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Studies on genetic variability, heritability and genetic advance in segregating generations of rice (*Oryza sativa* L.)

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SUMMARY

Genotypic and phenotypic coefficient of variation, heritability and genetic advance as per cent of mean were estimated in the F_2 and F_3 segregating populations of six crosses for six yield and yield component characters. The F_2 populations of the cross $P_1 \times P_3$ showed high PCV, GCV coupled with high heritability estimates and high genetic advance as percentage of mean for number of filled grains per panicle, 100 grain weight, biomass per plant and grain yield per plant. Similarly, the F_3 population of the cross $P_2 \times P_1$ exhibited high genetic parameters for number of productive tillers per plant and grain yield per plant. These populations could well be subjected to simple pure line selection to improve grain yield per plant.

Key words : Genotypic and phenotypic coefficient of variation, Heritability, Genetic advance, Rice.

Improvement in any crop largely depends on the genetic variability and the extent to which the traits are heritable. Segregating populations are more important for improving plant types by operating selection. The present study was formulated to quantify the extent of genetic variation available for grain yield and yield components in the segregating generations of rice and to assess the genetic gain that can be made by selection.

MATERIALS AND METHODS

The present investigation was carried out using the experimental material consisting of five generations *viz.*, P_1, P_2, F_1, F_2 and F_3 of three direct and three reciprocal crosses involving three varieties of rice *viz.*, ADT 37 (P_1; short duration), ADT 38 (P_2; medium duration) and ADT 44 (P_3; long duration). The experiment was conducted in a randomized block design with three replications. The crosses were randomized with in each replication followed by randomization of each generation within each replication. One row was allotted to each of P_1, P_2 and F_1 generations, whereas each F_2 and F_3 generations were grown in 10 rows. Each row was three metre long, with a plant to plant distance of 15 cm and row to row distance of 20 cm. The data were recorded on 10 plants per replication in parents and F_1's and 200 plants per replication in F_2's and F_3's. Genotypic and phenotypic coefficients of variation (GCV and PCV) were calculated based on the formulae advocated by Burton (1952). They were classified as per the method suggested by Sivasubramanian and Menon (1973). Heritability in broad sense was calculated according to Lush (1940) and expressed in percentage. It was classified based on the method outlined by Robinson *et al.* (1949). Genetic advance was worked out based on the formula given by Johnson *et al.* (1955). It was expressed as percentage of mean. It was classified according to Robinson *et al.* (1949).

RESULTS AND DISCUSSION

The F_2 population of the cross $P_3 \times P_2$ and the F_3 population of the cross $P_2 \times P_1$ showed high PCV and GCV coupled high heritability and genetic advance for number of productive tillers per plant. This indicated the presence of additive genetic variability for this trait. Hence, there is scope for selection. The gap between GCV and PCV was narrower indicating the lesser influence of environment (Table 1). The F_2 and F_3 populations of the cross $P_1 \times P_3$ recorded highest PCV and GCV for number of filled grains per panicle. The heritability estimates and genetic advance as percentage of mean was also higher with the F_2 and F_3 populations of this cross combination. It indicated the involvement of additive gene action in the inheritance of this trait. Hence, selection can be practiced in these generations (Table 2). The result is in agreement with the findings of Ganesan *et al.* (1996) and Sharma and Dubey (1997).

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