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(1 Page Limit)

Initial association analysis based on lines derived from crossing of four Tunisian tetraploid sources of resistance with durum cultivars 'Ben', 'Maier', 'Lebsock' and 'Mountrail' has proven powerful. The Tun18 and Tun7 expressed similar resistance level to FHB as compared with the best hexaploid wheat sources (i.e. Sumai3 and Wangshuibai). A new significant QTL for FHB resistance was identified on the long arm of chromosome 5B (*Qfhs.ndsu-5BL*) with association analysis. This result was further confirmed by the traditional QTL analysis of a large population. A total of 10 different association mapping models were analyzed with the linear mixed model considering the structure (Q or P) and the kinship matrix estimated by REML (K_T) identified as the best for association studies in a mixture of wheat populations from a breeding program. The results also demonstrated a region on the short arm of chromosome 3B as potentially linked to FHB resistance. This region is in proximity of major FHB resistance gene "*fhb1*" reported in hexaploid wheat. This finding was surprising considering the genetic distance and lack of relationship between Tunisian tetraploid sources studied here and Chinese sources used to identify *fhb1*. A possibility of having susceptibility or suppressor of resistance gene(s) on durum wheat chromosome 2A was further confirmed in this material explaining the problem in developing resistant genotypes without counter selection against this region. The outcome of this project were diagnostic markers and germplasm that can be easily incorporated into the breeding programs to derive more resistant cultivars. This work is being continued by generating more advanced backcross derived lines using current durum cultivars as the recipient parent. In this period we plan to **1)** finish the association analysis of two additional Tunisian- derived advanced backcross populations [Tun 108 × Lebsock/Lebsock and Tun 108 × Ben/Ben], **2)** use gamma radiation to generate populations for analysis of deletion of the possible suppressor locus on chromosome 2A, and **3)** initiate development of durum lines carrying resistance loci located on 5BL and 3BS.