

Plant Genomics

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Harnessing the hidden genetic diversity for improving multiple abiotic stress tolerances in rice (*Oryza sativa* L)

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Low and unstable productivity from multiple abiotic stresses are characteristic in the rice production of most rain fed areas of Asia and Africa. In 2007, we initiated backcross (BC) breeding procedure for improving yield and tolerances to multiple abiotic stresses. Using 8 BC1 populations derived from a widely adaptable and high yielding recipient and 8 donors plus two rounds of phenotypic selection, we were able to develop 496 introgression lines (ILs) with significantly improved yields under drought, salt and/or non-stress conditions. From these ILs, 6 new varieties were released for the rain fed and irrigated areas of Philippines and Pakistan and many more are in the pipeline to be released in several countries. Genetic characterization by SSR markers reveal three interesting aspects of donor introgression in the selected BC1F2 plants and BC1F3 lines: Introgression frequency in BC progenies was characteristic to specific crosses; donor introgression at different genomic regions of the selected ILs varied considerably across the genome resulting at least partially from strong selection for target traits; there was greatly reduced heterozygosity in the selected BC progenies, particularly with selection under drought and salinity. The strong phenotypic selection for abiotic stress tolerances at early segregating generation appeared to offer major advantages over the conventional pedigree breeding approach by not only allowing one or more abiotic stress tolerances integrated into elite backgrounds but being able to achieve quicker homozygosity in the selected progenies. The trait specific ILs are good materials for discovery of genes/QTL underlying the target and non-target traits and for highly efficient development of Green Super Rice by designed QTL pyramiding.

Biography

Jianlong Xu has obtained his PhD from Zhejiang University in China and his Postdoctoral career at PBGB Division of International Rice Research Institute (IRRI). He is majoring in molecular designing and genomic breeding of green super rice and has published more than 60 papers in reputed international journals, obtained eight patents and developed ten rice varieties.

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