

Study on Combining Ability and Heterosis for Sodicity Tolerance in Rice (*Oryza sativa* L.)

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ABSTRACT

Salinity / sodicity is one of the major constraints that cause serious hazards in agriculture thereby limiting agricultural productivity. Though salt tolerance rice varieties have been released for cultivation, continuous breeding programme for improving the grain yield level with desirable grain quality to cope up with demand for rice and to satisfy the consumer's preference is essential. Keep this in mind present investigation in rice (*Oryza sativa* L.) was carried out subjecting five lines and five testers crossed in a Line x Tester mating design at Anbil Dharmalingam Agricultural College to estimate gene action, combining ability and heterosis for 13 physio-morphological traits *viz.*, days to 50 per cent flowering, plant height, number of productive tillers per plant, panicle length, number of filled grains per panicle, spikelet fertility percentage, 100 grain weight, single plant yield, Na⁺: K⁺ ratio, proline content, total chlorophyll content, chlorophyll a: b ratio and chlorophyll stability index under sodicity condition. The estimates of combining ability variances revealed that there might be preponderance of non additive gene action involved in the expression of all the traits under sodicity except for days to 50 per cent flowering and panicle length, where, additive as well as non-additive gene actions played a major role in inheritance of these traits. Evaluation of parents based on *per se* and *gca* effects revealed that multiple crosses involving IR 20, CO (R) 50, TRY (R) 2, FL 478 and CSR 23 would be considered as invaluable sources of genetic material as there was a close correspondence between *per se* and *gca* effects. The present study brought an important hybrid *viz.*, CO (R) 50 / CSR 23 which was identified as the best for recombination breeding for six traits *viz.*, panicle length, number of filled grains per panicle, spikelet fertility, Na⁺: K⁺ ratio, proline content and chlorophyll a: b ratio.. Hence, this hybrid could be expected to yield promising materials in segregating generations combining desirable features of two parents, as the traits were mostly governed by additive and additive x additive type of gene interactions. Four hybrid combinations *viz.*, IR 20 / CSR 23, ADT 49 / TRY (R) 2, CO (R) 50 / TRY (R) 2 and IR 20 / FL 478 were suitable for heterosis breeding as they had high *per se*, *sca* and standard heterosis for sodicity tolerant, yield and yield contributing traits.

Keywords: Rice, Combining ability analysis, Heterosis and Sodicity tolerance.
