

Project Abstract

Project Title:	Genetic Characterization and Introgression of FHB Resistance in Durum Wheat	
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In previous studies, we detected a major QTL for FHB resistance on chromosome 2A in a mapping population derived from the cross between Divide and emmer wheat line PI 254188. Interestingly, the 2A QTL allele for reducing FHB severity is derived from the susceptible parent Divide in the mapping population. To confirm this 2A QTL and determine its genetic mechanism, we raised another recombinant inbred line (RIL) population from a cross between Joppa and an FHB resistant RIL derived from the Divide X PI 254188 cross. To identify genes conferring FHB susceptibility in durum wheat, we developed an EMS mutant population consisting of 1000 mutant lines from durum wheat cultivar ND Riverland and obtained 500 EMS mutants derived from Kronos from Dr. Jorge Dubcovsky. In this pre-proposal, our overall goal is to finely map the 2A QTL for FHB resistance and identify genes that contribute to FHB susceptibility in durum wheat. The specific objectives of the research are:

1. Finely map the 2A QTL for FHB resistance derived from the Divide X PI 254188 cross.
2. Develop user-friendly DNA markers for the 2A QTL.
3. Introgress the 2A QTL into durum wheat varieties.
4. Screen EMS mutants derived from ND Riverland and Kronos for FHB resistance.
5. Identify genes related to FHB susceptibility in durum wheat.

We will saturate the 2A QTL region with SNP markers using chromosome 2A sequences and available mapping populations. User-friendly DNA markers will be developed for the FHB resistance QTL, and the QTL will be Introgressed into adapted durum wheat cultivars by the backcrosses, marker-assisted selection and speed breeding approach. We will also screen the EMS mutants for FHB susceptibility and identify mutants that are less or more susceptible to FHB compared to their respective wild type parents (Kronos and ND Riverland) and detect gene mutations associated with the phenotype changes. Fine mapping of FHB resistance QTL and identification of DNA markers associated with them will accelerate the development of FHB resistant wheat varieties by marker assisted selection and gene pyramiding. Durum wheat germplasm with improved FHB resistance will be generated through the introgression process and will be provided to breeders (Dr. Elias and others) for developing FHB resistant varieties or germplasm. Discovery of genes related to susceptibility will facilitate improvement of the resistance level of durum wheat by removing the FHB susceptibility factors.