Effectiveness of drought yield QTLs on physiological traits and yield in backcross inbred lines of rice under moisture stress condition

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ABSTRACT : In this study, four Backcross Inbred lines (BIL) with multiple QTL combinations ($qDTY_{2.2}$, $qDTY_{3.1}$ and $qDTY_{8.1}$) were studied to estimate their yielding ability and stability of yield gain as an effect of introgressed drought yield QTL under moisture stress. The four BIL lines namely CB-193-1 ($qDTY_{2.2}$ and $qDTY_{3.1}$), CB-193-2 ($qDTY_{2.2}$ and $qDTY_{8.1}$), CB-193-3 ($qDTY_{3.1}$ and $qDTY_{8.1}$) and CB-229 ($qDTY_{2.2}$, $qDTY_{3.1}$ and $qDTY_{8.1}$) were observed for biometrical traits related to yield and physiological parameters under moisture stress. The results showed that the line CB-229 outperformed others under drought, which indicated that, the combination of three QTLs viz., $qDTY_{2.2}$, $qDTY_{3.1}$ and $qDTY_{8.1}$ had a major effect on grain yield under moisture stress than single and 2-QTL lines. Graphical genotyping was carried out using polymorphic SSR markers on these lines and found that they were harbouring many chromosomal segments from Apo, the donor and the maximum recovery of IR64 was found in linkage group 2 and 6. The total protein content, osmotic adjustment and the chlorophyll 'a' were also found to be higher in these lines which conferred tolerance to drought stress. The slow reduction in RWC with higher photosynthetic rate and conductance were found in these lines as of the donor parent Apo.

Key Words: Drought, heritability, major QTLs, physiological parameters, rice.