

Detection of Resistant QTL to Blast Based on GWAS Analysis
Using Korean *Japonica* Rice Germplasm

Young-Chan Cho^{1*}, Man-Kee Baek¹, Soon-Wook Kwon², Hyun-Su Park¹, Jong-Min Jeong¹, Jeong-Kwon Nam¹, Woon-Cheol Shin¹, Bo-Kyeong Kim¹

¹National Institute of Crop Science, RDA, 181 Hyeuksin-Ro, Iseo-myeon, Wanju 55365, Republic of Korea

²Department of Plant Bioscience, College of Natural Resources and Life Science, Pusan National University, Milyang 627-706, Republic of Korea

Blast by *Magnaporthe oryzae* is the most serious disease in rice production in the world. This study is to detect QTLs related to blast resistance based on genome-wide association study (GWAS) using Korean *japonica* rice germplasm. A total of 96 *japonica* rices including 24 bred varieties, 26 landraces, 22 weedy rices, 19 inbred lines and four Japanese varieties were used to detect resistant QTL for leaf blast based on GWAS. The rice germplasm population was genotyped by Illumina array analysis 768 SNP of *japonica* rice genetic background (Nagasaki *et al.* 2010). SNP calling was for 622 SNPs except for 68 SNP of false data, 20 monomorphic SNPs, and 58 SNPs of minor allele frequency less than 5% using genotyping module v2011.1 of Genome Studio software (Illumina Inc.). Association analysis was done by Weighted Mixed Liner Model (PCA+K, MLM). The Q-Q plot for analyzing correlation relationship between SNP marker and disease incidence to blast was from relationship among theoretical LOD and observed LOD. The Manhattan plot and Q-Q plot graphic were from *R* package qqman (Turner 2014). The markers over LOD 2.5 were considered to potential candidate. There were detected 22 putative QTLs explaining 6.8-14.9% of phenotype variation on chromosomes 1, 2, 3, 4, 6, 7, 8, 9 and 12. The major QTLs were *Gbn1.3* (*Pi35*), *Gbn2.1* (*Pi14*), *Gbn4.1* (*pi21*, *qLB4.1*), *Gbn4.2* (*Pi39*), *Gbn6.1* (*Piz*, *Piz-t*, *Piz-5*, *Pi9*, *Pi2-2*, *Pi26*, *Pi40*), *Gbn8.1* (*Pi33*), *Gbn12.1* (*Pi62*), *Gbn12.2* (*Pita*, *Pita-2*, *Pi20*, *Pi25*) and *Gbn12.3* (*Pi-GD3*, *Pi21*).

*Corresponding author: Tel. +82-63-238-5211, E-mail: yccho@korea.kr