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Project Title: Mapping Loci Conferring Resistance to FHB and DON Accumulation in Barley.

PROJECT 1 ABSTRACT

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Our overall goal is to reduce the losses caused by Fusarium head blight (FHB), especially quality discounts due to the accumulation of mycotoxins such as deoxynivalenol (DON). 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. Over the past decade, we have evaluated over 20,000 accessions of *Hordeum* for FHB reaction and have identified a subset of about 100 that possess a level of resistance comparable to the six-rowed control Chevron. Molecular marker analyses were conducted on this subset and were used to identify accessions that likely possess alleles for FHB resistance that have not yet been exploited in breeding programs. The accessions Kutahya (a cultivated barley from the Netherlands) and W-365 (a wild barley from Iraq) have exhibited moderate resistance to FHB and DON accumulation in trials conducted over the past 2-3 years; however, nothing is known regarding the genetics of resistance in these accessions. This knowledge, coupled with the identification of molecular markers closely linked to major effect resistance QTL can hasten the development of FHB resistant barley cultivars. This is the primary rationale for this research.

Our specific objective for this proposal is to determine the number, effect, and chromosomal position of FHB resistance loci in two *Hordeum* accessions (Kutahya and W-365) using the advanced backcross QTL method. These lines have now been advanced to the BC₂F₄ generation for phenotyping and genotyping in 2012 and 2013. This research addresses Objective #2 (Map novel QTL for resistance to FHB in barley) of the USWBSI Research Area "Variety Development and Host Resistance" (VDHR), but is also a step toward Objective #4 (Develop new barley varieties with enhanced resistance to FHB and lower DON). The outputs from this work will fulfill the USWBSI research priority to "develop germplasm to further enhance short term and long term improvement of FHB resistance and to efficiently introgress effective resistance genes into breeding germplasm."

The results from this study will be presented at the USWBSI forum and possibly other venues. Stakeholders will be informed of our activities at field days, producer/technical meetings, and also via barley council websites, and bulletins. The information generated from this study will lead to the development of malting barley cultivars with FHB resistance and low DON accumulation. This, in turn, will minimize the threat of FHB and associated mycotoxins for producers, processors, and consumers.