Analysis of QTLs for panicle exsertion and its relationship with yield and yield-related traits in rice (Oryza sativa L.)


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ABSTRACT. Panicle exsertion (PE) is an important morphological trait that is closely associated with spikelet fertility and grain yield. To understand the genetic basis of PE and its relationships with yield and yield-related traits, a recombinant inbred population consisting of 240 lines derived from a cross between an Indica cultivar ‘Kasalath’ and a Japonica germplasm ‘TD70’, was studied over two years. PE was significantly correlated with plant height, heading date (HD), panicle length (PL), and panicle characteristics such as primary branch number, spikelet number per panicle, and spikelet density, but showed poor correlation with yield components. Based on linkage mapping of 141 SSR markers, a total of 38 quantitative trait loci (QTLs) were located for 12 investigated traits, with the contribution varying from 6.51 to 8.61%. Among these, four QTL clusters were identified on chromosomes 1, 2, 3, and 6, suggesting the existence of pleiotropic alleles. In some
intervals, two loci for PE were collocated with several traits, which is consistent with the correlations observed with phenotypic variations. The PE QTLs with ‘Kasalath’ alleles and without pleiotropic effects would be valuable for the improvement of PE in ‘TD70’ and in other rice varieties.

**Key words:** *Oryza sativa* L.; QTL; Panicle exsertion; Recombinant inbred population; Yield-related traits