

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY15 Final Performance Report - NCE**
2nd One year No Cost Extension (NCE) for FY13 Award
Due date: July 15, 2016

Cover Page

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Fiscal Year:	2015
USDA-ARS Agreement ID:	59-0206-2-089
USDA-ARS Agreement Title:	Effects of Defense Peptides on Fusarium Head Blight.
FY15 USDA-ARS Award Amount:	No Cost Extension
Recipient Organization:	The Curators of the University of Missouri 310 Jesse Hall Columbia, MO 65211
DUNS Number:	153890272
EIN:	43-6003859
Recipient Identifying Number or Account Number:	
Project/Grant Reporting Period:	06/23/15-06/24/16
Reporting Period End Date:	06/24/16

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	FY13 ARS Award Amount
PBG	Effects of Defense Peptides on Fusarium Head Blight.	\$ 27,698
	FY15 Total ARS Award Amount	NCE

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: *Effects of Defense Peptides on Fusarium Head Blight.*

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

The goal of this no-cost extension was to create scab-inhibitory peptide gene constructs as transformation resources for studies of scab resistance.

Rationale for the goal: In previous studies conducted by John Leslie (Kansas State University), mating-pheromone peptides were discovered that inhibit germination of spores of the wheat scab pathogen. In recent collaborative studies conducted by Leslie, English, and Gary Yuen (University of Nebraska) and supported by the Scab Initiative, the peptides were tested for their efficacy for protecting wheat from scab when applied as a protective spray. Over a series of experiments, no protective effect was detected. We suggested this was likely due to insufficient peptide-suspension coverage of wheat floral tissues.

Lack of disease control in these experiments led to the need to create gene constructs for expression of inhibitory peptides in transgenic plants. By expressing the peptides within floral tissues, inhibitory peptides would be positioned to interact with the invading scab pathogen.

2. What was accomplished under these goals?

1) Major activities

Major activities included the design and construction of transformation vectors containing known inhibitory mating-pheromone peptides for use scab resistance studies.

2) Specific objectives

The main objective of the project was to design vectors containing one of each of the three most effective inhibitory peptides, as determined from John Leslie's previous in vitro analyses of mating-pheromone peptides. The three peptides included: Pnc (QWCRIHGQSCW), Pnc-S3 (QWCRWHGQSCW), Pgz-S2 (WCRWKGQPCW).

3) Significant results

Each of the three inhibitory peptides was incorporated into plasmid pMD1, previously used for transformation of the model plant, Arabidopsis. pMD1 contains the CMV35 followed by a short polylinker and then the NOS terminator region.

Two types of constructs were made for each mating-pheromone peptide. In the first, the inhibitory peptide gene sequence was attached to the active portion of an enterokinase (*M. musculus*) and its designed cleavage site. Expression of the gene sequences in Arabidopsis or other plants would produce free inhibitory peptide. The second construct included the peptide sequence alone for expression. The final result was six constructs

based on two formats for each of three selected inhibitory mating-pheromone peptides. Each construct could be modified appropriately for wheat transformation. Each construct has been stored as DNA and in E. coli.

4) Key outcomes or other achievements

Inhibitory mating-pheromone peptides were incorporated into plasmids as transformation resources for use in scab resistance research. Plasmids will be provided to project collaborators to assist further research with mating-pheromone peptides or for further distribution.

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?

Nothing to report.

Training of Next Generation Scientists

Instructions: Please answer the following questions as it pertains to the r 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 FY15 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 FY15 award period? No**

If yes, how many?

- 3. Have any post docs who worked for you during the FY15 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 FY15 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 FY15 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

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Publications, Conference Papers, and Presentations

Refer to the FY15-FPR_Instructions for listing publications/presentations about your work that resulted from all of the projects included in the FY15 grant. If you did not have any publications or presentations, state 'Nothing to Report' directly above the Journal publications section.

Nothing to report.

Journal publications.

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

Other publications, conference papers and presentations.