USDA-ARS
U.S. Wheat and Barley Scab Initiative
FY17 Final Performance Report
Due date: July 31, 2018

Cover Page

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Fiscal Year:	2017
USDA-ARS Agreement ID:	59-0206-4-035
USDA-ARS Agreement Title:	Improved Malt Barley Production in the Northeast.
FY17 USDA-ARS Award Amount:	$ 17,172
Recipient Organization:	University of Vermont and State Agricultural College Sponsored Project Administration 217 Waterman Building 85 South Prospect St. Burlington VT 05405
DUNS Number:	66811191
EIN:	03-0179440
Recipient Identifying Number or Account Number:	000028951
Project/Grant Reporting Period:	6/1/17 - 5/31/18
Reporting Period End Date:	05/31/18

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
MGMT	Integrated Management of FHB and DON in Barley in New England.	$ 17,172
	FY17 Total ARS Award Amount	$ 17,172

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

Project 1: *Integrated Management of FHB and DON in Barley in New England.*

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

In order for New England farmers to produce high quality grains for malting, more information is needed on the agronomic practices required to produce them. *Fusarium* head blight (FHB) is currently the most important disease facing organic and conventional grain growers in New England, resulting in loss of yield, shriveled grain, and, most importantly, mycotoxin contamination. Through this project integrated management strategies were evaluated with the goal of minimizing the loss of yield and quality from FHB.

The project objectives were:

1. Evaluate spring and winter barley varieties in order to identify those that are suitable for malting and adapted to the Northeast.
2. Evaluate the efficacy of using fungicides to control Fusarium head blight infection of spring malting barley.

2. What was accomplished under these goals?

1) major activities
A winter and spring malting barley variety trial were conducted in Vermont. In mid-September of 2016 a trial was initiated to evaluate 30 winter barley cultivars. The winter survival of the malting barley plots was assessed on May 11, 2017. There was severe winterkill in most of the plots and therefore the trial was terminated. In addition, a spring barley variety trial, consisting of 25 varieties, was established in April 2017. These varieties were evaluated for yield, quality, and DON concentrations.

2) specific objectives
Evaluate spring and winter barley varieties in order to identify those that are suitable for malting and adapted to the Northeast.

3) significant results
Spring barley yields ranged from 1,750 to 3499 lbs ac^{-1}, and DON levels from 0.50 to 2.33 ppm. These results indicate the importance of variety selection especially for those that may confer some tolerance to FHB. Similar to other years, winter barley had highly variable survival rates. The average survival rate for the trial was only 20% and hence the trial was terminated.

4) key outcomes or other achievements
Variety trial results were distributed to over 400 stakeholders during the project period. As a result, the primary malt company in Vermont has worked with growers to adopt new varieties such as Newdale that have performed well in the variety trials.

1) major activities
A field experiment was established in Vermont on 27-Apr to investigate the effects of cultivar resistance, fungicide efficacy, application timing on FHB and DON infection in spring malting barley. The experimental design was a randomized complete block, with a split-plot arrangement of cultivar as the whole-plot and fungicide+timing treatments as the sub-plots. The fungicide+timing treatments are listed in Table 1. Fungicides approved for use in organic systems included Actinovate, ChampION, and Sonata.

Treatments	Heading application	4 days after heading application	Application rate
	date	date	
Control	22-Jun	26-Jun	Water
Fusarium graminearum	23-Jun		40,000 spores/ml
Actinovate	22-Jun	26-Jun	6 fl oz ac^{-1}
Caramba	22-Jun	26-Jun	14 fl oz ac^{-1} +.125% Induce ac^{-1}
ChampION	22-Jun	26-Jun	1.5 lbs ac^{-1}
Prosaro	22-Jun	26-Jun	6.5 fl oz ac^{-1} +.125% Induce ac^{-1}
SONATA	22-Jun	26-Jun	2 qt. ac^{-1}

2) specific objectives
Evaluate the efficacy of using fungicides to control Fusarium head blight infection of spring malting barley.

3) significant results
Fungicide treatments did not significantly impact barley yields. However, fungicide treatments did have a significant impact on DON concentrations. Compared to the other fungicide treatments, Prosaro applied at heading resulted in the lowest DON concentrations (3.68 ppm) and was statistically similar to Caramba (4.80 ppm) sprayed at heading. The organic approved fungicide treatment ChampION applied at heading had statistically similar DON concentrations (5.74 ppm) when compared to the Caramba applied at heading. Application of fungicide at heading provided the best control of DON. Variety had a significant impact on DON concentration indicating again the importance of variety selection.

4) key outcomes or other achievements
Fungicide trial results were distributed to over 400 stakeholders during the project period. As a result, farmers have started to incorporate fungicide application into their production plans.

3. What opportunities for training and professional development has the project provided?
Nothing to Report

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

July 27, 2017. 10th Annual Northwest Crops and Soils Field Day - A Decade of Innovation-Germination-Application, Borderview Research Farm, Alburgh, VT. 302 attendees.

August 22, 2017. Harvesting and Malting Barley. Peterson's Quality Malt, Monkton, VT. 43 attendees.

March 22, 2018. The 14th Annual Grain Growers Conference- Diversifying Grains for a Changing Climate, Essex, VT. 107 attendees.

Training of Next Generation Scientists

1. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their MS degree during the FY17 award period?** N/A

2. **Did any graduate students in your research program supported by funding from your USWBSI grant earn their Ph.D. degree during the FY17 award period?** N/A

3. **Have any post docs who worked for you during the FY17 award period and were supported by funding from your USWBSI grant taken faculty positions with universities?** N/A

4. **Have any post docs who worked for you during the FY17 award period and were supported by funding from your USWBSI grant gone on to take positions with private ag-related companies or federal agencies?** N/A

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 FY17 award period. All columns must be completed for each listed germplasm/cultivar. Use the key below the table for Grain Class abbreviations. *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 FY17-FPR_Instructions for detailed instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY17 grant. Only include citations for publications submitted or presentations given during your award period (6/1/18 - 5/31/18). 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.
Nothing to Report

Books or other non-periodical, one-time publications.
Nothing to Report

Other publications, conference papers and presentations.

Darby, H., E. Cummings, and H. Emick. 2017. 2017 Organic Spring Barley Variety Trial. University of Vermont Extension Northwest Crops and Soils Program, St. Albans, VT. Available online at: http://www.uvm.edu/extension/cropsoil/wp-content/uploads/2017-Spring-Barley-VT-Report.pdf (accessed 27 Jul. 2018).

Status: Reports published online
Acknowledgement of Federal Support: YES

Darby, H., E. Cummings, and H. Emick. 2018. 2017 Organic Winter Barley Variety Trial. University of Vermont Extension Northwest Crops and Soils Program, St. Albans, VT. Available online at: http://www.uvm.edu/extension/cropsoil/wp-content/uploads/2017-Organic-WBVT-Report_Vermont.pdf (accessed 27 Jul. 2018).

Status: Reports published online
Acknowledgement of Federal Support: YES

Darby, H., and E. Cummings. 2018. The Efficacy of Spraying Fungicides to Control Fusarium Head Blight Infection in Spring Malting Barley. University of Vermont Extension Northwest Crops and Soils Program, St. Albans, VT. Available online at: http://www.uvm.edu/extension/cropsoil/wp-content/uploads/2017-Spring-Barley-Fungicide.pdf (accessed 27 Jul. 2018).

Status: Reports published online
Acknowledgement of Federal Support: YES

Darby, H. and E. Cummings. 2018. The Efficacy of a Fungicide Application to Control Fusarium Head Blight Infection in Spring Wheat. University of Vermont Extension Northwest Crops and Soils Program, St. Albans, VT. Available online at: http://www.uvm.edu/extension/cropsoil/wp-content/uploads/2017-Spring-Wheat-Fungicide.pdf (accessed 27 Jul. 2018).

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