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Genetic analysis of grain yield and milling quality characters of two line rice hybrids

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SUMMARY

The experiment was laid out at Agricultural College and Research Institute, Madurai, Tamil Nadu. India and the materials for this study consisted of three TGMS lines *viz.*, TS 29, TS 6 and GD 98013 and 11 testers *viz.*, ADT 39, ADT 41, Pusa Basmathi 1, Basmathi 370, Improved White ponni, AD 98028, GEB 24, ADT 43, ADT 45, Taroari Basmathi and Jeeraga samba. Crossing was done according to clipping and churning method in L X T fashion. Based on the nature of combining ability inferred from line x tester analysis, three cross combinations *viz,* TS 29 / ADT 41, TS 29 / Pusa Basmathi 1 and TS 29 / Basmathi 370 were selected for generation mean analysis study. The scaling tests indicated the presence of epitasis for all the characters and therefore, six parameters model was followed to estimate the various gene action. The scales A and C were negatively significant in all the crossed *viz.*, TS 29 / ADT 41, TS 29 / Pusa Basmathi 1 and TS 29 / Basmathi 370 for grains per panicle and hundred grains weight. The scale B was negatively non significant for grains per panicle and hundred grains weight in all the three crosses. The crosses TS 29 / ADT 41, TS 29 / Pusa Basmathi 1 and TS 29 / Basmathi 370 showed positively significant A and C scales for grain yield. The mean effect m was significantly positive and greater than all other effects in all the three crosses *viz.*, TS 29 / ADT 41, TS 29 / Pusa Basmathi 1 and TS 29 / Basmathi 370 for productive tillers, hundred grain weights, grain yield, hulling per cent, milling per cent and head rice recovery. A significant additive x dominance (j) effect was recorded in TS 29 / Pusa Basmathi 1 and TS 29 / Basmathi 370 crosses for grain yield and hulling per cent. A significant additive x dominance (j) was observed in TS 29 / ADT 41 cross (panicle length and milling per cent). The (h) and (l) effects took opposite signs in all the three crosses indicating the involvement of duplicate dominant epistatic kinds of interaction for productive tillers, hundred grains weight, grain yield, hulling per cent, milling per cent and head rice recovery. In general , both additive and non-additive gene effects appear to all eight characters studied. Therefore, improvement of these traits appears to be set with difficulties as simple selection techniques will not be able to fix superior lines in the early segregating generations. Postponement of selection of superior lines to later generations in pedigree breeding will be effective.

Key words : Combining ability, Pedigree breeding, Epistasis, Additive effect, Dominance, Rice

Rice has always been one of the most important food crops in the world. It is estimated that 40 per cent of the world's population take rice as their major source of food. The advent of higher yielding semi dwarf varieties has been instrumental in acheiving consistent progress in rice production in the past three decades and attaining self sufficiency. This has enabled the country to become the world's second largest producer of rice after China with a dramatic increase in rice production. China was the first country where yield barrier in semi-dwarf rice broken by successful development of hybrid rice, which yielded about 20 per cent more than the conventional varieties (Virmani *et al*.,1992). Though the three line system involving cytoplasmic male sterility-fertility restoration system to a large extent is quite effective for the development of commercial rice hybrids, this system cumbersome and tedious as it involves three lines (A, B and R) and has negative effects of cytoplasm.

A new vista in hybrid rice breeding has been opened by successful development of two line hybrids using Thermo Sensitive Genetic Male Sterile lines. It further enhances the hopes of exploiting the additional heterotic potential, which can outyield the intervarietal hybrids by 20 – 30 per cent (Virmani, 1994). Immense efforts of rice breeders made during the last ten years have enabled the country to become the second largest in the world to develop and commercialize hybrid and its technology.

Though 16 rice hybrids have been released all over India for cultivation, their spread is not commensurate with expectations. Along with other reasons, lack of consumer acceptance also added the cause for slow spread. Since rice hybrids have entered the country recently, there is a need to look in to the quality aspects so that hybrid rice can be developed coupled with improved quality characteristics. Research work on quality rice hybrids are scanty. Even though many studies have indicated the nature of gene action conditioning the quality traits are limited. But most of the quality traits are

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