The Andhra Agric. J 64 (2): 357-359, 2017

Genetic Parameters for Yield and Yield Components in Rice (*Oryza Sativa* L.) Genotypes

G Bharathi, B Krishna Veni, M Lal Ahamed and K Jaya Lalitha
Department of Genetic and Plant Breeding, Agricultural College, Bapatla 522 101

ABSTRACT

The present investigation was under taken to study the extent of variability and genetic parameters of 10 yield and quality parameters in a set of 32 high yielding diverse rice genotypes. Phenotypic and genotypic coefficients of variations were high for filled grains per panicle and grain yield/plant. High heritability estimates were recorded for all the characters studied except for panicle length. Filled grains/panicle and plant height exhibited high genetic advance as percent of mean while the remaining traits recorded low values. High GCV, PCV, heritability coupled with high genetic advance was manifested by filled grains per panicle indicating the role of additive gene action in the inheritance of this trait and simple selection is advocated for improvement.

Key words: *Genetic advance, Heritability, phenotypic and genotypic coefficients of variation* .

Assessment of variability present in any crop species is an essential prerequisite for formulating an effective breeding programme. The existing variability can be used to further enhancement of yield level of the cultivars by following appropriate breeding strategies. As the estimation of genetic variability alone does not give a clear indication of the possible improvement that can be achieved through simple selection it should be used in conjunction with heritability and genetic advance. Studies on genotypic coefficient of variation enable the breeder to compare the amount of variability present in different characters. Hence, the present investigation was carried out to study the variability parameters for yield and yield components in 32 rice genotypes.

MATERIAL AND METHODS

The experimental material consisted of thirty two rice genotypes grown during *Kharif* 2015-16 at Rice Research Unit, Bapatla. The main field was laid out in a randomized block design with two replications. One month old seedlings were transplanted in thoroughly puddled main field. Each experimental unit consisted of 2.4 m^2 and the spacing adopted was 20 cm between rows and 15 cm between plants. Observations were recorded on ten plants selected at random per genotype per replication and their means were used for statistical analysis. The components taken for the study are Days to 50% flowering, Plant height (cm), Number of ear bearing tillers per plant, Panicle length (cm), Number of filled grains per panicle, Test weight (g), Grain yield per plant (g), Grain length (mm), Grain breadth (mm) and L/B ratio by following standard procedures. Analysis of variance was carried out with the mean data of each character. The components of variance were used to estimate genetic parameters like genotypic and phenotypic coefficients of variation (GCV and PCV) as given by Falconer (1964) and heritability (h^2) in the broad sense as per Allard (1960).

RESULTS AND DISCUSSION

The analysis of variance for 32 genotypes of rice for 10 characters is presented in Table 1. The analysis of variance showed that the mean sum of squares for the genotypes were highly significant for all the traits measured. The phenotypic and genotypic coefficient of variation were highest for ear bearing tillers per plant (27.81 and 26.13) followed by filled grains per panicle (24.26 and 21.78) and grain yield/ plant (24.09 and 21.55) (Table 2). Moderate PCV and GCV were recorded for plant height (15.17 and 14.26) followed by test weight (15.09 and 13.43), panicle length (13.68 and 10.29). While the characters *viz.,* days to 50% flowering (7.81 and 7.67), grain length (7.12 and 6.60), grain breadth (7.95 and 6.66) and L/B ratio (7.60 and 6.03) manifested low phenotypic and

Table 1. Analysis of variance for yield and yield components among 32 genotypes of rice (*Oryza sativa* L.).

S. No.	Source	Replications	Treatments	Error
	Degrees of freedom	1	31	31
		Mean sum of squares		
1.	Days to 50% flowering	0.56	145.09**	2.49
2.	Plant height (cm)	10.97	423.70**	26.10
3.	Ear bearing tillers per plant	0.68	10.49**	1.12
4.	Panicle length(cm)	2.46	12.94**	3.58
5.	Filled grains per panicle	3.42	2163.05**	134.60
6.	Test weight(g)	0.07	15.53**	1.80
7	Grain yield per plant	12.12	39.45**	4.38
8.	Grain length(mm)	0.05	0.30**	0.02
9.	Grain breath(mm)	0.0008	0.04**	0.01
10	L/B ratio	0.0014	0.06**	0.01

**significant at 1% level

genotypic coefficient of variation. High GCV and PCV for ear bearing tillers per plant, filled grains per panicle and grain yield per plant were also reported by Sameera *et al.* (2015), Dhurai *et al.* (2014) and Nitesh *et al.* (2015) respectively.

Heritability is the measure of transmission of characters from generation to generation and estimates of heritability are helpful to the breeder in selecting superior individuals and successfully utilizing them in breeding programme(s) (Siva Parvathi, 2010). Heritability in broad sense (h^2) was high for days to 50% flowering (96.6%), plant height (88.4%), filled grains per panicle (88.3%)and grain length (85.8%), while panicle length (56.6%) manifested moderate heritability. Paikhomba *et al.* (2014), Kishore *et al.* (2015), Dhurai *et al. (*2014) and Prasad *et al*. (2009) also reported high heritability for days to 50% flowering, plant height, filled grains per panicle and grain length respectively. The characters filled gains per panicle (61.64) and plant height (27.31) recorded high genetic advance as per cent over mean. While the remaining traits under study manifested low values for genetic advance. Previous studies by Dhurai *et al. (*2014) and Paikhomba *et al.* (2014) also confirm the present results.

The estimates of phenotypic coefficient of variation for all the characters under study were high than the estimates of genotypic coefficient of variation. The estimates of heritability were high for most of the parameters under study except for panicle length. Based on the results of variability parameters, it may be concluded that filled grains per panicle exhisited high genotypic (27.81) and phenotypic (26.13) coefficients of variation along with high heritability (88.3) and high genetic advance as per cent of mean (61.64) indicated predominance of additive gene action is anticipated in the inheritance of this trait. Hence, simple selection will be highly rewarding for improving this character. These findings are in agreement with the results reported by Karthikeyan *et al*. (2007), Sharma and Sharma (2007), Prasad *et al*. (2009), Dhurai *et al. (*2014) and Sameera *et al.* (2015). The remaining characters under study *viz.,* days to 50% flowering, plant height, ear bearing tillers per plant, panicle length, test weight, grain yield per plant, grain length, grain breadth and L/B ratio exhibited low to moderate estimates for PCV, GCV, genetic advance coupled with moderate to high heritability estimates suggesting that both additive and non additive gene effects in the expression of these traits.

Table 2. Mean, variability, heritability and genetic advance as per cent of mean for yield, yield components and grain quality parameters in rice (*Oryza sativa* L.).

S. No.	Character	Mean	Range		Coefficient of variation		Heritability (%) (broad sense)	Genetic advance as per cent of mean (5% level)
			Minimum	Maximum	PCV %	GCV %		
1	Days to 50% Flowering	109.96	90.50	123.50	7.81	7.67	96.60	17.09
2	Plant height (cm)	98.84	77.10	144.35	15.17	14.26	88.40	27.30
3	Ear bearing tiller/plant	9.93	6.80	15.35	24.26	21.78	80.60	4.00
4	Panicle length (cm)	21.00	16.02	25.00	13.68	10.29	56.60	3.35
5	Filled grains/ Panicle	121.85	55.90	164.85	27.81	26.13	88.30	61.64
6	Test Weight (g)	19.49	15.53	27.23	15.09	13.43	79.20	4.80
7	Grain yield/plant	19.43	10.00	26.80	24.09	21.55	80.00	7.71
8	Grain length (mm)	5.71	5.10	6.80	7.12	6.60	85.80	0.72
9	Grain breadth (mm)	2.09	1.85	2.50	7.95	6.66	70.20	0.24
10	L/B ratio	2.68	2.34	3.33	7.60	6.03	63.10	0.26

PCV = Phenotypic coefficient of variation GCV = Genotypic coefficient of variation

LITERATURE CITED

Allard R W 1960 *Principles of Plant Breeding*. John Wiley and Sons Inc., New York. 485.

Dhurai S Y, Mohan R D, Bhati P K and Ravi S 2014 Studies on variability, heritability, and genetic advance for yield and quality traits in rice (*Oryza sativa* L.). *Society for Scientific Development in Agriculture and Technology,* 8: 482-484.

Falconer D S 1964 *An Introduction of Quantitative Genetics-Second edition*. Oliver and Boyd, Edinburgh. 312-324.

Karthikeyan P, Anbuselvan Y, Venkatesan M and Palaniraja K 2007 Genetic studies in rice (*Oryza Sativa* L.) under saline situation. *Madras Agricultural Journal,* 94(7-12): 272-276.

Kishore N S, Srinivas T, Nagabhushanam U, Pallavi M and Sameera S K 2015 Genetic variability, correlation and path analysis for yield and yield components in promising rice (*Oryza sativa* L.) genotypes. *SAARC Journal of Agriculture*, 13(1): 99-108.

Nitesh K, Singh P K, Vaishampayan A, Muk R, Rajesh S, Aparajitha S and Singh N K 2015 Appraisal of genetic architecture of yield and its contributing traits in rice germplasm. *Annals of Plant and Soil Research,* 17(2): 125-128.

Paikhomba N, Arvind K, Chaurasia A K and Rai P K 2014 Assessment of genetic parameters for yield and yield components in hybrid rice and parents. *Journal of Rice Research*, 2: 1-3.

Prasad R, Prasad LC and Agarwal R K 2009 Genetic diversity in Indian germplasm of aromatic rice. *Oryza,* 46(3): 197-201.

Sameera S K, Prasanna Rajesh A, Jayalakshmi V, Nirmala P J and Srinivas T 2015 Genetic variability studies for yield and yield componenets in rice (*Oryza sativa* L.). *Electronic Journal of Plant Breeding,* 6(1): 269-273.

Sharma A K and Sharma R N 2007 Genetic variability and character association in early maturing rice. *Oryza.* 44(4): 300-303.

Siva Parvathi P 2010 Genetic divergence in rice (*Oryza sativa* L.). *M.Sc. (Ag) Thesis*. Acharya N. G Ranga Agricultural University, Hyderabad, India.

(Received on 29.06.2016 and revised on 16.02.2017)