

QTL analysis of for micronutrient content in rice grain

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Abstract

Micronutrients such as zinc (Zn), iron (Fe), manganese (Mn) have important roles for development and growth in plants but it also have roles in animals and humans. In previous studies, a Korean weedy rice, KH2J was selected to have tolerance to heavy metal, lead (Pb) compared with a cultivar, Milyang23. To identify QTLs for micronutrients concentration in grain, an F2 population (120 plants) were developed from a cross between KH2J and an *indica* rice cultivar, Milyang23. To measure the concentration of eight ions, Zn, Fe, Mn, Pb, calcium (Ca), copper (Cu), cadmium (Cd) and arsenic (As), grains were collected and digested with 65% nitric acid, and the ion contents were measured using inductively coupled plasma mass spectrometry. A total 27 putative quantitative trait loci (QTLs) were detected on 12 chromosomes by single point analysis and 22 putative QTLs were detected by composite interval mapping. The co-locations of QTL for Zn, Fe and Mn were observed on chromosome 5. The QTLs for Cd, Cu and Zn were co-localized on chromosome 10, and QTLs for Zn, As and Mn was on chromosome 12. The Zn concentration in F2 generation showed significant correlation with concentrations of As ($r = -0.4$), Cu ($r = 0.5$) and Fe ($r = 0.2$) ($P < 0.01$). Also, the Ca concentration was significantly related with Mn and Fe concentrations ($P < 0.01$). Fine mapping of these QTLs is underway to analyze their functional relationship. This work was supported by a grant from the Next-Generation BioGreen 21 Program (No. PJ011987012017), Rural Development Administration, Republic of Korea.

Keywords: Rice (*Oryza sativa* L.), wild rice , micronutrient, QTLs

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