

PI: Steven Xu**PI's E-mail: Steven.Xu@ARS.USDA.GOV****Project ID: FY10-DU-003****FY09 ARS Agreement #: NA****Research Category: DUR-CP****Duration of Award: 1 Year****Project Title: Molecular Mapping and Introgression of Scab Resistance derived from Emmer Wheat.****PROJECT 1 ABSTRACT**

(1 Page Limit)

We previously identified a number of Persian wheat (*T. carthlicum*) and cultivated emmer wheat (*T. dicoccum*) accessions with Type II FHB resistance and developed about 500 double haploids (DH) and over 6,000 BC₁-BC₃ derived lines in various generations (F₃ to F₈) derived from about 100 crosses of *T. carthlicum* and *T. dicoccum* with current durum cultivars. The specific objectives of this proposal are to map the quantitative trait loci (QTL) for FHB resistance derived from *T. dicoccum* and to accelerate development and release of elite durum germplasm with improved FHB resistance using the developed populations and BC lines. For mapping the resistance QTL, a population BP025 (Ben/ *T. dicoccum* PI 41025) of 200 F_{2:7} recombinant inbred lines will be evaluated for Type II resistance in greenhouse for three seasons using a randomized complete block design (RCBD) with three replications. The linkage map covering all 14 chromosomes based on BP025 will be constructed using about 350 SSR markers. The phenotypic data and the linkage map will be used to identify QTLs associated with FHB resistance. For developing elite durum germplasm with improved FHB resistance, we will continue transferring the FHB resistance from *T. carthlicum* and *T. dicoccum* into durum cultivars. About 100 - 150 BC₁F₅ lines with improved FHB resistance derived from backcrossing four DH lines, six BC₁F₄-derived lines, and 19 *T. dicoccum* accessions with the durum cultivars Alkabo, Grenora, Maier, and Divide will be evaluated using a RCBD with three replications in the greenhouse for three seasons and field nurseries in three locations (Fargo, Langdon, and Prosper, ND) for two years. About 3,500 BC₁F₃ single-head selections made in 2009 will be initially evaluated in field nurseries in the summer of 2010. Lines with a combination of improved FHB resistance and good agronomic performance will be selected for further evaluation for three seasons in greenhouse and field nurseries in three locations for two years. We will improve the agronomic traits for the DH and BC₁-derived lines with high levels of FHB resistance but with poor agronomic traits (late maturity and tall in height). The lines LP749-14, 08F285, and three additional BC₁F₅ lines with the best levels of FHB resistance will be crossed with the durum cultivars Grenora and Divide. The F₁ hybrids will be backcrossed to their durum parents to produce BC₁ seeds (~100 crossed seed/cross). All the BC₁ crossed seeds will be planted for initial evaluation for Type II resistance in the greenhouse. The BC₁F₂ seed (3-5 seed/plant) harvested from the BC₁F₁ plants with low infection (less than 30%) will be advanced to the BC₁F₅ generation through evaluation and selection.