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Variability, heritability and genetic advance in rice (*Oryza sativa* L.)

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SUMMARY

In this study four crosses of F_2 generation were advanced to F_3 and F_4 generations to study variability, heritability and genetic advance of four crosses of rice genotypes. Among the four crosses studied, cross 1 exhibited superior *per* se performance in both F_3 and F_4 generations for almost all the economic characters studied including yield. This cross also recorded increased performance from F_3 to F_4 generations. This indicated the improvement of the genotypes as the generation progresses. High PCV and GCV values were observed for grain yield per plant for cross 1 followed by cross 2 in both F_3 and F_4 generations. Also cross 1 and cross 2 recorded high heritability and genetic advance for the characters *viz,* number of productive tillers per plant, 1000 grain weight and grain yield per plant in both F_3 and F_4 generations. This indicated that these characters are controlled by additive gene action. Hence the expected progress under selection could be obtained in the early generation itself. Genetic improvement for quantitative traits can be achieved through a clear understanding of the nature and amount of variability present in the genetic stocks and the extent to which the desirable traits are heritable. Therefore, information on the genetic parameters such as coefficient of variation, heritability, genetic advance and the influence of environment on the expression of these characters will help the breeder to evolve suitable cultivars within a short time.

Key words : PCV, GCV, Heritability, GA, Rice.

Rice (*Oryza sativa* L.) is a major food crop in the world. At present, rice is the major source of nutrition for about 40 per cent of world's population. In India, about 65 per cent of the population has rice as major constituent in the diet (Nidhi *et al.*, 2003). More over rice consumers are increasing every year at the rate of 1.8 per cent (Khush and Virk, 2000) and estimates reveal that the production of rice should be doubled by 2025 to meet our Indian requirements. This in turn elucidates that we must reorient our research towards yield improvement. Genetic variability helps to choose desirable genotypes. The genetic variation and genetic gain obtained by selection are studied by predicting the heritability and genetic advance.

MATERIALS AND METHODS

The F_3 and F_4 populations of four crosses, namely, AD 95137 x ADT 36 (cross 1), AD 95157 x ADT 36 (cross 2), AD 95157 x ADT 43 (cross 3) and AD 95157 x IR 50 (cross 4), selected in F_2 generation based on grain yield and grain quality were raised in October 2004 and October 2005, respectively. A total of 500 seeds were sown for each cross. All the crosses were raised (25 days seedlings), adopting a uniform spacing of 20 cm between rows and 15 cm between plants in a randomized block design with two replications. Normal cultural practices were adopted. Four hundred plants from each segregating populations were randomly selected for recording observations on plant height, productive tillers per plant, panicle length, number of grains per panicle, 1000 grain weight (Test weight) and grain yield per plant. The genetic variance was separated from the total variance. The phenotypic and genotypic coefficients of variation (PCV, GCV), heritability and genetic advance were computed following the standard procedures.

RESULTS AND DISCUSSION

The study on mean performance indicated that cross 1 recorded superior performance for most of the economically important traits *viz,* number of productive tillers per plant, panicle length, number of grains per panicle and ultimately grain yield per plant in both F_3 and F_4 generations (Table 1). The thousand grain weight was moderate which, indicated that the quality of rice is best suited for consumption as it produces medium slender grain. This was followed by cross 2 which recorded high mean performance in both F_3 and F_4 generations for the characters *viz.*, number of productive tillers per plant, 1000 grain weight and grain yield per plant. Hence, it is understood that increase in grain yield might be due to the presence of more number of productive tillers per plant and 1000 grain weight. It is quite interesting to note that mean, of F_3 and F_4 in cross 1 and cross 2 indicated

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