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Abstract: The present investigation entitled “Genetic analysis in rice (*Oryza sativa* L.) under rainfed ecosystem” was formulated to study the gene action along with combining ability for various characters of rice. To meet the objective ten genotypes of rice (*Oryza sativa* L.) viz., IR-64, RR-272-1745, BR-34, BR-9, BR-10, RR-272-829, Swarna, Pankaj, BR-8 and Kanak were crossed following diallel mating system excluding reciprocals. The total of fortyfive crosses were made during kharif , 2001 and the crossed seeds were grown again in kharif , 2002 in a complete randomized block design (RCBD), following standard agronomic practices. The observations recorded on fourteen quantitative characters were utilized in analyzing various genetic parameters, like, estimates of variability, heritability (broad and narrow sense), genetic advance, heterosis (over mid-parent and better parent) and combining ability effects and variances for all the fourteen characters following standard statistical methods. Combining ability analysis was done by diallel mating design, method II as suggested by Griffing (1956). The analysis of variance revealed highly significant differences among all the 55 genotypes (10 parents and 45 crosses) for all the characters, except, 1000-grain weight (g) and harvest index (%). This indicated the inherent genetic differences among all the genotypes for all the characters studied. High genetic coefficient of variation was observed for the number of leaves per plant, number of tillers per plant, grains per panicle and spikelet fertility. Heritability estimates in broad sense were high for days to panicle emergence, plant height, total number of leaves per plant and number of grains per panicle. The genetic advance (GA) was also moderate to high for these characters. Highest heritability (narrow sense) was observed for plant height which was followed by days to panicle emergence and flag leaf area. A wide range of heterotic effect was also observed for most of the characters. The expression of heterosis over mid-parent and over better parent, varied according to the characters. The maximum heterotic effect was observed for grains per panicle over both mid-parent and better parent. Almost half of the crosses (F1’s) exhibited positive heterosis over mid-parent and better parent for grain yield per plant. The best cross combination showing significant heterosis over better parent was RR-272-1745 x BR-9 (22.47 %). This cross was also good for number of ear bearing tillers/ plant. Studies on combining ability showed that both additive and nonadditive genetic components were involved in determining the expression of the characters but non-additive type of gene action was predominant in all these characters, except, plant height. Hence, heterosis breeding is recommended for improving the respective characters of rice instead of simple selection. For grain yield per plant good general combiners were IR-64 and BR-8. However, Swarna and Kanak also exhibited good general combiners for some other yield attributing characters. Based on the specific combining ability performance of grain yield per plant, the crosses RR-272-1745 x BR-9, RR-272-829 x Swarna and Pankaj x BR-8 could be selected as superior ones. The cross RR-272-1745 x BR-9 performed best in heterosis over better parent also. Thus, the crosses showing high heterotic value for this character, may further be exploited for hybrid rice development.

Description: GENETIC ANALYSIS IN RICE (*Oryza sativa* L.) UNDER RAINFED ECOSYSTEM

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