

Relationship between subspecies-specific region in genome and F₁ hybrid sterility QTL in rice

Joong Hyoun Chin^{1,2}, Michael J Thomson¹, Sang-Ho Chu², Reflinur Basyirin², Darshan S Brar¹, Hee-Jong Koh²

¹International Rice Research Institute, www.irri.org Email j.chin@cgiar.org

²Seoul National University, Korea, cals.snu.ac.kr Email heejkoh@snu.ac.kr

Abstract

The study on hybrid compatibility between two subspecies, *indica* and *japonica*, have been fundamental to develop high-yield varieties with improved abiotic and biotic tolerance. However, reproductive barriers in hybrid progenies between subspecies have been major obstacles in breeding programs using inter-subspecific hybridization. The 67 subspecies-specific (SS) STS markers, through comparing between two DNA sequences of Nipponbare(*japonica*) and 9311(*indica*), have developed, but the association test between markers and segregation distortion(SD) revealed that SD might not be the only cause of generating SS-STS markers. The SS-STS markers were applied to wild rice accessions, representing AA~HHKK genome, and the allele distribution showed that the significantly strong disequilibrium of *indica-japonica* alleles across some loci may suggest the effect of domestication in selecting conserved regions. Few SS-STS markers, which showed highly significant SD in segregating population were not seemed to have meaningful relationship with the F₁ hybrid sterility(HS) QTLs on chromosome 5, a cluster of HS-QTLs for fertility were identified from the recombinant inbred lines(RILs) of Dasanbyeo(*indica*) and TR22183(*japonica*). It is expected that the allele association between SS regions and HS-QTL can explain the functional role of responsible genes on HS-QTL to the stability of SS regions associated with the domestication of rice. For the rice breeders, SS-STS markers will be applicable to estimate the genomic inclination of varieties and lines and to study the differentiation of *indica* and *japonica*, and ultimately to breed true hybrid rice varieties in which desirable characters from both subspecies are recombined.

Media summary

Understanding genetics of *indica-japonica* difference and their relationship with hybrid sterility would be one of key step to breed true hybrid rice varieties.

Key words

Indica, japonica, indel, STS, wild rice, segregation distortion