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PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium graminearum adheres strongly to plant surfaces as it develops trichome-associated infection structures and produces host responses. Microscopy analyses of *F. graminearum* infecting barley show fungal cells forming across the plant as an integral part of the infection and early colonization. In culture, germinating conidia produce cells that continue to form a colony, rather than developing in preparation for infections and protection from plant resistance responses. In plants, we observe bulbous morphology in hyphae infecting stems and paleae. The knockout mutant of a cell-surface protein gene shows reduced adhesion and altered phenotypic responses to ROS conditions.

Our goal is to (1) Compare the *in planta* and *in vitro* morphology of cells using microscopy. (2) Determine if the plant associated morphologies are more resistant to external stressors, such as fungicides, than in culture. (3) Identify processes and genes important to specialized cell formations using transcriptional profiling on the plant and in culture, using wild type, adapted strains, and mutant strains in the presence of fungicides and ROS. Identify genes whose regulation is affected by these different conditions. Generate and phenotype gene knockouts to demonstrate gene function in stress resistance and pathogenicity.

The proposed research focuses on determining under what conditions and what stages of infection *F. graminearum* generates unique cells and of their role in disease, including tolerance to fungicides and difficulty in identifying varieties with robust FHB resistance.