USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY19 Final Performance Report
Due date: September 30, 2020

Cover Page

Principle Investigator (PI):	Patrick Hayes
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Fiscal Year:	2019
USDA-ARS Agreement ID:	59-0206-7-156
USDA-ARS Agreement Title:	Production of Double Haploid for FHB Resistance
FY19 USDA-ARS Award Amount:	$ 78,666
Recipient Organization:	Office for Sponsored Research and Award Administration Oregon State University A312 Kerr Administration Building Corvallis, OR 97331-2140
DUNS Number:	053599908
EIN:	61-1730890
Recipient Identifying Number or Account Number:	RO719A
Project/Grant Reporting Period:	8/1/19 - 7/31/20
Reporting Period End Date:	7/31/2020

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Collaborative Doubled Haploid Production for FHB Resistance Breeding	$ 78,666
	FY19 Total ARS Award Amount	**$ 78,666**

Patrick M. Hayes — September 22, 2020

Principal Investigator — Date

* MGMT – FHB Management
FST – Food Safety & Toxicology
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

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Project 1: *Collaborative Doubled Haploid Production for FHB Resistance Breeding*

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

Our overall project goal is to increase the efficiency with which researchers identify and deploy genes and QTLs that contribute to reduction in the losses caused by Fusarium head blight (FHB). This can be achieved by developing doubled haploid germplasm from the F1s of cross combinations identified by collaborating breeders. Doubled haploids - being complete homozygotes – are immortal reference stocks that provide unequivocal genotyping and phenotyping data. To further increase the efficiency of this process we implemented two new dimensions this year: seed-to-seed production at OSU and lyophilizing of DH tissue for genotyping at the Pullman, WA ARS genotyping lab.

Our project objectives were to:

1) Produce seed of 1,000 DH lines from the F1 donor plants.
2) Ship DH seed to cooperators.
3) Lyophilize tissue of DH during seed production for shipping to the Pullman, WA ARS genotyping lab.

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

a) What were the major activities?

The F1s received from USWBSI cooperators that were used as donor plants traced to the following pedigrees:

- VA16M-81/Calypso; Virginia Tech
- VA16M-84/Violetta//Flavia; Virginia Tech
- 95SR316A/Golf; USDA-ARS, Idaho

F1 donors were grown and used for DH production.
Tissue was harvested from DH plantlets and lyophilized
Lyophilized tissue was sent to the Pullman genotyping lab.

b) What were the significant results?

- 680 donor tillers were harvested; 20,400 anthers were plated.
- 2,632 plantlets were regenerated.
- 1,406 plantlets were transplanted and 1,125 DH are estimated to be harvested.
- 635 DH were shipped and an estimated 490 DH will be shipped when seed is harvested. We exceeded the DH production target goal of 1,000 DH for Virginia Tech.
- There were extra plantlets remaining for Virginia Tech. These 265 plantlets were shipped.

- Tissue was harvested from 1,354 UWBSI DH and lyophilized. Nine plates were sent to the Pullman genotyping lab. A lyophilizer malfunction led to suspension of processing the final 8 plates. These plates will be shipped once the machine functionality is restored.
- The 95SR316A/Golf cross was recalcitrant in anther culture. Therefore, this population was shifted to speed breeding. An F2 generation of 240 plants was grown, harvested, and planted for the F3 generation.

c) List key outcomes or other achievements.

Missions accomplished

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

The research was impacted – every task took longer and required workarounds. Thankfully, our dedicated staff were able to safely alter their schedules and get done what needed to be done.

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

Tanya Filichkin and Laura Helgerson honed their doubled haploid and plant propagation skills, respectively. They communicated effectively with collaborators and are nationally recognized for their efforts.

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

At the USWBSI Scab Forum and in UWBSI progress reports.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the FY19 award period (8/1/19 - 7/31/20). 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 FY19 award period?**
   NA

   If yes, how many?

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY19 award period?**
   NA

   If yes, how many?

3. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   NA

   If yes, how many?

4. **Have any post docs who worked for you during the FY19 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   NA

   If yes, how many?

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 FY19 award period. 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** (S, MS, MR, R, where R represents your most resistant check)	**FHB Rating** (0-9)	**Year Released**

Add rows if needed.

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

Abbreviations for Grain Classes

Barley - BAR
Durum - DUR
Hard Red Winter - HRW
Hard White Winter - HWW
Hard Red Spring - HRS
Soft Red Winter - SRW
Soft White Winter - SWW

Publications, Conference Papers, and Presentations

Instructions: Refer to the FY19-FPR_Instructions for detailed more instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY19 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period (8/1/19 - 7/31/20**) 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:

Patrick M. Hayes*, Tanya Filichkin, Laura Helgerson, Daniela Carrijo, Scott Fisk, Meghan Stack and Brigid Meints. 2019. "COLLABORATIVE DOUBLED HAPLOID BREEDING FOR FUSARIUM HEAD BLIGHT RESISTANCE IN BARLEY". In: S. Canty, A. Hoffstetter, H. Campbell and R. Dill-Macky (Eds.), *Proceedings of the 2019 National Fusarium Head Blight Forum* (p. 12), Milwaukee, WI; December 8-10.
Status: Abstract Published and Poster Presented
Acknowledgement of Federal Support: YES (Abstract and Poster)

Journal publications.
NA

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

Other publications, conference papers and presentations.
NA