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Project Title: Evaluation and Genetic Characterization of Barley Germplasm for FHB Resistance

PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium head blight (FHB) has devastated the once-thriving malting barley industry in the Midwest and is now threatening other production areas in the west and northeast. Our overall goal is to reduce the losses caused by FHB, especially quality discounts due to the accumulation of mycotoxins such as deoxynivalenol (DON). In conjunction with chemical and cultural management strategies, this can be best achieved by identifying and incorporating into barley cultivars genes that confer a high level of resistance to FHB and the accumulation of mycotoxins. Our specific objectives for this proposal are to: 1) determine the number, effect, and chromosomal position of FHB resistance loci in the PI 350725/Quest population; 2) conduct rigorous FHB evaluations of the 100 most resistant *Hordeum* accessions in order to select the very best ones for breeding and genetic analysis; 3) evaluate previously untested barley landraces for FHB reaction, and 4) provide adapted FHB-resistant parental materials to barley improvement programs. PI350725 is a two-rowed accession from the Tirol in Austria that has exhibited consistently low levels of FHB and DON accumulation. An advanced backcross population was developed between PI350725 and the moderately resistant Minnesota cultivar Quest to map QTL underlying resistance to FHB and DON accumulation. Many barley accessions have been reported to carry moderate resistance to FHB; however, no study has been advanced to test all of these select accessions in head to head comparisons. For this objective, we will obtain rigorous multi-location, multi-replicate data on ~100 select *Hordeum* accessions for FHB severity and DON accumulation in order to select the very best ones for genetic studies and breeding. Although extensive FHB evaluations of *Hordeum* germplasm have been completed over the past 16 years, there still remains untested landrace accessions. For this objective, we will evaluate up to 600 new barley landraces for resistance to FHB. The proposed research will be accomplished within the next seasons of 2019 and 2020. Key outcomes from this research will be the identification of novel FHB resistance QTL; advanced breeding lines with enhanced resistance; and also new sources of resistance in barley. Use of this knowledge and germplasm in breeding will help fulfill the USWBSI's primary goal to enhance food safety and supply by reducing the impact of FHB on barley.