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Research Category: **BAR-CP** **Duration of Award: 1 Year**

Project Title: Molecular Genetics Approaches to Developing Scab Resistant Barley.

PROJECT 1 ABSTRACT

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Fusarium head blight (FHB; scab) caused by *Fusarium graminearum* is a devastating disease of barley. Previous work in my laboratory has resulted in identifying a barley UDP-glucosyltransferase (*HvUGT13248)* that exhibits resistance to FHB and trichothecenes when expressed in transgenic wheat, and mapping QTL for FHB resistance in barley. We have developed transgenic barley overexpressing *HvUGT13248* in the Golden Promise genetic background. We have also initiated backcrossing these transgenic plants to the elite six-row cultivar Rasmusson. The chromosome 6H bin 7 FHB resistant QTL is also associated with grain protein content such that FHB resistance is associated with high grain protein content. Unfortunately, high grain protein content is unacceptable in the malting and brewing industry. Previously, my laboratory conducted an RNA-seq experiment on the chromosome 6H bin 7 FHB resistant QTL and identified SNPs within the QTL region. To leverage the prior work in these two areas we propose to: (1) characterize transgenic barley overexpressing *HvUGT13248*; and (2) fine map and characterize the chromosome 6H bin 7 FHB resistance QTL.

For objective 1, we will conduct two backcrosses of the transgenic plants into the Rasmusson genetic background and during the introgression process we will select for expression of the transgene. Homozygous lines will be screened for FHB resistance in the field in collaboration with Dr. Ruth Dill-Macky. For objective 2, we will obtain genetic stocks segregating for the chromosome 6H bin 7 region (collaboration with Kevin Smith) and select recombinants from ~5,000 individuals using flanking markers. To identify the regions conferring FHB resistance and protein content, we will screen the recombinants for FHB severity in the field and assess protein content in the mature grain. Our goal is to identify recombinants that exhibit FHB resistance and low grain protein content. These recombinants along with the associated markers can be used directly in breeding programs.

This proposed project addresses the priorities of the "Gene discovery and engineering resistance" (GDER) research area to "characterize the genetic function of existing and novel loci for FHB resistance" and "to develop effective FHB resistance and/or reduced DON accumulation through transgenic strategies", and the priorities of the Barley CP to "validate and fine map FHB resistance QTL" and to "evaluate promising transgenes in adapted genetic backgrounds in regional nurseries".