Short Communication

Role of genetic variability in yield and yield attributing traits in rice (*Oryza sativa* L)

PRADEEP KUMAR SAO*, PRABHARANI CHAUDHARI, MOHIT SAHU and SHAIK JAVID

Department of Genetics and Plant Breeding
Indira Gandhi Krishi Vishwavidyalaya, Raipur 492012 Chhattisgarh, India
*Email for correspondence: saopradeep155@gmail.com

 Received: 18.05.2024/Accepted: 24.07.2024

ABSTRACT

Fifty three genotypes of rice were evaluated for the genetic variability present in the material for yield and yield contributing traits. The phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all the characters. High heritability, along with higher genetic advance as per cent of mean, was recorded for test weight, plant height, number of filled grains per panicle, number of unfilled grains per panicle, number of total grains per panicle, number of panicles per plant, number of total tillers per plant, biological yield per plant, grain yield per plant and harvest index. The results indicated that such characteristics can be improved through mass selection and hybridization methodologies based on the selection of progeny.

Keywords: Rice; yield; GCV; PCV; characters; heritability

INTRODUCTION

Rice, *Oryza sativa* (2n = 24); that belongs to the family Gramineae and sub-family Oryzoides, is the second most important cereal crop and serves as a staple food for over half of the world's population. The slogan Rice is Life is more appropriate for India as this crop plays a vital role in our national food security and is a means of livelihood for millions of rural households (Umadevi et al 2012).

Any breeding technique's efficiency is based on the extent of variability created. The ultimate goals of any plant breeder are the selection, creation and maintenance of variable genotypes of a crop. Thus variability must be present in order to go through the selection process to identify the various parents to be used in the hybridization programme.

MATERIAL and METHODS

Fifty three genotypes of rice, including three checks viz IR-64, Swarna and MTU 1010 were evaluated in RBD with three replications during kharif season 2023. The spacing was maintained at 20 cm between rows and 15 cm between plants. Observations were recorded on 5 randomly selected plants from each replication. The mean values from selected plants were considered for statistical analysis.

RESULTS and DISCUSSION

Analysis of variance revealed presence of highly significant differences for all the studied characters. Variance analysis indicated that the mean sum of squares was found highly significant for all traits due to genotypes (Table 1). The highest mean performance for plant height was observed at 137.5 cm, while the higher magnitudes of genotypic (GCV) and phenotypic (PCV) coefficients of variation were observed for harvest index, grain yield per plant, biological yield per plant, number of total tillers per plant, number of unfilled grains per panicle and number of panicles per plant. This indicated that the genotypic variance was smaller than phenotypic variance, which showed that environment had masking effect on the expression of genetic variability. High heritability, along with a higher genetic advance as a per cent of the mean, was recorded for test weight, plant height, number of filled grains per panicle, number of unfilled

Table 1. Estimation of variability parameters for yield and its contributing traits

Character	Mean	Range		GCV (%)	PCV (%)	h^2 (bs)	GA as per cent of mean
		Min	Max				
Days to 50% flowering	100.00	90.00	110.00	4.29	4.60	87.07	8.25
Plant height (cm)	137.5	85.67	189.33	18.59	19.63	89.63	36.25
Number of filled grains/panicle	117.00	72.00	162.00	18.04	19.24	87.89	34.85
Number of unfilled grains/panicle	16.5	7.33	26.00	26.39	32.35	66.50	44.33
Number of total grains/panicle	129.18	82.33	179.33	17.20	18.45	86.93	33.04
Spikelet fertility (%)	90.11	84.72	95.51	2.34	2.93	63.99	3.86
Panicle length (cm)	25.16	19.33	31.00	9.45	11.18	71.40	16.45
Number of panicles/plant	6.00	3.00	9.00	25.89	30.62	71.48	45.10
Number of total tillers/plant	8.00	4.00	12.00	27.33	30.23	81.74	50.91
Test weight (g)	32.26	18.23	46.30	18.46	18.71	97.34	37.53
Biological yield/plant (g)	59.33	23.00	89.67	28.10	30.28	86.11	53.72
Grain yield/plant (g)	23.38	4.73	42.03	41.90	45.55	84.61	79.40
Harvest index (%)	29.65	8.66	50.64	46.35	50.56	84.01	87.51

GCV = Genotypic coefficient of variation, PCV = Phenotypic coefficient of variation, h^2 (bs) = Heritability in broad sense, GA = Genetic advance, Min = Minimum, Max = Maximum

grains per panicle, number of total grains per panicle, number of panicles per plant, number of total tillers per plant, biological yield per plant, grain yield per plant and harvest index. The expression of these traits suggested the prevalence of additive gene action. Such characteristics can be improved through mass selection and hybridization methodologies based on the selection of progeny.

Kujur et al (2023) reported that in 48 studied rice genotypes, all 13 characters' mean sum of squares were significant, which showed that there was a lot of genetic variation in these variables. The highest magnitude of PCV and GCV was estimated for number of unfilled grains per panicle. High magnitude of heritability along with high genetic advance as per cent of mean was observed for plant height. The biological yield, harvest index, number of effective tillers per panicle, number of filled grains per panicle, spikelet fertility and harvest index were all positively and significantly associated with grain yield per plant.

Sao et al (2024) studied genetic variability parameters in 2,879 rice germplasm accessions for 11 quantitative traits. Moderate values of GCV and PCV were observed for 100-seed weight, seedling height, L-B ratio, plant height and number of effective tillers, whereas, rest of the traits had low GCV and PCV values. High heritability was observed for all the traits except leaf length, leaf width and grain yield per plant. High heritability coupled with high genetic advance as per cent of mean was observed for 100-seed weight, seedling height and L-B ratio. High heritability coupled with moderate genetic advance as per cent of mean was recorded for days to 50 per cent flowering and plant height.

REFERENCES

Kujur VK, Sao A, Singh MK and Tiwari A 2023. Genetic variability, heritability and association analyses for yield and related characters in rice germplasm (*Oryza sativa* L). Pharma Innovation **12(4):** 2236-2240.

Sao A, Singh G, Nair SK and Harish GD 2024. Estimation of genetic variability parameters for various yield attributing traits in germplasm collection of rice (*Oryza sativa* L). International Journal of Plant and Soil Science **36(3):** 158-165.

Umadevi M, Pushpa R, Sampathkumar KP and Bhowmik D 2012. Rice – traditional medicinal plant in India. Journal of Pharmacognosy and Phytochemistry **1(1):** 6-12.