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Variability for Yield and Component Traits in Elite Parental Lines of Rice (Oryza sativa L.)

Key words : Genetic advance, Heritabil*ity, Variabil*ity.

Rice (*Oryza sativa* L.) is the staple food for two-third of the world population and increasing its productivity to achieve greater production is of major concern today. The improvement of any crop depends upon the extend of genetic variability present in the breeding material. Hence knowledge on genetic variability and gene action governing yield and component traits is of utmost importance for initiating any breeding programme. Though variability is the basic factor to be considered, the estimates of heritability and genetic advance can provide a clearer picture for the improvement of a particular trait. The estimate of heritability act as predictive instrument in expressing the reliability of phenotypic value and indicates the relative degree of transmissibility of character from parents to offspring while, genetic advance is a useful indicator of the progress that can be expected as result of exercising selection on the pertinent population. Hence the present investigation was carried out with an objective to study the extend of genetic variability, heritability and genetic advance among elite parental lines in rice.

The experimental material comprised of 57 elite restorer lines and 2 CMS lines developed at APRRI and RARS, Maruteru and the study was carried out at the experimental farm of the institute during *kharif* 2012. Twenty three days old seedlings were transplanted at a spacing of 20×15cm in a randomized block design with 2 replications. The crop was raised using the recommended practices and necessary plant protection measures were taken against pests and diseases. Data was recorded on 10 plants selected at random per genotype for each replication and their means were used for statistical analysis. However the observations on days to 50% flowering, days to maturity and test weight were recorded on plot basis. The treatment means for all characters were subjected to analysis of variance as per the standard statistical procedure given by Panse and Sukhatme (1978). Phenotypic and genotypic coefficients of variation (PCV and GCV) were computed according to formulae suggested by Burton and Devane (1953). Heritability in broad sense was estimated as per Allard (1960) and genetic advance using formulae given by Johnson *et al.* (1955).

The analysis of variance revealed existence of significant differences among the parental lines for all the characters (Table 1) indicating the presence of considerable genetic variability. The estimates of mean, variability, heritability and genetic advance are presented in Table 2. The Phenotypic Coefficient of Variation (PCV) was little higher than Genotypic Coefficient of Variation (GCV) for all the characters studied indicating slight influence of environment on the expression of these traits. The estimates of PCV and GCV were high for number of filled grains per panicle, while the traits *viz.,* number of ear bearing tillers per plant, test weight and grain yield per plant exhibited moderate PCV and GCV values, indicating the presence of sufficient genetic variability for these traits. Similar observations were reported by Seyoum *et al.*, (2012) for number of filled grains per panicle and ear bearing tillers per plant and Satish Chandra *et al.,* (2009) for grain yield per plant.

High heritability coupled with high genetic advance was observed in case of ear bearing tillers per plant, number of filled grains per panicle, test weight and grain yield per plant suggesting the role of additive gene action in the inheritance of these traits and directional selection could be profitably applied on these traits in a genetically diverse material. These results are in accordance with Mohan Lal and Chauhan (2011) for ear bearing tillers per plant, Siva Parvathi *et al.,* (2011) for number of filled grains per panicle and Bhadru *et al.,* (2012) for test weight and grain yield per plant.

Table 1. Analysis of variance for yield and yield contributing characters in parental lines of rice.

S.No.	Character	Mean sum of squares		
		Replications (d.f = 1)	Treatments (d.f = 56)	Error (d.f = 56)
1	Days to 50 % flowering	2.84	82.83**	0.79
2	Plant height(cm)	23.09	308.69**	7.29
3	No. of ear bearing tillers plant^{-1}	1.90	2.75**	0.60
4	Days to maturity	2.25	82.57**	1.12
5	Panicle length (cm)	5.09	3.70**	1.46
6	No. of filled grains panicle^{-1}	163.67	8805.38**	399.05
7	Spikelet fertility (%)	3.54	147.93**	11.57
8	Test weight (g)	1.55	11.21**	1.50
9	Grain yield plant^{-1}(g)	3.01	8.65**	2.07

Table 2. Estimation of genetic variability and genetic parameters in parental lines for yield and yield contributing characters in rice (*Oryza sativa* L.)

S.No.	Character	Mean	Range	PCV (%)	GCV (%)	Heritability (h^2_{bs})	Genetic advance as % of mean
1	Days to 50 % flowering	105.14	81.00 - 114.50	6.15	6.09	98.11	12.43
2	Plant height(cm)	126.73	84.00 - 149.05	9.92	9.69	95.38	19.49
3	No. of ear bearing tillers plant^{-1}	8.02	5.00 - 10.70	16.11	12.92	64.31	21.34
4	Days to maturity	135.09	111 - 144.50	4.79	4.72	97.32	9.60
5	Panicle length (cm)	23.82	20.22 – 26.40	6.74	4.44	43.48	6.04
6	No. of filled grains panicle^{-1}	204.75	112.06 – 400.89	33.13	31.66	91.33	62.33
7	Spikelet fertility (%)	83.09	47.03 – 93.09	10.75	9.94	85.49	18.93
8	Test weight (g)	18.48	13.30 – 22.94	13.64	11.92	76.36	21.46
9	Grain yield plant^{-1}(g)	13.90	9.36 – 18.47	16.66	13.05	61.38	21.06

The present study revealed that, number of ear bearing tillers per plant, number of filled grains per panicle, test weight and grain yield per plant were less influenced by environment and exhibited considerable variability. These traits also recorded high heritability coupled with high genetic advance indicating the presence of additive gene action and hence directional selection may be effective for these characters based on phenotypic values in order to obtain maximum genetic gain for yield improvement.

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