

Project Abstract

Project Title:	Einkorn genomics to identify FHB-resistance genes in wheat	
USWBSI Project ID:	FY24-GD-003	
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Project Summary

Fusarium head blight is a devastating disease of wheat and barley. Extensive germplasm screening of wheat cultivars, landraces and some distant wild relatives of wheat have identified a limited number of effective genes / QTL and these included Fhb1, Fhb6 and Fhb7. Two closer wild relatives of *Aegilops tauschii* and *Triticum monococcum* have also been screened for FHB resistance and several studies have indicated presence of genetic diversity in these germplasm for FHB resistance. Einkorn (*Triticum monococcum*; $2n=2x=14$) is the first domesticated wheat species and was central to the birth of agriculture. Several studies in the past have shown excellent resistance in diploid A-genome einkorn wheat (*T. monococcum*). However, lack of systematic approaches and genomic resources limited exploitation of the einkorn germplasm for FHB resistance and related gene discovery.

Recently we have generated reference genome assemblies (with completely assembled centromeres) for wild and domesticated einkorn wheat. In addition, we have sequence indexed (with 10x coverage) a large Tm-GWAS panel (219 accession in total) that was selected from 1200 einkorn accessions. Replicated phenotypic evaluation of the TM-GWAS panel suggested an excellent genetic diversity against FHB.

Expected Outcome:

This project will identify new sources of resistance in einkorn wheat. Through association mapping and high-resolution genetic mapping, we will map new resistance genes and will provide flanking markers for targeted FHB QTL and genes. We will transfer most important QTL in soft red winter wheat cultivars background using bridge cross scheme. Seeds of adapted soft red winter wheat cultivars with einkorn introgression with enhanced scab resistance will be shared with the regional breeders.

