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Mapping QTL for resistance to Chinese C5 strain of *Xanthomonas axonopodis* pv. *glycines* in diverse soybeans by association analysis

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Bacterial leaf pustule (BLP) caused by *Xanthomonas axonopodis* pv. *glycines* (Xag) is a notable disease leading to great loss of soybean production in the world. Two resistant genes reported in USA and Korea have been widely utilized. In China, BLP is also a common disease, and two strains, C5 and B523, were identified from southern China. However, the genetic architecture of soybean lines to the Chinese Xag strain remains to be revealed. To mapping QTL/genes conferring resistance to a highly pathogenic Xag strain C5, we conducted a genome-wide association study by using two soybean natural populations. One is a Yangtze-Huai soybean breeding germplasm (YHSBG) population with 573 lines and 61166 single nucleotide polymorphism (SNP) markers, and another is an introduction accession (IA) population consisted of 271 accessions and 35240 SNPs obtained from SoyBase. Great variation of resistance action to C5 was observed in both populations, and quite a few elite lines with high resistance to BLP were found according to the data of a two-year experiment. The two populations have different genetic structure. At the significance level of $-\log_{10}P \geq 4$, 21 SNP were detected in association with the disease resistance in YHSBG population, and four QTL on chromosome 5 and 17 were extracted. Total 18 significant SNP markers were also identified using the IA population, and six putative QTL distributed on the chromosome 6, 12, 13, 16, 17 and 20 were proposed. A locus near the previously reported linkage locus of *rxp* on chromosome 17 was detected with high significance level values in both populations. Our results indicated that *rxp* gene was also the major controller for resistance to the Chinese Xag strain, and more QTL might be involved in the genetic structure of resistance to BLP in soybean. Five candidate genes, Glyma17g10290, Glyma17g10350, Glyma17g10810, Glyma17g10820, Glyma17g11170, were identified in the *rxp* locus region with characteristics of defense response or R gene domain. The finds of this study will provide useful information for genetic dissection and molecular marker-assisted breeding of soybean resistance to BLP.