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(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 have been evaluated for Type II resistance in greenhouse in 2010 using a randomized complete block design (RCBD) with three replications and will be evaluated for two more seasons in 2011. 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. In the summer of 2010, 159 BC₁F₄₋₅ progenies derived from backcrossing four DH lines, six BC₁F₄-derived lines, and 19 *T. dicoccum* accessions with the durum cultivars Alkabo, Grenora, Maier, and Divide were evaluated in a field nursery in Langdon, ND using a RCBD design with three replications. Another set of BC₁F₄₋₅ progenies derived from 128 BC₁F₃ and 139 BC₁F₄ plants were evaluated in field nurseries in Fargo and Prosper, ND. In addition, 1,396 BC₁F₃ head selections were evaluated in Langdon, ND. On basis of field evaluation, 68 lines with a combination of improved FHB resistance have been selected and evaluated in greenhouse in the winter of 2010. These lines in BC₁F₆₋₇ generation will be further evaluated in field nurseries in Fargo and Langdon and in greenhouse for two seasons in 2011. For further improving the agronomic traits of the selected DH and BC₁-derived lines with high levels of FHB resistance, seven lines (LP749-14, 07F459, 08F285, 08G33, 10FAR2278, 10FAR2627, and 10FAR2891) have been crossed with the new ND durum cultivar 'Tioga' and two advanced durum lines in 2010. The F₁ hybrids will be backcrossed to their durum parents to produce BC₁ seeds (~100 crossed seed/cross) in 2011. 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.