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## Estimates of genetic variability and heritability in some promising lines of 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 grains per panicle, 1000 grain weight (g), productive tillers per plant, grain yield per plant 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.

**Keywords:** GCV, PCV, heritability, GA and GAM

#### Introduction

Rice (*Oryza sativa* L.) is the world's largest food crop, providing the caloric needs of millions of people daily. Rice is a monocotyledonous angiosperm belonging to genus *Oryza* of family *Poaceae*. 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 twenty two promising lines and four variety of rice from DBSKKV, Dapoli for eleven quantitative characters.

#### Materials and Methods

Twenty six genotypes of rice were grown in randomized block design with three replications during Kharif 2015 at Research farm, Department of Agricultural Botany, College of Agriculture, Dapoli. Each genotype had 4 rows of 4.5 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), productive tillers per plant, panicle length (cm), grains per panicle, spikelet fertility (%), 1000 grain weight (g), grain yield per plant (g) and straw yield per plant (g). Analysis of variance was done by method suggested by Panse and Sukhatme (1954) [5]. 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) [2] and Johnson *et al.* (1955) [3] respectively.

#### Result and Discussion

Analysis of variance revealed the significant difference among genotypes for all the characters studied (Table 1) indicating presence of extreme 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 (68 to 140 cm), productive tillers per plant (6 to 13.4), panicle length (17.9 to 26.6 cm), grains per panicle (68.5 to 189.1), 1000 grain weight (11.8 to 31 g) and grain yield per plant (12.8 to 23.5 g) and straw yield per plant (19.3 to 32.9 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) [4], Bhadrur *et al.* (2012) [1], Tuwar *et al.* (2013) [8] and Singh *et al.* (2013) [7].

In general the phenotypic variances were higher than the genotypic variances. High PCV for the characters viz. productive tillers per plant, grains per panicle, 1000 grain weight (g) and grain yield per plant (g) indicated that these characters were influenced by environmental

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factors. High GCV was observed in productive tillers per plant, grains per panicle, 1000 grain weight (g), grain yield per plant (g) and straw yield per plant (g). The results are in agreement with the findings of Yadav *et al.* (2011) [9], Bhadru *et al.* (2012) [11], Shukla *et al.* (2005) [6] and Tuwar *et al.* (2013) [8].

Highest heritability was observed in days to initiation of flowering followed by days to 50% flowering, days to maturity, spikelet fertility (%), 1000 grain weight (g), grains per panicle, panicle length (cm), plant height (cm), grain yield per plant (g). 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, 1000 grain weight (g), grain yield per plant (g) and productive tillers per plant. Similar results were also reported by Bhadru *et al.* (2012) [11] and Tuwar *et al.* (2013) [8]. It appeared that the above mention 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 (25)	Error (50)
Days to initiation of flowering	0.73	174.40**	0.31
Days to 50% flowering	1.55	173.05**	0.59
Days to maturity	1.43	180.87**	0.56
Plant height (cm)	119.31	809.40**	82.55
Productive tillers per plant	0.78	9.80**	0.85
Panicle length (cm)	1.54	17.57**	0.75
Grains per panicle	6.40	2981.47**	113.84
Spikelet fertility (%)	0.05	206.21**	0.71
1000 grain weight (g)	0.31	72.19**	0.58
Grain yield per plant (g)	4.71	21.07**	3.72
Straw yield per plant (g)	3.27	31.62**	3.60

\*\* 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 <sup>2</sup> b (%)	GA	GAM (%)
Days to initiation of flowering	80.67 to 112.33	99.53	7.65	7.67	99.46	15.65	15.72
Days to 50% flowering	84 to 115.33	102.67	7.38	7.42	98.98	15.53	15.13
Days to maturity	104.33 to 140.33	127.21	6.09	6.12	99.06	15.90	12.49
Plant height (cm)	68 to 140.47	106.70	14.59	16.89	74.59	27.69	25.95
Productive tillers per plant	6 to 13.40	8.50	20.30	23.02	77.81	3.13	36.90
Panicle length (cm)	17.93 to 26.60	22.77	10.39	11.07	88.07	4.57	20.09
Grains per panicle	68.53 to 189.13	118.55	26.07	27.58	89.35	60.20	50.78
Spikelet fertility %	70.92 to 96.80	82.07	10.08	10.13	98.96	16.96	20.66
1000 grain weight (g)	11.83 to 31	20.90	23.37	23.65	97.62	9.94	47.57
Grain yield per plant (g)	12.80 to 23.57	17.90	13.42	17.21	60.83	3.86	21.57
Straw yield per plant (g)	19.33 to 32.93	24.48	12.48	14.69	72.16	5.34	21.84

## 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, 1000 grain weight (g), productive tillers per plant and grain yield per plant (g).

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