PI: Martha Vaughan
PI's E-mail: martha.vaughan@usda.gov
Project ID: FY20-VA-028
ARS Agreement #: *N/A*
Research Category: PBG
Duration of Award: 1 Year
Project Title: Silencing *Fusarium graminearum* Virulence through Bacterial Associations

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* (*Fg*), cause *Fusarium* head blight 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 critically needed. This proposal aims to harness natural bacterial associations with *Fg* to reduce *Fusarium graminearum* virulence and/or fitness and control Fusarium head blight and mycotoxin contamination of grain. We will seek to identify bacteria associated with *Fg* hyphae that can modulate fungal mycelial growth, reproduction, and/or mycotoxin production during plant-fungal interactions. *Fusarium* genome sequencing projects have led to identification of several *Fg* isolates with 'contaminating' bacterial DNA that belong to bacterial symbionts. Once the bacteria have been identified, their effects on *Fg* biology will be evaluated by comparing growth, reproduction and virulence of the bacterial-associated *Fg* to the cured *Fg* strains. The nature of the bacterial- *Fg* associations will be determined and methods to transfer these associations to other *Fg* isolates will be investigated. Determining if the bacteria are ectosymbionts or endosymbionts of *Fg* hyphae, and if their associations with *Fg* 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. Potential outcomes will be (1) identification of bacterial strains or communities that efficiently colonize fungal hyphae and can silence/reduce virulence of the pathogen, and (2) development methods to establish antagonistic bacterial associations with *Fg* strains to reduce Fusarium head blight and mycotoxin contamination of wheat and barley.