

**PI:** David Haak

**PI's E-mail:** dhaak@vt.edu

**Project ID:** FY20-HA-045

**ARS Agreement #:** 59-0206-0-187

**Research Category:** PBG

**Duration of Award:** 1 Year

**Project Title:** Managing the Phytomicrobiome for Increased Disease Resistance

### PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB), caused by *Fusarium graminearum* (*sensu stricto*), is a devastating disease of wheat and barley in the US. Managing FHB is challenging because FHB impact on plant health and agronomic properties are strongly integrated and genetic resistance is incomplete. Recent studies have shown that the wheat microbiome changes in response to the presence of *Fusarium spp.* Further, there is evidence that microbes can reduce FHB impacts on both grain quality and quantity. Our goal in this USWBSI project is to characterize the host genotype x microbiome x pathogen interactions among wheat varieties with varying resistance levels in a systems framework. The specific objectives are: 1) Describe the metagenomic network landscape for the interactions of host-microbiome-pathogen in susceptible, moderate resistant, and resistant wheat varieties across two locations. 2) Identify microbe and microbial community nodes associated with *Fusarium* load. 3) Identify microbial metabolism genes and correlate their abundance with *Fusarium* load. We expect to develop host-genotype specific microbe and microbial gene networks that respond to the presence of *Fusarium* across locations. From these data we will identify nodes (clusters of microbes or genes) that are negatively correlated with FHB or mycotoxin level in this system. The PI and Co-PIs will disseminate results to USWBSI investigators and stakeholders through, publications, presentations and direct oral communication. Results from this project will help identify environmentally stable sources of additional resistance to FHB for winter wheat. Specifically, the data obtained herein will provide candidate genes, microbes, and microbial communities that can be refined for testing as biological control agents.