffstetter, and R. Dill-Macky (Eds.), *Proceedings of the 2020 National Fusarium Head Blight Forum (*p. 12.), Virtual; December 7-11. Online: https://scabusa.org/pdfs/NFHBF20_Proceedings.pdf.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.

Wolfe, M.D., A.W. Chan, P. Kulakow, I. Rabbi, and J.-L. Jannink. 2021. Genomic mating in outbred species: predicting cross usefulness with additive and total genetic covariance matrices. bioRxiv: 2021.01.05.425443. doi: 10.1101/2021.01.05.425443.
Status: Also accepted with minor revisions in Genetics
Acknowledgement of Federal Support: NO (oops)

Books or other non-periodical, one-time publications.

Nothing to report.

Other publications, conference papers and presentations.

Nothing to report.