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Project ID: FY21-GE-001

ARS Agreement #: *New*

Research Category: TSCI

Duration of Award: 1 Year

Project Title: Breeding Potential for Microbiome Protection against Fusarium Head Blight

PROJECT 1 ABSTRACT

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Overall project goals: To evaluate the potential ability of barley genetics to recruit beneficial microbes that protect from Fusarium head blight. Accomplishing the following objective will set the stage for rapid incorporation of microbial protection as a selectable trait in ongoing barley breeding programs.

Project Objective: Identify FHB recruited and genotype-responsive microbes.

Expected outcomes: 1) Identification of groups of microbes (taxa) that are recruited in response to FHB disease. Plants recruit beneficial microbes in a “cry for help” strategy under biotic stress. By profiling the bacterial and fungal community composition in healthy and diseased barley heads we will identify taxa that are specifically associated with FHB disease. 2) Identification of groups of microbes with differential abundance across barley genotypes. By utilizing diverse germplasm for amplicon sequencing analysis, we will identify taxa within the barley microbiome that respond to plant genotypes. Genotype-responsive taxa can be used as traits for selective breeding approaches to improve their recruitment in the barley microbiome. Microbes that are both recruited in response to FHB and influenced by plant genotype will represent candidate FHB biocontrol taxa to be used as traits for selective breeding.

Plans to Accomplish Project Goals: To accomplish the goals of this project in the year, sampling will occur in coordination with existing projects to survey the training population from Aberdeen, ID and to measure fungal biomass in coordinated nurseries. Discovery of beneficial microbes and validation of methods can be expanded to genomic selection and surveying genotypes in nurseries across North America in future research

Statement of Mutual Interest: This proposal meets all three goals of the Transformational Science grant, three PIs, including the lead PI, are new to the initiative, the proposed work is a novel approach to finding disease resistance to FHB, and involves collaboration between scientists from the coordinated project Barley-CP and research area PBG. Previous research in biocontrols focused on management and application or characterization of interactions with resistant and susceptible wheat lines. This research is a novel approach because it focuses on a well genetically characterized training population for malt barley. Additionally, exploring the microbial analysis in already available harvested grains opens the potential for large scale analysis in nurseries across North America.