

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 the 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 generations (73% of 0.046 T w 9 ma) 9(r)4- >>BDC BTR(r)13. >>BDC BTR(Span <<1.046 T2((io)12(n f)s)5e103()uT2(n 2(n f)s)5e12 (

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