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**ARS Agreement #:** 59-0206-7-006

**Research Category:** GDER

**Duration of Award:** 1 Year

**Project Title:** RNA-Interference Targeting of Fungal Genes for Enhancing FHB Resistance

## PROJECT 1 ABSTRACT

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Project Goals: The long-term goal of research in the PI's group is to develop alternative strategies for controlling FHB and mycotoxin accumulation that complement existing control measures in wheat and barley. While breeding efforts target host genes to enhance resistance, host-induced gene silencing (HIGS) provides a parallel *in planta* strategy to silence expression of fungal genes to control infection and toxin accumulation. The goal of the proposed work is to test the hypothesis that HIGS of *Fusarium graminearum* effector-encoding genes, which are required for virulence, will adversely impact pathogenicity and thus promote resistance against *F. graminearum*. Two secretory protein-encoding genes will be targeted; (i) *FGLI*, which encodes a lipase that is required for spread of the infection on wheat, and (ii) *FgNahG*, which encodes an enzyme that is predicted to breakdown the defense signaling metabolite salicylic acid. The specific objectives of the project are to:

1. Determine the effect of HIGS-mediated silencing of a *F. graminearum* secretory lipase in promoting resistance against *F. graminearum*.
2. Prevent the ability of *F. graminearum* to suppress plant defense signaling by HIGS-mediated silencing of *FgNahG* expression.

The proposed work will provide proof-of-concept that HIGS of virulence factor-encoding genes is an effective strategy for controlling *F. graminearum* infection and mycotoxin accumulation. The proposed work addresses GDER's priority of 'promoting the development of effective FHB resistance and/or reduced mycotoxin accumulation through transgenic strategies'.

Plan to Accomplish Project Goals Within Period of Proposed Work: To expedite the timely accomplishment of the project goals, in addition to wheat, the above objectives will be simultaneously pursued in *Arabidopsis thaliana*. Transgenic Arabidopsis and wheat, which are required for the proposed study, are available, thus further facilitating the timely completion of the proposed work.

Statement of Mutual Interest: The successful completion of this work will provide a new strategy and targets for enhancing FHB resistance and controlling mycotoxin accumulation in wheat, which in the future could also be extended to barley. FHB resistant wheat generated as a result of this work will provide germplasms that could be used for transferring resistance to elite cultivars. In addition, these germplasms will be of utility to pathologists studying the virulence function of *F. graminearum* genes.