Molecular Marker Aided Identification of Restorer Lines from Tropical *japonica* Derivatives of Rice (*Oryza sativa* L.)

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Abstract—*Hybrid rice area in India is very less accounting to only 6.3% of the total area of 44 mha under rice cultivation. One of the major reasons for poor adoption is the extent of heterosis realized in rice, which is due to poor diversity in the germplasm utilized in development of parental lines. To this extent, the diversity in the japonica rice germplasm can be of great help in improving heterosis. We have developed 227 genotypes by crossing indica genotypes with tropical japonica lines and the present study was carried out with the objective of identifying potential restorers using marker assisted selection for two genes, Rf3 and Rf4 governing fertility restoration in wild abortive male sterility system for their utility in hybrid rice breeding. The 227 tropical japonica derived lines were screened for the presence of the fertility restorer genes, Rf3 and Rf4 genes using a candidate gene based marker, DRRM-RF3-10 and a gene linked marker, RM6100 markers, respectively. Based on allelic status with these markers, 32 genotypes were found to possess Rf3 gene, while 41 genotypes were found to possess Rf4 gene. Seven genotypes were found to possess both Rf3 and Rf4 genes. The potential restorers identified in the present study after validation of their fertility restoration behaviour through test crossing with cytoplasmic male sterile lines, can be utilized in hybrid rice breeding for improving heterosis in rice.*

Keywords*: Rice, Heterosis, Restorer Genes, Molecular Marker, Marker Assisted Selection, Tropical japonica and Hybrid Rice*