

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

**Cover Page**

<b>Principle Investigator (PI):</b>	Santiago Mideros
<b>Institution:</b>	University of Illinois
<b>E-mail:</b>	smideros@illinois.edu
<b>Phone:</b>	217-265-6340
<b>Fiscal Year:</b>	2020
<b>USDA-ARS Agreement ID:</b>	59-0206-0-180
<b>USDA-ARS Agreement Title:</b>	Determinants of Aggressiveness in <i>Fusarium graminearum</i>
<b>FY20 USDA-ARS Award Amount:</b>	\$ 54,640
<b>Recipient Organization:</b>	The Board of Trustees of the University of Illinois Grants & Contracts Office 1901 S. First Street, Suite A Champaign, IL 61820
<b>DUNS Number:</b>	41544081
<b>EIN:</b>	37-6000511
<b>Recipient Identifying Number or Account Number:</b>	AG020
<b>Project/Grant Reporting Period:</b>	5/15/20 - 5/14/21
<b>Reporting Period End Date:</b>	5/14/2021

**USWBSI Individual Project(s)**

USWBSI Research Category*	Project Title	ARS Award Amount
PBG	Determinants of Aggressiveness in <i>Fusarium graminearum</i>	\$ 54,640
<b>FY20 Total ARS Award Amount</b>		<b>\$ 54,640</b>



27 July 2021

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

**Project 1:** *Determinants of Aggressiveness in Fusarium graminearum*

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

The objective of this project is to identify genes that control the aggressiveness of *F. graminearum*. We will identify them by phenotyping and genotyping a population of *F. graminearum*. To achieve this, we will:

- 1) Conduct greenhouse aggressiveness assays with a population of isolates collected from wheat lines with different levels of resistance.
- 2) These isolates will be genotyped using a whole genome re-sequencing approach. Population genetic analyses will be conducted to identify genes that are under selection.

**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?**

Greenhouse and laboratory trials for aggressiveness and in vitro traits for 57 isolates were conducted. A total of 57 isolates were phenotyped twice in replicated experiments in the greenhouse. The same collection was phenotyped twice and in vitro. Activities for the in-vitro assays are complete. All the data has been collected and is being analyzed. Two greenhouse evaluations have been conducted. The second assay was harvested on July 23.

Preliminary data analysis of the first greenhouse experiment and the *in vitro* evaluations has been conducted. DNA for the 57 isolates was isolated and has been sequenced on a SP lane of a Novaseq6000.

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

We have found a significant difference between the isolates collected from a susceptible wheat line and those from a resistant one. The isolates obtained from the resistant wheat line are less aggressive than those collected from the susceptible wheat line. This confirms our previous preliminary results and will result on an impactful paper. DNA sequence with 1 x 100nt reads produced over 490 million reads for the 57 samples.

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

Greenhouse assays are finished. Data analysis is in progress DNA extraction and sequencing has been completed. Variant calling is in progress. The project is on track as per the proposal timeline.

**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.**

It is hard to quantify but the pandemic probably slowed us down. The project is on track thanks to the ability of the student conducting the research to continue to work during the pandemic. At some point she was germinating plants in her own house. Had this project been on somebody else's hands, we could be severely delayed.

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

The project is covering for a MS student. The student has conducted all the experiments with my coaching. We are now working on data analysis. In addition, the student has completed 19 credit hours of courses in plant pathology, population genetics, genetics and others.

We have recently started to train an undergraduate student to conduct phenotypic evaluations, DNA extractions, and sequencing.

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

Nothing to report for this period. A poster will be presented at the Plant Health 2021 virtual meeting in August of 2021.

## Training of Next Generation Scientists

**Instructions:** Please answer the following questions as it pertains to the FY20 award period (5/15/20 - 5/14/21). 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.](#)

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### 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 (5/15/20 - 5/14/21). 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
N/A	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
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.

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## **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 (5/15/20 - 5/14/21)** 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](https://scabusa.org/pdfs/NFHBF20_Proceedings.pdf).  
Status: Abstract Published and Poster Presented  
Acknowledgement of Federal Support: YES (Abstract and Poster)

### **Journal publications.**

Nothing to report

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

Nothing to report

### **Other publications, conference papers and presentations.**

Nothing to report