Identification and Characterization of QTLs for Grain Protein Content in Durum Wheat

M.I. Hassan and Blanco A.

Abstract:

A population of recombinant inbred lines (RILs) produced from a cross between the cultivated durum wheat cvs. Svevo and Ciccio was used to develop near isogenic lines (NILs) for grain protein content (GPC) QTLs on chromosomes 2A, 2B, 3B, 5A and 6B. NILs were used to validate individual effects of the putative QTLs under different environmental conditions and to investigate the genetic relationship between GPC QTLs and grain yield. The results showed that the effect of the QTL located on 2AS on GPC was stable over different genetic backgrounds and different environmental conditions. Furthermore, this QTL appeared to be the most promising effect on phenotypic variation of GPC, thereby confirming its environmental stability and pointing to its appropriateness for marker assisted selection (MAS) for GPC improvement. QTLs located on 3BS, 5AL and 6BS were validated across environments, but only at single NIL for each. Validation of these QTLs in diverse genetic backgrounds and under different environmental conditions is still required to confirm their environmental stability. A weak negative relationship between GPC and grain yield was observed at a single case, indicating that different loci within the linkage groups could be involved and no strong evidence that GPC QTLs have pleiotropic effects on grain yield. Thus, it could be possible to use these results for GPC improvement without reduction in grain yield.

Keywords:

Durum wheat, grain protein content, near isogenic line, QTL mapping

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