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MAP-BASED CLONING OF FHB RESISTANCE QTL IN DURUM WHEAT

Agata Gadaleta, Angelica Giancaspro, Stefania Giove, Pasqualina Colasuonno, Antonio Blanco

*Department of Environmental and Territorial Sciences (DiSAAT), University of Bari "Aldo Moro",
Via G. Amendola 165/A - 70126, Bari, Italy*

Fusarium graminearum is one of the most threatening pathogen of wheat, responsible for Fusarium head blight (FHB) which annually leads to severe yield losses, grain quality decay and healthy concerns due to the accumulation of mycotoxins in kernels. Host resistance represents the most effective approach to limit disease damages; however, while several species have been identified in the hexaploid germplasm to be used as donors to develop FHB resistant varieties, only a limited number of resistant loci have been detected in durum genotypes. Moreover, most mapped QTLs have not been genetically characterized as they cover large confidence intervals, have a DNA marker density not enough for fine mapping or map-based cloning, and a very limited number of validated resistance genes.

In this work we report the map-based cloning of a FHB-QTL on 2A chromosome of durum wheat, introgressed from a resistant line derived from the cv. Sumai-3. Markers enrichment of the QTL region was carried out leading to the inclusion of new SNPs respect to the existing map. Candidate genes potentially involved in FHB resistance were identified in the region, among which the gene for a wall-associated receptor-like kinase (WAK2) protein was characterized. A new functional marker was developed based on a sequence polymorphism between durum and common wheat found associated to FHB-resistance. Involvement of WAK2 gene in FHB defense response was assessed by gene expression comparison between resistant and susceptible wheat lines, and disease symptoms evaluation of TILLING lines carrying mutations affecting WAK protein function.

ABSTRACT