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Research Category: **PBG** **Duration of Award: 1 Year**

Project Title: Evaluation of Defense Peptides to Protect Wheat from Fusarium Head Blight.

PROJECT 1 ABSTRACT

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The overall project goal is to apply newly developed plant defense technologies to the protection of wheat from scab caused by *Fusarium* species. Our technologies include methods for selection of peptides that bind to and disrupt the development of infective structures of invasive pathogens, and means of delivering disruptive defense peptides in transgenic plants via fusion to a scaffold protein. Project objectives for 2008 build on initial successes towards fulfillment of 2007 Objectives. Proposed objectives include: 1) evaluation of the germling inhibition efficacy of putative inhibitory peptides when displayed as part of a protein display scaffold, and 2) evaluation of putative peptides for their ability to inhibit head blight development in wheat inoculated with *F. graminearum*.

To evaluate the inhibition potential of peptides when displayed as part of a delivery protein scaffold, we will fuse candidate peptides to maize cytokinin oxidase/dehydrogenase (ZmCKX1). This is a naturally occurring, secretable plant protein that we have used previously for defense peptide delivery in tomato. Peptides fused to ZmCKX1 will be expressed in yeast and tested for germling inhibition in vitro. To evaluate the potential of peptides to protect plants from infection, we will mix either a candidate phage-displayed peptide or ZmCKX1-displayed peptide with macroconidia or ascospores prior to inoculation of wheat at appropriate reproductive stages of development. Based on extensive experience in applying these methods to other fungal and human pathogens, we expect to successfully complete these objectives.

The objectives of this project meet the need for novel strategies to reduce the impact of *F. graminearum* on wheat and barley, as described in the area of Pathogen Biology and Genetics (PBG) within the U.S. Wheat and Barley Scab Initiative. The results of this project will ultimately contribute to the development of novel wheat germplasm based on new forms of plant defense.