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Elisama Xaxa
KVK, Lohardaga, Birsa
Agricultural University, Ranchi,
Jharkhand, India

Supriya Surin
Department of Genetics and
Plant Breeding, Birsa
Agricultural University, Ranchi,
Jharkhand, India

Savita Ekka
Plant Pathology, Birsa
Agricultural University, Ranchi,
Jharkhand, India

Genetic variability studies of important yield attributing traits in rainfed upland rice (*Oryza sativa* L.)

Elisama Xaxa, Supriya Surin and Savita Ekka

Abstract

In present study Variability, Heritability and Genetic advance were studied in 46 elite varieties and 3 established varieties of rice. The variability study revealed that considerable amount of variability was observed for all the 10 characters viz; Plant height, Panicle length, Number of spikelets per panicle, Number of tillers per plant, Days to 50% flowering, Days to maturity, Grain yield per panicle, grain yield per plant, grain yield per square metre and 1000 seed weight. The analysis of variance indicates that significant differences among all the genotypes for all the characters. High heritability coupled with high genetic advance was observed for plant height, number of spikelets per panicle, 1000 seed weight, Grain yield per panicle, grain yield per plant, grain yield per square metre indicating that these characters can be improved through direct selection since the additive gene action is being involved in the inheritance these characters. The characters number of spikelets per panicle expressed maximum genetic advance (44.21) followed by plant height (23.94) and days to 50% flowering (10.84). Hence it is suggested that these characters could be of great importance for selecting better genotype in the rice improvement programme.

Keywords: Variability, Heritability, Genetic advance, Rice

1. Introduction

Rice (*Oryza sativa* L.) is one of the staple food of the world. The major area of Jharkhand state covered with sandy loam to loam with acidic soils (PH 4.5 -6.5) and having low fertility. The water holding capacity of the state soil is very low due to porous nature of the soil and undulating topography. In Jharkhand, about 91% of the cropped area is covered under food crops including 84% under cereals. Rice is the single most important food crop in Jharkhand contributes about 1.62mha under rice cultivation. The yield of rice in Jharkhand is higher (1832 kg /ha) followed by W.B. (2593kg/ha) and U.P. (1879kg/ha).

For further improvement in the yield of rice, it is essential to have a thorough knowledge on the variability present in the genotypes. It has been realized that heritability estimates in broad sense along with the genetic advance is more useful in producing the resultant effect for selection of the best individuals as reported by Johnson *et al* (1995). Genetic advance for any quantitative character can predicted with the help of heritability and aids in exercising the necessary selection pressure.

Materials and Method

A set of 46 elite varieties and 3 established varieties of rice obtained from Rice Research Project BAU Ranchi were Randomized Block Design with 2 replications at Rice Research Station BAU Ranchi. The direct sowing method was used for sowing the seed in 4.5x 1.2 sq m. Each genotypes was planted in 6 rows of 20 cm apart. The fertilizer dose was 40:20:20 kg NPK /ha. Data on five randomly selected plants in each genotype were collected for plant height, panicle length, number of spikelets per panicle, number of tillers per plant, days to maturity, grain yield per panicle, grain yield per plant, grain yield per square metre and 1000 seed weight. The mean of the replications are used for statistical analysis.

Result and Discussion

The analysis of variance revealed that the genotypes exhibited significant differences among all the genotypes for all the characters under studied. The phenotypic expression of the characters is the result of inter action between the genotype and environment. In the present study, estimates of phenotypic coefficient of variation for all the characters were higher than the estimates of genotypic coefficient of variation. It can be seen that grain yield per square metre exhibited highest genotypic coefficient of variation (GCV) followed by grain yield per plant, grain yield per panicle, number of spikelet per panicle, 1000 seed weight, plant height

Correspondence
Elisama Xaxa
KVK, Lohardaga, Birsa
Agricultural University, Ranchi,
Jharkhand, India

indicating presence of high amount of variability for improvement of these characters Rao *et al* (1985), Kavitha and Reddi (2002), Chookar *et al* (1994) also reported high variability for these traits. The high difference between PCV and GCV observed for number of tillers per plant indicated that this character was highly influenced by the environment. In this study, higher heritability estimates were obtained for all the characters except number of tillers per plant and panicle length, Which had moderate heritability values. The genetic advance as percentage of mean was high for the traits grain yield per square metre, grain yield per plant, grain yield per panicle, number of spikelet per panicle and plant height. High heritability coupled with high genetic advance was observed for plant height(97.4%), number of spikelets per

panicle(89.74%), 1000 seed weight(87.51%), Grain yield per panicle(94.9%), grain yield per plant (91.20%), grain yield per square metre(93.70). High heritability coupled with high genetic advance as percentage of mean indicating greater response to phenotypic selection and hence the undesirable effects of grain yield can be overcome by exerting effective selection and discarding the undesirable genotype. These results are in accordance with that of Chauhan (1996). Days to maturity exhibited high heritability and low genetic advance indicating the presence of both additive and non-additive gene action hence simple selection for these traits would be less effective. This results are in accordance with Sharma *et al* (1997) and Saravanan and Senthil (1997).

Table 1: Estimates of Phenotypic Coefficient of Variance (PCV) and Genotypic Coefficient of Variance (GCV), genotypic, phenotypic and error variance, heritability in percentage, Genetic advance and Genetic advance expressed in percentage of mean for ten quantitative Characters of Rice (*Oryza sativa* L.)

Sl.No	Characters	Mean	PCV	GCV	Genotypic variance	Phenotypic variance	Error variance	Heritability (%)	Genetic advance	Genetic advance (%)
1.	Plant height (cm)	90.60	13.16	12.99	138.604	142.17	3.56	97.4	23.94	26.42
2.	Panicle length(cm)	21.85	10.97	6.30	1.89	5.74	3.85	32.98	1.62	7.45
3.	No. of tillers per plant	5.37	13.63	8.45	0.20	0.53	0.33	38.46	0.58	10.80
4.	No. of spikelets per panicle	116.32	20.56	19.47	531.43	572.11	58.68	89.74	44.21	38.01
5.	Days to 50% flowering	66.59	8.64	8.26	30.30	33.16	2.85	91.37	10.84	16.27
6.	Days to maturity	94.16	4.98	4.61	18.92	22.02	3.10	85.89	8.304	8.81
7.	1000 grain weight	26.39	15.05	14.08	13.81	15.79	1.97	87.51	7.16	27.14
8.	Grain yield per panicle(gm)	1.72	29.54	28.79	0.24	0.26	0.013	94.9	0.99	57.81
9.	Grain yield per plant (gm)	8.60	29.78	28.45	5.98	6.56	0.577	91.20	4.81	55.97
10.	Grain yield per square metre(kg)	0.358	50.07	48.47	0.030	0.032	0.002	93.70	0.34	96.65

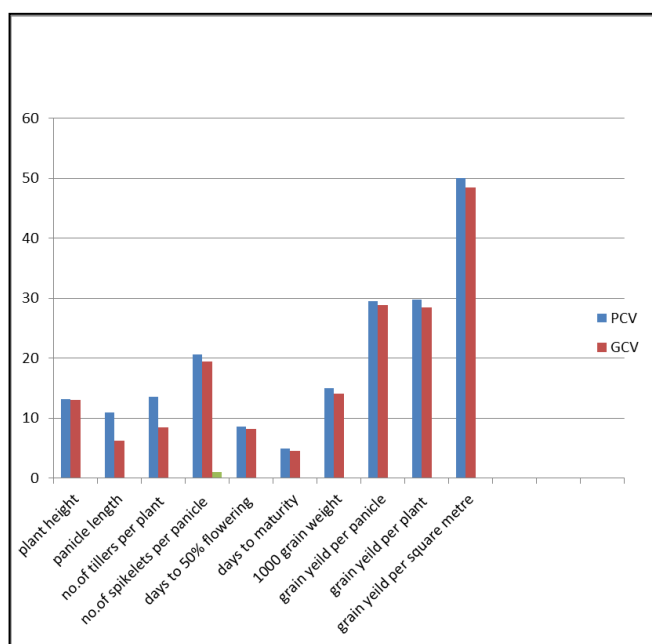


Fig 1: Chart diagram estimates of Phenotypic Coefficient of Variance (PCV) and Genotypic Coefficient of Variance (GCV) for ten quantitative Characters of Rice (*Oryza sativa* L.)

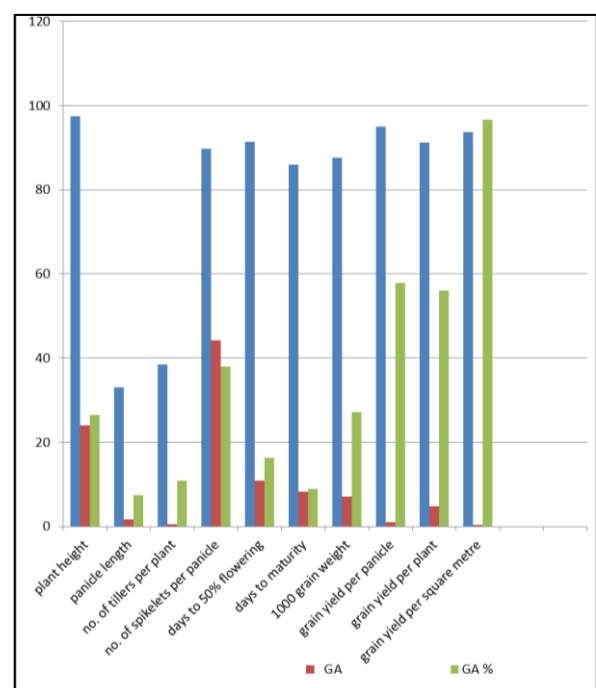


Fig 2: Chart diagram of Heritability, Genetic advance and Genetic advance expressed in percentage of mean for ten quantitative Characters of Rice (*Oryza sativa* L.)

References

1. Chauhan JS. Genetic variability study in rice. *Oryza*. 1996; 33:168-173.
2. Chookar SK, Marekar RV, Siddiqui MA. Genetic variability for grain yield in rice. *Oryza*. 1994; 29:168-173.
3. Johnson HW, Robinson HF, Comstock RE. Estimates of genetic and environmental variability in Soybean. *Agron J*. 1995; 47:314-318.
4. Kavitha S, Reddi N, Sree Rana. Variability, Heritability and Genetic advance of some important traits in Rice (*Oryza sativa* L.). *The Andhra Agric. J*. 2002; 49(3, 4):222-224.
5. Rao GPP, Rao MN, Anjanappa M. Genetic variability in *Setaria*. *Andhra Agric. J*. 1985; 32(1):34-36.
6. Saravanan R, Senthil N. Variability, Heritability and Genetic advance of some important traits in Rice (*Oryza sativa* L.) *Madras Agric. J* 1997; 84:276-277.
7. Sharma RK, Dubey SD. Variation and association among panicle traits in rice. *Oryza*. 1997; 37:8-12.