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Research Notes

Variability and Heritability Studies in Rice (*Oryza sativa* L.) Under Coastal Salinity

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Abstract
Genetic parameters of variability and heritability of different characters were studied in 36 genotypes of rice. The maximum genotypic coefficient of variability and phenotypic coefficient of variability were observed for straw yield/plant, grain yield/plant, total biological yield/plant, number of fertile florets/panicle and number of branches/panicle. The heritability estimates were highest for days to 50% flowering, days to maturity and 1000 – grain weight. GA as % over mean were higher for number of branches/ panicle, straw yield/plant, total biological yield/plant and grain yield/plant will be useful for further breeding programme.

Keywords:
Rice, coastal salinity, variability, heritability

Variation is the basis of plant breeding. As success of any crop improvement programme largely depends on the magnitude and range of variability on the available genetic stock. A critical estimate of genetic variability is a prerequisite for initiating appropriate breeding procedures in crop improvement programmes. Hence, it becomes necessary to spilt over-all variability into its heritable and non-heritable components with the help of certain genetic parameters, which may enable the breeders to plan a proper breeding programme. Therefore, the progress of a population mainly depends upon the amount and magnitude to genotypic variability present in the population. Information of genetic variability among growth as well as yield components in rice has been reported by many workers (Sivasubramanian and Madhava Menon, 1973; Latif and Zamin 1965).

The experimental material used in the present study comprised 36 genotypes of rice obtained from the plant breeding farm, Faculty of Agriculture, Annamalai University, Annamalainager. The field experiment was conducted in saline environment with Ec of 4.8ds/m and pH of 7.9. The trial was subjected to salt stress at entire growth period. The experiment was laid out in Randomized Block Design, consisting of three replications adopting a spacing of 20 x 15 cm. Observations were obtained on five competitive plants for days to 50% flowering, days to maturity, number of effective tillers/plant, number of leaves/main tiller, height of plant, length of panicle, length of boot leaf, number of branches/panicle, number of fertile flowers/panicle, 1000-gain weight, straw yield/ plant, total biological yield/ plant, harvest index % and grain yield/plant. The coefficient of variation was estimated as suggested by Burton (1952), Expected genetic advance was estimated as suggested by Allard;1960.

Analysis of variance showed highly significant differences due to treatments for all the characters. In general estimates of phenotypic coefficient of variability (PCV) were higher than those due to genotypic coefficient of variability for all characters (Table-1). Similar results were also reported by (Das *et al.,* 2001 and Majumdar *et al.,* 1971).

The genotypic coefficient of variability was found maximum for straw yield/plant followed by grain yield/plant, total biological yield/plant, number of fertile florets/panicle, number of branches/panicle

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and minimum length of panicle followed by length of boot leaf by Karthikeyan (2003). High variability has been reported in rice for grain yield/plant and number of fertile florets/panicle (Das *et al.,* 2001; Sundram *et al.,* 1988; Chaudhary *et al.,* 1973) and low for length of panicle by Das *et al.,* (2001). The heritability was found highest in all the characters except number of effective tillers/plant. High heritability were observed for days to 50% flowering, days to maturity, 1000-grain weight, number of branches/panicle, number of fertile florets/panicle, height of plant; number of leaves/main tiller, harvest index, length of panicle, length of boot leaf and low heritability for number of productive tillers/plant. This trend was also observed in rice for days to 50% flowering, 1000-grain weight and plant height by Ali *et al*. (2000); Sun (1979) and Msurya (1976). Number of grains/panicles was similar to the findings of Ali *et al.* (2000) and Maurya (1976). Burton (1952) suggested that the genetic coefficient of variation along with heritability give clear picture of the amount of advance to be accepted from selection. In the present studies, the character *viz*. 1000-grain weight, number of leaves/main tillers, length of panicle, straw yield/plant and grain yield/plant had high heritability values but exhibited low genetic advance. Similar result for length of panicle and 1000-grain weight was reported earlier (Das *et al.,* 2001). High heritability coupled with genetic advance can be more useful in selection types with such characters. A relative comparison of heritable estimates and expected genetic advance expressed as percentage of mean will give an idea about the nature of gene action governing a particular character. A comparison of heritability and genetic advance as percentage of mean revealed that number of branches/panicle, straw yield/plant, number of fertile florets/plant, total biological yield/ plant and grain yield/plant had high heritability coupled with high-expected genetic advance as percentage of mean. This showed the substantial contribution of additive genetic variance in the expression of these characters. These substantial contribution of additive genetic variance were in confirmation with earlier report of Johnson *et al*., (1955) while number of fertile florets/ panicle and grain yield /plant had high heritability coupled with high-expected genetic advance as percentage of mean were also observed by Shivani and Sree rama Reddy (2000). On the basis of heritability estimates and expected genetic advance as percentage of mean for different characters studied in the present studies selection, criteria based on number of branches/panicle, straw yield/plant, number of fertile florets/plant, total biological yield/plant and grain yield/plant will be useful for further improvement of rice.

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Table – 1: Estimates of different genetic parameters in Rice

Characters	Days to 50% flowering	Days to maturity	No. of effective tillers / plant	No. of leaves/ main tillers	Height of plant	Length of boot leaf	Length of panicle	No. of branches / panicle	No. of Fertile florets / plant	1000 grain weight	Straw yield / plant	Total biological yield/ plant	Harvest index %	Grain yield plant
Genotypic coefficient of variability (G.C.V.)%	12.59	9.29	8.65	9.61	14.28	8.14	7.62	15.98	22.99	10.29	27.80	23.59	11.89	24.68
Phenotypic coefficient of variability (P.C.V.)%	12.58	8.88	18.08	10.17	15.02	10.41	9.02	16.28	25.31	11.12	32.21	27.52	12.95	29.32
Heritability (H)%	99.80	99.20	23.14	85.80	87.30	79.89	79.80	93.40	88.80	97.60	74.90	74.20	82.50	73.20
Genetic advance (G.S.)%	24.89	24.46	1.13	1.34	24.87	4.32	3.62	3.12	58.49	4.54	11.31	18.43	11.48	8.88
Genetic advance % of mean	26.44	19.39	8.60	18.01	27.58	15.08	13.98	31.99	45.13	21.22	49.42	42.12	23.10	43.43
Grand mean	97.12	128.47	11.31	6.02	89.89	26.04	25.16	10.48	129.30	22.32	22.07	43.21	50.13	21.01
Coefficient of variation (C.V.)%	0.71	0.81	16.30	4.21	5.16	4.85	4.38	4.03	8.13	2.10	19.02	14.07	5.48	15.34
Critical difference (C.D.) at 5%	1.178	1.622	3.213	0.361	8.878	1.473	1.514	0.187	2.402	1.013	5.718	9.719	4.359	5.237