

Fine mapping of *qBK1*, a major QTL for bakanae disease resistance in rice

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Abstract

Bakanae disease is one of the most serious and oldest problems of rice production, which was first described in 1828 in Japan. This disease has also been identified in Asia, Africa, North America, and Italy. Germinating rice seeds in seed boxes for mechanical transplantation has caused many problems associated with diseases, including bakanae disease. Bakanae disease has become a serious problem in the breeding of hybrid rice, which involves the increased use of raising plants in seed beds. The *indica* rice variety Shingwang was selected as resistant donor to bakanae disease. One hundred sixty nine NILs, YR28297 (BC₆F₄) generated by five backcrosses of Shingwang with the genetic background of susceptible *japonica* variety, Ilpum were used for QTL analysis. Rice bakanae disease pathogen, CF283, was mainly used in this study and inoculation and evaluation of bakanae disease was performed with the method of the large-scale screening method developed by Kim et al. (2014). SSR markers evenly distributed in the entire rice chromosomes were selected from the Gramene database (<http://www.gramene.org>), and the polymorphic markers were used for frame mapping of a BC₅F₅ resistant line. Here, we developed 168 near-isogenic rice lines (NILs, BC₆F₄) to locate a QTL for resistance against bakanae disease. The lines were derived from a cross between Shingwang, a highly resistant variety (*indica*), and Ilpum, a highly susceptible variety (*japonica*). The 24 markers representing the Shingwang allele in a bakanae disease-resistant NIL, YR24982-9-1 (parental line of the BC₆F₄ NILs), were located on chromosome 1, 2, 7, 8, 10, 11, and 12. Single marker analysis using an SSR marker, RM9, showed that a major QTL was located on chromosome 1. The QTL explained 65 % of the total phenotype variation in BC₆F₄ NILs. The major QTL designated *qBK1* was mapped in 91 kb region between InDel15 and InDel21. The identification of *qBK1* and the closely linked SSR marker, InDel18, could be useful for improving rice bakanae disease resistance in marker-assisted breeding.

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