**USDA-ARS**  
U.S. Wheat and Barley Scab Initiative  
FY18 Final Performance Report  
Due date: July 12, 2019

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## Cover Page

<table>
<thead>
<tr>
<th><strong>Principle Investigator (PI):</strong></th>
<th>Ruth Dill-Macky</th>
</tr>
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<tbody>
<tr>
<td><strong>Institution:</strong></td>
<td>University of Minnesota</td>
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<tr>
<td><strong>E-mail:</strong></td>
<td><a href="mailto:ruthdm@umn.edu">ruthdm@umn.edu</a></td>
</tr>
<tr>
<td><strong>Phone:</strong></td>
<td>612-625-2227</td>
</tr>
<tr>
<td><strong>Fiscal Year:</strong></td>
<td>2018</td>
</tr>
<tr>
<td><strong>USDA-ARS Agreement ID:</strong></td>
<td>59-0206-4-016</td>
</tr>
<tr>
<td><strong>USDA-ARS Agreement Title:</strong></td>
<td>Management of Fusarium Head Blight in Small Grains.</td>
</tr>
<tr>
<td><strong>FY18 USDA-ARS Award Amount:</strong></td>
<td>$122,616</td>
</tr>
</tbody>
</table>
| **Recipient Organization:** | Regents of the University of Minnesota  
Suite 450  
Sponsored FIN RPT-P100100001  
Minneapolis, MN 55455-2003 |
| **DUNS Number:** | 555917996 |
| **EIN:** | 41-6007513 |
| **Recipient Identifying Number or Account Number:** | CON000000048329 |
| **Project/Grant Reporting Period:** | 5/6/18 - 5/5/19 |
| **Reporting Period End Date:** | 05/05/19 |

### USWBSI Individual Project(s)

<table>
<thead>
<tr>
<th>USWBSI Research Category*</th>
<th>Project Title</th>
<th>ARS Award Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT</td>
<td>Minnesota Component of the FHB Integrated Management Coordinated Project.</td>
<td>$29,148</td>
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<tr>
<td>GDER</td>
<td>A Field Nursery for Testing Transgenic Spring Wheat and Barley from the USWBSI.</td>
<td>$17,004</td>
</tr>
<tr>
<td>EC-HQ</td>
<td>Support for the USWBSI Researcher Co-Chair and Executive Director of the NFO.</td>
<td>$76,464</td>
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</tbody>
</table>

**FY18 Total ARS Award Amount**  
$122,616

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* 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
Project 1: *Minnesota Component of the FHB Integrated Management Coordinated Project.*

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

   Demethylation inhibitor (DMI) fungicides such as prothioconazole, metconazole, and tebuconazole are the most effective for Fusarium head blight (FHB) and deoxynivalenol (DON) management. When applied at or up to 6 days after anthesis to moderately resistant cultivars, these fungicides provide more than 70% reduction of both FHB index and DON, relative to an untreated, susceptible check. Preliminary results from a limited number of trials showed that Miravis Ace (Adepidyn; Pydiflumetofen), a new succinate dehydrogenase inhibitor fungicide that is currently being labeled for use in wheat, has comparable efficacy against FHB and DON to the DMI fungicides Prosaro and Caramba when applied at anthesis (Feekes 10.5.1) or at 50% head emergence (Feekes 10.3). This project represented the Minnesota participation in two experiments proposed in the overall MGMT-CP, an integrated management trial (IM) and a uniform fungicide trial (UFT). In combination these trials have contributed to the overall effort to test Miravis Ace across grain market classes and growing conditions.

2. **What was accomplished under these goals?** *Address items 1-4) below for each goal or objective.*

   1) **major activities**

   We participated in the two experiments proposed in the overall MGMT-CP, an integrated management trial (IM) and a uniform fungicide trial (UFT). In combination these will contribute to the overall effort to test Miravis Ace across grain market classes and growing conditions. Experiments were established at two locations (St Paul and Crookston) for two grain classes (hard red spring wheat and barley) and completed following the experimental design as established by the coordinating group.

   2) **specific objectives**

   In the Minnesota component of this project we conducted inoculated field experiments, using three cultivars of hard red spring wheat at two locations with the intent of providing useful data for the meta-analysis following the completion of similar experiments by others.

   3) **significant results**

   We generated useful levels of FHB and obtained data from the two locations where the experiments were established. The toxin analyses for the 2018 trial were completed in early 2019 and the data files are currently being compiled ahead of submission to the project coordinator. I am behind as my field technician left before the data were fully compiled buy, I expect to have the data available soon.

   4) **key outcomes or other achievements**

   Results of these experiments will be used to advance the development of best management practices for FHB and DON.
3. **What opportunities for training and professional development has the project provided?**

   In both sub-projects undergraduate researchers utilized the project to gain experience in field-based research techniques.

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

   The data collected from these trials, along with trials conducted by other colleagues as part of the integrated management coordinated project funded by the USWBSI, will ultimately be used in a meta-analysis that will be published in peer-reviewed scientific journals. The outcome of this large collaborative research effort will ultimately provide information of the efficacy of fungicide treatments for FHB that would not be obtainable by any individual scientist.
Project 2: *A Field Nursery for Testing Transgenic Spring Wheat and Barley from the USWBSI.*

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

   This project had the objective of establishing an annual nursery to provide a central field-testing site for transgenic spring wheat and barley lines developed by researchers in the USWBSI.

2. What was accomplished under these goals? *Address items 1-4) below for each goal or objective.*

   1) major activities
   
   In 2018 a nursery was planted that to include 76 wheat and 12 barley entries evaluated in side by side experiments. The trial was planted at UMore Park, Rosemount MN on May 22, 2018. Trial entries and untransformed controls for wheat were submitted by the University of Minnesota (52 wheat lines + Bobwhite*, Linkert* and Rollag* along with the checks Norm and Sumai 3), Rutgers University (16 wheat lines + Bobwhite*, RB07* and Rollag*) and the USDA (8 lines and CB037*). All barley lines included in the nursery were provided by the University of Minnesota (12 barley lines + Rasmusson*). Entries within each experiment were planted 2.43 m long single row plots, arranged in a randomized complete block design with four replications. Lines with known reactions to Fusarium head blight (FHB) were also included as checks. The wheat checks included the moderately resistant cultivars Linkert (FHB-5), RB07 (FHB-4), and Rollag (FHB-3) and the susceptible cultivars Norm (FHB-8) and Wheaton (FHB-8). The barley checks were the moderately resistant cultivar Quest (FHB-5) and the susceptible cultivar Lacey (FHB-8).

   2) specific objectives
   
   In 2018 the major objectives were completing the screening as planned and delivering the data to the cooperators.

   3) significant results
   
   Specific results were delivered to the cooperators and presented in the poster at the USWBSI forum in December 2018.

   4) key outcomes or other achievements
   
   In 2018 we conducted a successful nursery. The PI’s submitting entries had their data ahead of the USWBSI forum and we presented the field data in a poster at that meeting.
3. What opportunities for training and professional development has the project provided?

None. Given the nature of the monitoring work access to the site was restricted to project personnel with considerable experience in running transgenic nurseries.

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

The USWBSI-funded PI’s with wheat and barley entries in the nursery have been provided their data and copied on all communications with APHIS regarding site monitoring.
Project 3: Support for the USWBSI Researcher Co-Chair and Executive Director of the NFO.

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

The funding for this project is to provide personnel support for Dr. Ruth Dill-Macky, USWBSI Co-Chair and Executive Director of the USWBSI’ Networking & Facilitation Office. The project will support a full-time research assistant to help with Dr. Dill-Macky’s USWBSI research projects, thereby allowing Dr. Dill-Macky to redirect time to her USWBSI administration responsibilities. The project will also support a very small amount (~1%) of the NFO’s Director of Operations (DOO) salary to assist Dr. Dill-Macky with her PI responsibilities associated with the ARS/USWBSI agreement, etc. (funding applications, annual performance reports, travel assistance, etc.).

2. What was accomplished under these goals? Address items 1-4) below for each goal or objective.

1) major activities
A research technician was trained to oversee the aspects of inoculating and rating Fusarium head blight in the field. This includes overseeing planting activities, inoculum preparation, installing mist-irrigation and rating FHB.

2) specific objectives
The objective of this project was to train and support a research technician to oversee the everyday aspects of Dr. Ruth Dill-Macky’s lab and field research related to Fusarium head blight. The training of this technician allows Dr. Dill-Macky to focus on her administrative responsibilities for the USWBSI.

3) significant results
A research technician was trained to run the day to day aspects of the lab. This includes preparing and inoculating the transgenic FHB nursery, coordinating FHB fungicide trials, and rating FHB in the field.

4) key outcomes or other achievements
Both the transgenic nursery and FHB fungicide trials were successful. The research technician has quickly adapted to running the aspects of the lab and has recently taken on more responsibilities related to the FHB projects. The technician has also been instrumental in advising Dr. Dill-Macky’s undergraduate advisees and summer interns. She attended and participated in the 2018 annual forum. In addition, she provided staff support during the forum by helping with the registration process and coordinating Q&A’s during the general sessions.
3. What opportunities for training and professional development has the project provided?

Not applicable to this project.

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

Not applicable to the objective of this project.
Training of Next Generation Scientists

**Instructions:** Please answer the following questions as it pertains to the FY18 award period. 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 FY18 award period?**
   
   No

   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 FY18 award period?**
   
   No

   If yes, how many?

3. **Have any post docs who worked for you during the FY18 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?**
   
   No

   If yes, how many?

4. **Have any post docs who worked for you during the FY18 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?**
   
   No

   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 FY18 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.

<table>
<thead>
<tr>
<th>Name of Germplasm/Cultivar</th>
<th>Grain Class</th>
<th>FHB Resistance (S, MS, MR, R, where R represents your most resistant check)</th>
<th>FHB Rating (0-9)</th>
<th>Year Released</th>
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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

(Form – FPR18)
Publications, Conference Papers, and Presentations

Instructions: Refer to the FY18-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY18 grant. Only include citations for publications submitted or presentations given during your award period (5/6/18 - 5/5/19). If you did not have any publications or presentations, state ‘Nothing to Report’ directly above the Journal publications section.

NOTE: Directly below each reference/citation, you must indicate the Status (i.e. published, submitted, etc.) and whether acknowledgement of Federal support was indicated in publication/presentation.

Journal publications.

Status: Published
Acknowledgement of Federal Support: Yes

Status: Published
Acknowledgement of Federal Support: Yes

Status: Published
Acknowledgement of Federal Support: Yes

Status: Published
Acknowledgement of Federal Support: Yes

**Status:** Published

**Acknowledgement of Federal Support:** Yes

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

Nothing to Report

### Other publications, conference papers and presentations.


**Status:** Abstract Published and Poster Presented

**Acknowledgement of Federal Support:** Yes (poster), No (abstract)


**Status:** Abstract Published and Poster Presented

**Acknowledgement of Federal Support:** Yes (poster), No (abstract)


**Status:** Abstract Published and Poster Presented

**Acknowledgement of Federal Support:** Yes (poster), No (abstract)

**Status:** Abstract Published and Poster Presented

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