

Research
Paper

Genetic analysis of quality characteristics of TGMS rice hybrids

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ABSTRACT

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 11 testers viz., ADT 39, ADT41, Pusa Basmati 1, Basmati 370, Improved White Ponni, AD 98028, GEB 24, ADT 43, ADT 45, Taroari Basmati and Jeeraga samba. Crossing was done according to clipping and churning method in L x T fashion. The 33 hybrids obtained by crossing three lines and eleven testers were raised in randomized block design with two replications during 2004-2005. The parents were also raised in similar design in an adjacent plot with two replications. Observations were made on KL, KB, KLAC, LER, VER, ASV, GC and AC. Based on the nature of combining ability inferred from line x tester analysis, three cross combinations viz., TS29/ADT41, TS29/Pusa Basmati 1 and TS29 / Basmati 370 were selected for generation mean analysis study. The scaling tests indicated the presence of epistasis for all the characters and, therefore, six parameters mode was followed to estimate the various gene action. In TS29/Basmati 370 cross combination all the three scales were positively significant in TS29/ADT 41 cross combination. The mean effect m was significantly positive and greater than all other effects in all the three crosses for kernel breadth, kernel length after cooking, volume expansion ratio, alkali spreading value, gel consistency and amylose content. The additive x dominance effect (j) was positive and significant for kernel length after cooking, linear elongation ratio, gel consistency and amylose content in the crosses TS29/ADT41, TS29/Pusa Basmati 1 and TS29/Basmati 370. In general, both additive and non-additive gene effects appeared to all eight characters studied. Therefore, improvement of these traits appears to beset 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.

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

INTRODUCTION

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 achieving 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 inter-varietal hybrids by 20 – 30 per cent. 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