Mining Resistance Alleles of Gene *Xa38* for Bacterial Blight Resistance in Sri Lankan Rice Accessions

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Bacterial Blight (BB) caused by *Xanthomonas oryzae* pv. *oryzae* is one of the devastating rice diseases in Sri Lanka. Currently, 42 genes have been identified as important for conveying BB resistance, out of which *Xa38* (*Os04g53030*) is considered as a gene with major importance. For marker-assisted selection of *Xa38* resistance allele, a co-dominant linked-marker (*Os04g53050-1*) designed based on an adjacent gene (*Os04g53050*), co-segregating with *Os04g53030* is recommended. Among Sri Lankan germplasm, the *Xa38* resistance allele carrying rice accessions have not been identified to-date. In the current study, a panel of 48 rice accessions was genotyped using the marker *Os04g53050-1* and 12 traditional Sri Lankan rice accessions (*Batapola el*, *Dik wee*, *Halsuduwee*, *Herath banda*, *Sudu goda wee*, *Kuru wee*, *Suwadel*, *Katteyaran*, *Mada el*, *Pachchaperumal*, *Gonabaru* and *Mahakuru wee*) and 21 newly improved Sri Lankan varieties were identified as resistance allele carriers for *Xa38*. These accessions can be used as *Xa38*-mediated resistance donors in future rice breeding programs. Further, the present study focused on the development of an intragenic marker for the *Xa38* gene as an alternative to the currently used linked-marker. Haplotypes were defined to identify a potential site for designing an intragenic molecular marker. Haplotyping was carried out using the coding sequence of *Os04g53030* from 2,395 rice accessions sequenced in the 3K Rice Genomes Project. Based on the multiple sequence alignment, haplotype-defining polymorphisms with ≥5% occurrence in the panel of accessions (64 single nucleotide polymorphisms and 13 insertion/deletion sites) were identified and was used to define 20 confirmed haplotypes (H1 to H20; ≥1% occurrence frequency in the panel of accessions). Further investigation is underway to develop an intragenic molecular marker based on the identified polymorphic target sites.

Keywords: *Xa38*-mediated bacterial blight resistance, *Os04g53030*, Intragenic marker, Haplotyping, Marker-assisted selection

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