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Genotype x environment interaction for yield and yield contributing characters in rice

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SUMMARY

Six saline tolerance genotypes of rice were evaluated in three environments to study the genotype x environment interaction and phenotypic stability for grain yield per plant and its component traits. Genotypes x environment interaction effects were significant for all the characters. Among the six genotypes, TRY 1 was high yield with stable. This genotype can be effectively utilized to develop stable strain having wider adaptability.

Key words: Saline Rice, Phenotypic Stability, G x E interaction, Grain Yield

Rice (*Oryza sativa* L.) is a staple food crop for more than 40 % of the world population and also is the most important food crop of India, occupying 44.9 m ha with a total production of 89.4 m t and the average productivity of 1.9 t ha^{-1}. Millions of people depend on it, as a source of food and income. The basis cause of differences between genotypes in their yield stability is the wide occurrence of genotype x environment interactions. In other words, the ranking of genotypes depends on the particular environment where they are grown. The new varieties / strains should be stable over at wide range of environmental conditions. The present study has been designed to study the phenotypic stability of six saline tolerant rice genotypes under three environments.

MATERIALS AND METHODS

Six saline tolerant genotypes of rice *viz.*, IR 6331-1-B-3R-B-24-3, IR 71895-3R-17-1-2-B, Nona bokra, Co 43, Pokkali and TRY 1 were evaluated in randomized block design with three replications under three diverse micro-environments during 2003 – 2004 at Plant Breeding Farm, Department of Agricultural Botany, Faculty of Agriculture, Annamalai University, Annamalainagar. Each genotype was transplanted in single row with the spacing of 20 cm between rows and 15 cm between plants in all the environments. Standard cultural practices were followed to raise a good crop. The data were recorded on nine quantitative characters *viz.*, days to 50 per cent flowering, plant height, number of productive tillers per plant, panicle length, total number of grains per panicle, number of filled grains per panicle, grain fertility, thousand grain weight and grain yield per plant. Stability parameters were estimated using the model proposed by Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The joint regression analysis (Table 1) revealed that the mean squares due to genotypes were highly significant for all the characters indicating that there was enough variability among the experimental material. Mean squares due to environment in this study were distinct. The significance of genotype x environment interaction effects were predictable in respect to all the characters except panicle length and thousand grain weight suggesting that the genotypes did not perform consistently under different environments. Similar to genotype x environment interaction the joint regression analysis also showed that linear components of regression were significant for all the characters except panicle length and thousand grain weight. Though the genotype x environment linear portion was non significant for these characters, the percentage contribution of linear component to genotype x environment interaction was high showing the preponderance of linear component (Table 2). Gupta *et al.* (2006) evaluated the behaviour of stability parameters with respect to eleven quantitative characters and concluded that both linear and non linear components of genotype x environment were significant but linear component was predominant over non linear component of genotype x environment interaction for all the characters. Stability parameters for important characters are presented in Table 3. The genotypes with different levels of mean performance and stability

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