FY21 USWBSI Project Abstract

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Research Category: BAR-CP	Duration of Award: 1 Year
Project Title: Genomics Selection for FHB Resistance and Malting Quality in Spring Malting Barley	

PROJECT 3 ABSTRACT
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Overall project goals: To increase the level of FHB resistance in Aberdeen malting barley germplasm while maintaining outstanding malt quality.

Project Objectives:

1. Evaluate FHB resistance and malt quality lines in a training population selected to represent the Aberdeen, ID spring malting barley breeding program.
2. Develop and apply a genomic selection prediction model for FHB resistance in the Aberdeen spring malting barley germplasm, accounting for the need to maintain acceptable malt quality.

Plans to accomplish project goals:

From a founder population of ~700 lines, 248 lines were selected as a training population (TP) representative of the Aberdeen spring breeding program. The founder population has been genotyped and the TP was grown at Aberdeen in 2019 for initial phenotyping and to increase seed. In 2020 and beyond, the TP will be planted in multiple irrigated and rain-fed locations. Agronomic and malting phenotyping will be conducted in standard small plot trials and malting quality evaluated by USDA-ARS-CCRU. Inoculation with FHB will be done in mist nurseries at Aberdeen and Kimberly Idaho, and in Minnesota, New York and North Dakota locations. Using phenotypic data for the TP and SNP data for the Founder population a training prediction model will be developed. Lines with highest genomic estimated breeding value (GEBV) will be selected for crosses. The crosses will be advanced and genotyped to F3 and selection will be done based on GEBV. Genome-wide association studies in the barley germplasm will identify the useful genomic regions, markers, and alleles that can be readily deployed in marker-assisted selection for fast track improvement of barley in Aberdeen Idaho.

Statement of mutual interest:

Identification of new sources for resistance, and release of new cultivars tolerant to FHB disease is necessary to protect growers in the Intermountain west from FHB disease. The use of genomic selection will speed up the process of screening and variety release. The improved germplasm developed through this project can be further developed into varieties or used as parents in future breeding programs. The new sources of resistance and new varieties to be released will make our germplasm more useful and will benefit other barley breeding programs.