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Project Title: Identify and Map Novel QTL for FHB Resistance in Durum Wheat

PROJECT 1 ABSTRACT

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PI 254188 is one of the emmer wheat (*Triticum turgidum* L. subsp. *dicoccum*) accessions which showed a high level of FHB resistance in multiple years of greenhouse and field evaluations. Using this material as FHB resistant donor, Dr. Steven Xu at USDA-ARS has already generated some introgression durum wheat lines with a good level of FHB resistance by crosses and backcrosses to North Dakota durum wheat cultivars. However, the number and chromosome locations of the QTL responsible for the FHB resistance in PI 254188 are still not known. In this proposal, we aim to identify, map, and deploy QTLs for FHB resistance in PI 254188. We developed a mapping population with 200 RILs (F2:8) derived from the Divide/PI 254188 cross by single seed descent. The population was evaluated for FHB resistance in one field experiment. Genotyping of this population with the wheat 90K-SNP chips is in progress for construction of a molecular linkage map. Therefore, the specific objectives of the proposal are:

- Phenotype FHB resistance and morphological traits of the mapping population from the Divide/PI 254188 cross in greenhouse and field;
- Construct a genetic linkage map of the population using SNP markers;
- Identify QTL for FHB resistance in PI 254188;
- Develop user-friendly DNA markers for tagging the FHB resistance QTL;
- Transfer and pyramid the FHB resistance QTL into adapted durum wheat cultivars.

We will continue to phenotype the population for FHB and other traits (plant height and heading date) for at least two greenhouse seasons and one more field season. The genotype and phenotype data will be used to identify QTL for FHB resistance in the population. Once the QTL regions are identified, user-friendly markers will be developed using the publicly available reference genome sequences. We initiated a cross between Joppa and a resistant RIL from the Divide/PI 254188 cross, and will transfer the FHB resistance QTL into adapted durum cultivars by backcrosses in combination with marker-assisted selection. Identification of DNA markers associated with the FHB resistance QTL 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 provided to breeders (Dr. Elias and others) for developing FHB resistant varieties or germplasm.