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Project ID: FY20-BA-018

ARS Agreement #: *N/A*

Research Category: BAR-CP

Duration of Award: 1 Year

Project Title: Genomics Selection for FHB Resistance and Malting Quality in Spring Malting Barley

PROJECT 2 ABSTRACT

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The goal of this project is to increase the level of FHB resistance in Aberdeen malting barley germplasm while maintaining outstanding malt quality. We will evaluate FHB resistance and malt quality of lines in a training population selected to represent the Aberdeen, ID spring malting barley breeding program, then 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.

From a founder population of ~700 lines, 248 lines were selected as a training population (TP) representative of the Aberdeen spring breeding program. The full 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. 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 and SNP data, a genomic prediction model will be used to select parents from the Aberdeen, Idaho spring malting barley breeding germplasm for crosses. In addition, genome-wide association studies 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.

Identification of new sources of 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.