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PROJECT 1 ABSTRACT
(1 Page Limit)

Bacterial-fungal associations can influence fungal phenotypes and shape the outcomes of plant-fungal interactions. Species of the fungus *Fusarium,* including *Fusarium graminearum,* cause *Fusarium* head blight (FHB) of cereal crops and contaminate grain with harmful trichothecene mycotoxins. In the absence of completely resistant host plant varieties, there is a need for more sustainable agricultural practices. In light of this, ecological approaches, which have the potential to reduce *Fusarium* virulence and success in agroecosystems, are becoming more desirable. This proposal aims to harness natural bacterial associations with *F. graminearum* to control FHB and mycotoxin contamination of grain.

Goal: Manipulate bacterial-fungal associations to reduce *Fusarium graminearum* virulence and/or fitness.

Objective 1: Identify bacteria associated with *F. graminearum* hyphae that can modulate fungal mycelial growth, reproduction, and/or mycotoxin production during plant-fungal interactions.
Outcome will be identification of bacterial strains or communities that efficiently colonize fungal hyphae and can silence/reduce virulence of the pathogen. *Fusarium* genome sequencing projects have led to identification of several *F. graminearum* isolates with 'contaminating' bacterial DNA that belong to bacterial symbionts. Once the bacteria have been identified, their effects on *F. graminearum* biology will be evaluated by comparing growth, reproduction and virulence of the bacterial-associated *F. graminearum* to the cured *F. graminearum* strains.

Objective 2: Determine the nature of the bacterial- *F. graminearum* associations and identify methods to transfer these associations to other *F. graminearum* isolates.
Outcome will be methods to establish antagonistic bacterial associations with *F. graminearum* strains to reduce Fusarium head blight and mycotoxin contamination of wheat and barley. Determining if the bacteria are ectosymbionts or endosymbionts of *F. graminearum* hyphae, and if their associations with *F. graminearum* are transient or stable, will aid in the development of strategies to manipulate the bacterial-fungal interactions. Drawing from existing literature, we will evaluate methods to re-establish the bacterial-fungal associations resulting in reduced fungal virulence and/or success.

Statement of Mutual Interest: This research does not duplicate prior investments in biological control approaches of FHB, which aimed primarily to develop strains and products that could be applied to the wheat or barley spike to prevent floral infection. The proposed research uniquely seeks to identify biological control bacteria that can associate with the fungal hyphae and reduce its success during both saprophytic and pathogenic stages. This work builds on previously USWBSI funded research, focused on identifying bacterial parasites of *F. graminearum* perithecia to reduce the success of spore production or active discharge.