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Developing climate resilient rice through genomics assisted breeding

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Abstract

Rice is one of the major cereal food crops whose production has to be doubled to achieve the projected demand [1] and current yield trends are not sufficient to meet the projected growth in production. Increasing the rice production by 30% during 2030 needs overcoming challenges viz., yield plateau, declining land, water and labor resources and predicted effects of global climate change. Development of high performance rice genotypes with enhanced yield potential and resilience to climate change will help in sustained increase in rice production. Deployment of genomic technologies can accelerate development and delivery of improved germplasm with enhanced resilience and adaptability [2, 3]. In this context, the present study was undertaken with an aim of developing rice genotypes pyramided with QTLs/genes controlling tolerance against various biotic and abiotic stresses viz., bacterial leaf blight (*xa13, Xa21*), blast (*Pi9*), Gall midge (*Gm4*), drought (*qDTY1.1 qDTY2.1*), submergence (*Sub1*) and salinity (*Saltol*)). CBMAS14065 an elite culture harboring QTLs controlling tolerance against drought, salinity and submergence was crossed with a donor harboring BLB, Blast and Gall midge resistant genes. True F_1s were backcrossed with CBMAS14065 and BC_1F_1 progenies were subjected to foreground selection using markers linked to the target traits. Superior plants (18) of BC_1F_1 generation were subjected to background selection which revealed 71.42 - 86.90% recurrent parent (CBMAS14065) genome recovery. Selected BC_1F_1 plants were advanced to BC_2F_1 generation backcrossing with CBMAS14065. In BC_2F_1 generation, through foreground selection 6-8 QTL/gene positive plants have been selected and advanced for further evaluation. The superior lines with desired QTLs/genes will be subjected to rigorous phenotypic evaluation against target stresses and advanced further.

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