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Fusarium head blight (FHB) is a serious disease that currently threatens durum wheat production in the United States. The development of adapted durum wheat germplasm with improved FHB resistance is essential for U.S. durum wheat breeding programs. We previously identified two Persian wheat (*Triticum carthlicum*) accessions (PI 61102 and PI 94748) and two cultivated emmer wheat (*T. dicoccum*) accessions (PI 272527 and PI 41025) with Type II FHB resistance. We also identified two major FHB resistance QTLs on chromosome arms 5AS and 5AL in a hexaploid wheat line (PI 277012) that was misclassified as *T. dicoccum*. A major FHB resistance QTL on 5AL derived from Timopheev wheat (*T. timopheevii*) accession PI 343447 was recently mapped in Canada. By using these resistance sources in crosses with North Dakota durum cultivars ('Ben', 'Lebsock', 'Divide', and 'Maier'), we have developed a number of durum lines with improved FHB resistance. The specific objective of this proposal is to develop elite durum germplasm with improved FHB resistance and superior agronomic performance, using developed populations and germplasm with FHB resistance. Seven BC₁-derived durum lines (10FAR2627 and 10FAR2891 from Divide/PI 272527//Divide, 08F285, 08G33, and 08G105 from Ben/PI 41025//Maier, and 07F459 from Lebstock/PI 94748//Lebstock, and 10FAR2778 from Lebsock/PI 277012//Lebsock) and one DH line LP102-14 (Lebsock/PI 61102) have been crossed and backcrossed with the two new ND durum cultivar 'Tioga' and 'Carpio' and an elite durum line D04581. Approximately 2,000 of the BC₁ crossed seeds were planted for initial evaluation for Type II resistance in the greenhouse, and produced BC₁F₂ seed in the spring of 2012. The BC₁F₂ seed (3-5 seed/plant) from the resistant BC₁F₁ plants will be advanced to the BC₁F₅ generation through evaluation and selection by the summer of 2013. The stable lines with a combination of FHB resistance and good agronomic performance in the advanced generations (BC₁F₆) will be selected based on evaluation in greenhouse and at two or three field locations (Fargo, Langdon, and Prosper) in North Dakota.. They will be released as durum wheat germplasm and/or directly enter the trials of the durum breeding program in North Dakota. In order to transfer the 5A QTL from *T. timopheevii* PI 343447 into North Dakota durum wheat, the wheat line TC67 carrying the 5A QTL from PI 343447 was crossed with three durum cultivars (Carpio, Divide, and Tioga). The F₁ plants will be backcrossed with their durum parents to produce about 250 BC₁ seeds. All the BC₁ crossed seeds will be planted for initial evaluation with three SSR markers linked to the 5A QTL. The BC₁ plants that have PI 343447 alleles at the three marker loci will be evaluated for Type II resistance in the greenhouse and will produce BC₁F₂ seed, which will be advanced to the BC₁F₅ generation through evaluation and selection.