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(1 Page Limit)

Fusarium head blight (FHB) is a serious fungal disease that currently threatens durum wheat (*Triticum turgidum* ssp. *durum*) production in North America. There is an urgent need to identify FHB-resistant genes or quantitative trait loci (QTL) that are useful for improving FHB resistance in durum and to develop adapted durum germplasm with improved FHB resistance. Several previous studies showed that four tetraploid wheat accessions (*T. dicoccum* PI 272527 and PI 41025, *T. carthlicum* PI 61102 and PI 94748), a hexaploid wheat line (PI 277012) carrying two 5A QTLs, a wheat line (TC67) carrying a 5A QTL from *T. timopheevii*, and two wheat-*Elymus tsukushiensis* translocation lines (TA5660 and TA5661) have certain level of Type II FHB resistance. In addition, durum cultivar 'Divide' is known to possess a moderate level of resistance to FHB. By using these resistance sources in crosses with durum cultivars ('Ben', 'Lebsock', 'Maier', 'Tioga', 'Carpio', and 'Joppa'), we previously developed a number of durum lines and populations with improved FHB resistance. The specific objectives of this proposal are to identify the FHB-resistant QTLs in *T. dicoccum* PI 272527 and durum Divide and to develop elite durum germplasm with improved FHB resistance and superior agronomic performance using previously developed populations and germplasm with FHB resistance. For identifying FHB-resistant QTLs in Divide and PI 272527, a population of 200 recombinant inbred lines from the cross between Divide and PI 272527 will be evaluated for Type II resistance in the greenhouse for three seasons and field nurseries in two locations for two years using a randomized complete block design with three replications. The population will be genotyped using the wheat 90K SNP arrays and a linkage map covering all 14 chromosomes will be then constructed with the polymorphic SNP markers. The phenotypic data and the linkage map will be used to identify QTLs associated with FHB resistance. To develop elite durum germplasm with improved FHB resistance, we previously selected about 20 stable lines (BC<sub>1</sub>F<sub>7</sub> and beyond) with improved FHB resistance derived from PI 272527, PI 41025, PI 61102, PI 94748, and PI 277012. We will continue evaluating these lines for FHB resistance in greenhouse and field nurseries in multiple locations. The top four lines carrying FHB resistance from PI 272527, PI 41025, PI 94748, and PI 277012 will be intercrossed to pyramid different QTL together. To transfer FHB resistance from TC67, TA5660, and TA5661, the BC<sub>1</sub>-derived lines derived from their backcrosses with Divide, Tioga, and Carpio will be evaluated for FHB resistance in greenhouse and field nurseries in multiple locations. The durum lines carrying the resistance from TC67, TA5660, and TA5661 will be crossed and backcrossed with Carpio and Joppa to improve their agronomic and quality traits.