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VARIABILITY AND GENETIC PARAMETERS FOR GRAIN YIELD AND ITS COMPONENTS IN RICE (*Oryza sativa* L.) GENOTYPES

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Rice (*Oryza sativa* L. 2n=24) is one of the most important staple food crop in the world particularly in South East Asia. It is grown in almost all the continents of the world except Antarctica, occupying 155.13 million hectares with an annual production of about 646 million tonnes globally. India is the largest rice growing country with an area of 41.92 million hectares with an output of 89.09 million tones which averages around 2.125 tonnes per hectare the productivity level of rice is very low compared to the world's average productivity. Assessment of variability for yield and its component characters becomes absolutely essential before planning for an appropriate breeding strategy for genetic improvement. Genetic parameters such as genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) are useful in detecting the amount of variability present in the germplasm. Heritability coupled with high genetic advance would be more useful tool in predicting the resultant effect in selection of the best genotypes for yield and its attributing traits. It helps in determining the influence environment on the expression the genotypic and reliability of characters. With the above background information the present investigation was undertaken to study the genetic parameters among the sixty three rice genotypes.

The experimental material used in the study consisted of 63 genotypes of rice grown in a completely randomized block design with three replications at Department of Genetics and Plant Breeding, School of Agriculture, SHIATS, Allahabad. Twenty four days old seedlings of each genotype were transplanted in three rows of 2.0 m length by adopting a spacing of 22.5 cm between rows and 10 cm between plants with in rows at the rate of 20 plants per row. The crop was grown with the application of fertilizer N, P and K at the rate of 120, 60 and 60 kg ha respectively. Standard agronomic practices were followed to raise a good crop. A composite sample of 10 plants from the middle row was used to record observations on these plants for plant height, total number of productive tillers per plant, panicle length, number of grains per panicle, harvest index and grain yield per plant except days to 50 per cent flowering and days to maturity. The treatment means for all the characters were subjected to analysis of variance technique on the basis of model proposed by (1). The genotypic and phenotypic variances were calculated as per the formulae proposed by (2). The genotypic (GCV) and phenotypic (PCV) coefficient of variation

Table-1 : Analysis of variance for different quantitative characters in rice.

S.No.	Characters	Mean Sum of Squares		
		Replications (df = 2)	Treatments (df = 62)	Error (df = 124)
1.	Days to 50% Flowering	3.83	199.40**	1.21
2.	Plant Height	0.36	695.04**	1.28
3.	Flag Leaf Length	3.12	88.63**	1.38
4.	Flag Leaf Width	0.000015	0.096**	0.00035
5.	Tillers/ plant	0.0022	15.17**	0.026
6.	Panicle length	0.047	21.84**	0.27
7.	Biological yield	17.87	733.81**	29.60
8.	Harvest index	51.58	109.82**	27.48
9.	Days to maturity	0.021	191.10**	1.85
10.	Spikelet's/ panicle	0.49	7954.79**	11.58
11.	Panicles/ hill	0.021	14.72**	0.12
12.	Test Weight	0.27	38.04**	0.52
13.	Seed Yield/ plant	0.69	132.85**	8.37

Table-2 : Estimate of genetic parameters for 13 quantitative characters in rice genotypes.

Character	Mean	Range	Vg	Vp	GCV (%)	PCV (%)	h^2(bs) (%)	GA	GA as % of mean
Days to 50% flowering	92.13	71.67 - 110.00	66.06	67.28	8.82	8.90	98	16.59	18.01
Plant Height	100.94	70.20 - 156.27	231.25	232.54	15.07	15.11	99	31.24	30.95
Flag Leaf Length	33.19	21.27 - 48.83	29.08	30.47	16.25	16.63	95	10.85	32.70
Flag Leaf Width	1.32	0.98 - 1.93	0.03	0.03	13.53	13.60	99	0.37	27.71
Number of Tillers per Hill	11.81	7.73 - 18.60	5.05	5.08	19.04	19.08	99	4.62	39.11
Number of Panicles per Hill	10.16	6.47 - 16.93	4.87	4.99	21.71	21.98	98	4.49	44.19
Panicle length	25.35	18.98 - 31.77	7.19	7.47	10.58	10.78	96	5.42	21.38
Number of Spikelets per Panicle	161.43	58.33 - 261.60	2647.74	2659.32	31.88	31.95	100	105.77	65.52
Biological Yield per Hill	57.47	33.33 - 102.33	234.74	264.34	26.66	28.69	89	29.74	51.76
Days to Maturity	123.04	103.00 - 140.33	63.08	64.94	6.46	6.55	97	16.13	13.11
Test Weight	22.37	14.01 - 30.08	12.51	13.03	15.81	16.14	96	7.14	31.91
Harvest index	44.72	33.79 - 61.17	27.45	54.93	11.71	16.57	50	7.63	17.06
Grain yield per hill	25.36	15.00 - 44.00	41.49	49.87	25.40	27.85	83	12.10	47.73

was calculated by the formulae given by (2). Heritability in broad sense [h(b)] was calculated by the formula given by (3) as suggested by (4). From the heritability estimates, the genetic advance (GA) was estimated by the following formula given by (4).

Analysis of variance revealed the significant differences among the genotypes for all the traits indicating the sufficient scope for further improvement (Table-1). The range of mean variation observed among yield components in genotypes revealed that highest range of mean variation was noticed for number of grains per panicle (161.43) and days to maturity (123.04) whereas the range was found to least for plant height (86.07) and economic yield per plant (29.00), respectively (Table-2). Similarly, the highest magnitude of genotypic and phenotypic variance was registered for number of grains per panicle, biological yield per hill and plant height while least estimates were recorded for number of panicles per hill and flag leaf width (Table-2).

The PCV estimates were higher than GCV for all the traits, indicating the influence of environment for the expression of these traits in case of parents. The difference between PCV and GCV estimates were relatively low for all the traits indicating lesser contribution of environment towards expression. Characters like spikelets per panicle followed by biological yield, grain yield per plant and number of panicles per hill showed higher estimates of PCV and GCV therefore, simple selection can be practiced for further improvement of these characters. This was in conformity with the findings of (5) for total number of spikelets per panicle. Moderate estimates of PCV and GCV values were recorded for number of tillers per hill, flag leaf length, test weight, plant height, flag leaf width, harvest index. These results were in consonance with the findings of (6) for number of tillers per hill and plant height, (7) for flag leaf length and flag leaf width. However, other characters showed low PCV and GCV estimates.

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