

## ESTIMATE OF GENETIC VARIABILITY AND HERITABILITY IN SOME EXOTIC GERMPLASM LINES IN *KHARIF* RICE (*ORYZA SATIVA* L.)

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**ABSTRACT:** The high genotypic coefficient of variation, high heritability with high genetic advance as percent of mean was observed for grain yield per plant, total tillers per plant, productive tillers per plant and grains per panicle, whereas days to initiation of flowering, days to 50 % flowering and days to maturity had high heritability with low genetic advance as per cent of mean.

**Key words:** GCV, PCV, heritability, GA and GAM.

### INTRODUCTION

Genetic variability is the prime requirement for breeding programme. An understanding of the nature and magnitude of genetic variation present in the germplasm lines and cultivated varieties is necessary before initiating a breeding programme aiming to develop high yielding varieties. Since, the effectiveness of selection depends up on the extent of genetic variability for different characters an attempt has been made to evaluate 53 exotic germplasm lines and one variety of rice from DBSKKV, Dapoli for twelve quantitative characters.

### MATERIALS AND METHODS

Fifty four genotypes of rice were grown in randomized block design with three replications during Kharif 2013 at Research farm, Department of Agricultural Botany, College of Agriculture, Dapoli. Each genotype had 3 rows of 1.5 m length with spacing of 20 x 15 cm. Recommended package of practices and plant protection measures were adopted to raise the crop healthy. Observations on five randomly selected plants were recorded for the characters *viz.* days to initiation of flowering, days to 50 % flowering, days to maturity, plant height (cm), total tillers per plant, productive tillers per plant, panicle length (cm), grains per panicle, spikelet fertility (%), 1000 grain weight (g), straw yield per plant (g) and grain yield per plant (g). Analysis of variance was done by method suggested by Panse and Sukhatme (1954). Genotypic and phenotypic coefficient of variation, heritability and genetic advance were studied as per the procedure given by Burton (1952), Burton and De Vane (1953) and Johnson *et al.* (1955) respectively.

### RESULT AND DISCUSSION

Analysis of variance revealed the significant difference among genotypes for all the characters studied (Table 1) indicating presence of variability in the material. Estimates of genetic parameters like GCV, PCV, heritability, genetic advance and genetic advance as per cent of mean are presented in (Table 2). It is revealed from the data, maximum variation was observed for plant height (84 to 120 cm), productive tillers per plant (6.3 to 15.3), panicle length (21.3 to 30.1 cm), grains per panicle (104 to 266), 1000 grain weight (22.1 to 36.1 g) and grain yield (12.4 to 31 g). The data suggest that wide range of variation were present in the genotypes for these characters, Similar result were also reported in rice by Karim *et al.* (2007), Bhadru *et al.* (2012), Tuwar *et al.* (2013) and Singh *et al.* (2013).

In general the phenotypic variances were higher than the genotypic variances. High PCV for the characters *viz.* total tillers per plant, productive tillers per plant, grains per panicle and grain yield per plant (g) indicated that these characters were influenced by environmental factors. High GCV was observed in total tillers per plant, productive tillers per plant, grains per panicle, 1000 grain weight, straw yield per plant and grain yield per plant (g). The result are in agreement with the findings of Yadav *et al.* (2011), Bhadru *et al.* (2012), Shukla *et al.* (2005) and Tuwar *et al.* (2013).

Highest heritability was observed in days to 50 % flowering followed by days to initiation of flowering, grains per panicle, plant height (cm), 1000 grain weight (g), days to maturity, grain yield per plant (g) and spikelet fertility (%). The high genetic advance was observed for grains per panicle and plant height (cm). High estimates of heritability along with high genetic advance as per cent of mean were exhibited in the characters, grains per panicle, grain yield per plant (g), productive tillers per plant, total tillers per plant and 1000 grain weight (g). Similar results were also reported by Bhadru *et al.* (2012) and Tuwar *et al.* (2013). It appeared that the above mentioned characters might exhibit predominance of additive gene effects, hence selection for these characters would be effective for the genetic improvement of yield. High heritability was accompanied with low genetic advance for the characters, viz days to initiation of flowering, days to 50% flowering and days to maturity which was apparently due to low PCV. High heritability and low genetic advance for such character indicated that dominance and epistatic effects were of considerable value in the inheritance of these characters.

**Table 1. Analysis of variance for different characters in rice.**

Characters	Mean sum of squares		
	Replication (2)	Genotypes (53)	Error (106)
Days to initiation of flowering	0.13	46.31**	1.44
Days to 50 % flowering	0.35	50.47**	0.93
Days to maturity	0.15	70.12**	6.33
Plant height (cm)	8.32	173.96**	11.18
Total tillers per plant	6.20	13.52**	1.74
Productive tillers per plant	0.070	10.88**	1.51
Panicle length (cm)	2.40	11.16**	2.46
Grains per panicle	581.77	2703.25**	152.82
Spikelet fertility %	31.09	66.14**	8.69
1000 grain weight (g)	0.93	25.67**	2.19
Straw yield per plant (g)	0.030	28.94**	7.31
Grain yield per plant (g)	0.85	53.57**	7.12

\*\* Significance at 1%.

Figures in parentheses are degrees of freedom.

**Table 2. Variability parameters for different characters in rice.**

Characters	Range	Mean	GCV (%)	PCV (%)	$h^2_b$ (%)	GA	GAM (%)
Days to initiation of flowering	90 to 109	97	3.97	4.16	91.00	7.61	7.82
Days to 50 % flowering	93 to 114	100	4.03	4.14	95.00	8.15	8.07
Days to maturity	116 to 137	126	3.66	4.17	77.00	8.34	6.61
Plant height (cm)	84 to 120	101	7.28	8.00	83.00	13.82	13.66
Total tillers per plant	7.7 to 18.4	11.8	16.76	20.14	69.00	3.40	28.74
Productive tillers per plant	6.3 to 15.3	9.6	18.42	22.42	67.00	2.99	31.16
Panicle length (cm)	21.3 to 30.1	26.0	6.54	8.89	54.00	2.58	9.91
Grains per panicle	104 to 266	165	17.61	19.12	85.00	53.30	33.39
Spikelet fertility %	73.9 to 94.8	87.3	5.01	6.04	69.00	7.48	8.56
1000 grain weight (g)	22.1 to 36.1	28.2	9.90	11.20	78.00	5.09	18.02
Straw yield per plant (g)	14.1 to 28.7	21.1	12.67	17.99	50.00	3.90	18.39
Grain yield per plant (g)	12.4 to 31.0	19.9	19.75	23.86	69.00	6.71	33.67

## CONCLUSION

It is concluded that the significant differences among the genotypes for all the characters studied indicating the presence of variability in the material. The high GCV, high heritability with high genetic advance as per cent of mean were observed for grains per panicle, grain yield per plant (g), productive tillers per plant, total tillers per plant.

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ISSN : 0976-4550

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