

PI: John Leslie

PI's E-mail: jfl@ksu.edu

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ARS Agreement #: 59-0206-1-113

Research Category: PBG

Duration of Award: 1 Year

Project Title: Effects of Defense Peptides on Fusarium Head Blight.

PROJECT 2 ABSTRACT

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This project builds on a research collaboration initiated in 2009 with the overall goal of developing a strategy for deploying inhibitory peptides to protect wheat from head blight. Technologies developed as part of this strategy will enable peptide deployment as protective sprays or in disease-resistant transgenic germplasm. Protection against disease is based on small peptides, including mating pheromones and sequences derived therefrom, that are known to inhibit spore germination and germling growth of *Fusarium graminearum*. Collaborative experiments initially established that chemically synthesized mating pheromone peptides inhibit pathogen development and spikelet/wheat head infection. Current activities are underway with FY11 funds to confirm that these peptides will inhibit pathogen development and disease in the same manner when produced by yeast fermentation.

The objectives of the proposed 2-year project (2012-2014) address the final testing needed to confirm the utility of inhibitory peptides for disease control. Specific objectives include: 1) completion of evaluations of peptide inhibitory efficacy in relation to floral development and peptide stability in relation to cyclic wetting and drying, 2) initiation of greenhouse evaluations of the protective efficacy of inhibitory peptide mixtures, and 3) initiation of field-based, microplot evaluations of the protective efficacy of inhibitory peptides. To achieve these objectives, test peptides will be produced in the English lab. In laboratory studies the Leslie lab will: 1) test peptides for inhibition of pathogen development through variable periods of wetting and drying, and 2) test mixtures of peptides for inhibition of pathogen development. In greenhouse and field studies, the Yuen lab will 1) test peptides for inhibition of pathogen infection when applied over a range of floral developmental stages, 2) test mixtures of peptides for inhibition of pathogen development, and 3) test peptides for inhibition of head blight in field microplots.

These objectives represent the continuing stages of stringent testing required to establish the utility of inhibitory peptide protection against wheat head blight either through protective spray applications or by deployment in transgenic, disease-resistant germplasm.

The objectives of this project address research priorities within two research categories as follows:

- I. Fusarium Head Blight Management: Fungicides and biocontrol agents with demonstrated field efficacy, and their application technologies.
- II. Pathogen Biology and Genetics: Develop new strategies for reducing impact of FHB disease and mycotoxin contamination in barley and wheat. Focus on research that seeks to demonstrate a reduction in FHB or DON in planta.