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Genetic Variability, Heritability and Genetic Advance for Yield and its Related Traits in Rice Genotypes Under Rainfed Shallow Lowland Area

B. MANJUNATHA AND B NIRANJANA KUMARA

All India Coordinated Research Project on Rice, Agricultural and Horticultural Research Station, Ponnampet
University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka
email : manjugpb@gmail.com

ABSTRACT

The present study consists of 64 rice genotypes that were evaluated at Agricultural and Horticultural Research station, Ponnampet. Karnataka to study genetic variability, heritability and genetic advance for grain yield and four yield associated traits. Theexperiment was conducted using 6 × 6 simple lattice design with two replications during the 2012 *kharif* main cropping season. The analysis of variance revealed statistically significant differences ($p<0.05$) indicating the existence of genetic variability among the 64 genotypes for all the traits studied. Significant differences were observed for grain yield that ranged from 1562.00 to 5414.00 kg/ hawith overall mean value of 3765.00 kg haHigher PCV and GCV values were exhibited by yield kg/ha which suggests the possibility of improving thistrait through selection. The highest heritability was recorded for panicles per square metre followed by days to fifty percent flowering, yield kg/ha and plant height. High to medium heritability coupled with high GCV and high genetic advance as percentage of means were exhibited for plant height, panicles per square metre. High genetic advances as percent of means were recorded by yield kg per hectare, panicles per square metre, Plant height (cm) and days to fifty per cent flowering.

Key words *Variability, heritability, genetic advance*

Rice is a self-pollinated cereal crop belonging to the family Gramineae (synomym-Poaceae) under the order Cyperales and classMonocotyledon having chromosome number 2n=24 [1]. The genus*Oryza* includes a total of 25 recognized species out of which 23 are wildspecies and two, *Oryzasativa* and *Oryzaglaberrima* are cultivated [2].It can survive as a perennial crop and can produce a ratoon crop forup to 30 years but cultivated as annual crop and grown in tropical andtemperate countries over a wide range of soil and climatic condition.

For any crop improvement it depends on magnitude of genetic variability present in base population. Environmental effects influence the total observable variations of quantitative traits. Therefore,partitioning of overall variance due to genetic and non-genetic causes becomes necessary for effectivebreeding programme. The genotypic coefficient of variation estimates the heritable variability, whereasphenotypic component measures the role of environment on the genotype. High PCV and low GCV for acharacter indicated high influence of environment in its expression. The phenomenon of transmission ofcharacters from parents to offspring is usually measured in terms of heritability. Therefore the estimatesof heritability and genetic advance would help to formulate theadvanced breeding programme.

MATERIAL AND METHODS

The experiment was carried out during *kharif,* 2012 at Agricultural and Horticultural Research Station, Ponnampet.The material comprised of 64 elite rain fed shallow low land genotypes(Table 1) sown in a simple lattice design with tworeplications with spacing of 20 X 15 cm. Data were recorded on five randomly selected plants in each entry in each replications for the traits days to 50% flowering, Plant height (cm), number of panicles per square metre,except yield which recorded in kg/plotconverted into kg/ha. The data subjected to INDOSTAT software to estimate Genetic coefficient ofvariation (%), phenotypic coefficient of variation (%), Heritability (%) (Broad sense), Genetic Advance and Genetic Advance as percent of mean. The estimates for variability treated as per the categorizationproposed by Siva Subramanian and Madhavamenon(4), heritability and genetic advance as percent of meanestimates according to criteria proposed by Johnson *et al.*(2).

RESULTS AND DISCUSSION

In the present study analysis of variance revealed the existence of significant differences among genotypes for all traits studied. The mean, variability estimates *i.e.*, Genetic coefficient of variation (%), phenotypic coefficient of variation (%), Heritability (%) (Broad sense), Genetic Advance as percent of mean are presented in Table 2. All traits under studied have higher phenotypic coefficient of variation than genotypic coefficient of variation. The magnitude ofphenotypic coefficient of variation and genotypic coefficient of variation was moderate to highfor the traits panicles per square metre and yield [3, 5]. The high PCV observed for yield per hectare [5]. The high GCV obtained for number of panicles per square metre indicating the improvement is possible through selection. Genotypic coefficient of variation measures the extent of genetic variability percent for a trait but does not assess the amount of genetic variation which is heritable. Heritability estimates were high for all the characters. The heritability estimates along with genetic advance can be useful to predict effect of selection in selection programmes. The traits like days to fifty percent flowering, yield [7] and plant height exhibited

Table 1. The different rice genotypes used in the experiment

Serial no.	IET numbers	Serial no.	IET numbers	Serial no.	IET numbers
1	IET 22416	23	IET 23145	45	IET 23166
2	IET 22420	24	IET 23146	46	IET 23167
3	IET 22428	25	IET 23147	47	IET 23168
4	IET 22422	26	IET 23148	48	Thunga
5	IET 22423	27	IET 23149	49	IET 23169
6	IET 22437	28	IET 23150	50	IET 23170
7	IET 21974	29	IET 23151	51	IET 23171
8	IET 22418	30	IET 23152	52	IET 23172
9	IET 21996	31	IET 23153	53	IET 23173
10	IET 23133	32	IET 23154	54	IET 23174
11	IET 23134	33	Savithri	55	IET 23175
12	IET 23135	34	IET 23155	56	IET 23176
13	IET 23136	35	IET 23156	57	IET 23177
14	IET 23137	36	IET 23157	58	IET 23178
15	IET 23138	37	IET 23158	59	IET 23179
16	IET 23139	38	IET 23159	60	IET 23180
17	IET 23140	39	IET 23160	61	IET 23181
18	IET 23141	40	IET 23161	62	IET 23182
19	Dhanarasi	41	IET 23162	63	IET 23183
20	IET 23142	42	IET 23163	64	IET 23184
21	IET 23143	43	IET 23164		
22	IET 23144	44	IET 23165		

Table 2. Variability, Heritability and genetic advance for quantitative traits in rice.

Characters	Mean	Range	Genetic coefficient of variation (%)	Phenotypic coefficient of variation (%)	Herita bility (%)	Genetic advance (%)	Genetic advance as percent mean
Days to fifty percent flowering	120	100-137	6.90	7.00	0.96	16.75	13.32
Plant height (cm)	81	59-100	11.77	11.40	0.94	18.44	22.84
Panicles per m^2	358	242-511	15.64	15.85	0.97	113.88	31.80
Yield kg/ha	3765	1562-5414	22.17	22.16	0.95	1640.6	43.60

high magnitude of genetic advance as percent of mean. The traits plant height, days to fifty percent flowering, panicles per square metre and yield have high heritability along with genetic advance as percent of mean indicate that these characters attributable to additive gene effects which are fixable revealing that improvement in these characters would be possible through direct selection.

CONCLUSION

Sixty four rice genotypes along with one standard checks were evaluated for four yield and yield attributing traits. Results of the present investigation on variability, heritability and genetic advance indicated a scope for improvement of grain yield through selection.

LITERATURE CITED

Hooker J. D., 1979. The flora of British India. Vol 2. Reeve L & Co., Kent, England, p: 25.

Brar D. S., Khush G. S., 2003. Utilization of wild species of genus *Oryzae* in rice improvement. In: J S Nanda, Sharma SD Monograph on Genus *Oryzae* 283309.

Singh S. K., Bhati P. K., Sharma A, Sahu V 2015. Super hybrid rice in China and India: current status and future prospects. *Int J Agric and Biol* 17: 221-232.1. Genetic variability and association analysis in rice. *International Journal of Applied Biology and Pharmaceutical Technology*. **5**(2): 63-65.

Johnson, H.W. Robinson, H.F. and Costock, R.E. 1955. Estimates of genetic and environmental variability in Soyabean. *Agronomy Journal,* **47**(7): 314-318.

Roy, B. Hossain, M. and Hossain, F. 2001. Genetic variability in yield components of rice (*Oryzasativa*L.). *Environment and Ecology.***19(1)**: 186-189.

Siva Subramanian, S. and Madhavamenon, P. 1973. Combining ability in rice. *Madras Agricultural Journal*. **60**: 419-421.

Thirumala Rao, V. Chandra Mohan, Y. Bhadru, D. Bharathi, D. and Venkanna,. V. 2014, genetic variability and association analysis in rice, International Journal of Applied Biology and Pharmaceutical Technology.

Venkanna, V., Lingaiah, N., Raju, Ch and Rao, V.T. 2014. Genetic studies for quality traits of F population of rice (*Oryzasativa* L.). *International Journal of Applied Biology and PharmaceuticalTechnology.***5(2)**: 125-127.

Vaithiyalingan, M. and Nadarajan, N. 2006. Genetic variability, heritability and genetic advance in F_1 population of inter sub-specific crosses of rice. *Crop Research*. **31**(3): 476-477.

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