The Andhra Agric. J 61(2): 475-477, 2014

Studies on Genetic Parameters for Yield and its Contributing Characters in Rice Hybrids and Their Parents

Key words : Gentic Advance, Heritability and Variability.

Rice is one of the significant cereal commodities fulfilling the nutritional requirements of more than 70% of population and source of livelihood for about 150 million rural households in India. For the formulation of successful breeding programme, genetic variability in a crop species is pre-requite and it also offers better scope for selection. Effective selection not only depends on estimation of genetic variation among the genotypes but also on the proportion of heritable variation and the expected genetic gain. Heritability coupled with genetic advance would be more useful tool in predicting the resultant effects in selection of best genotypes for yield and its contributing traits. Therefore, present study was conducted to estimate the extant of genetic variability, heritability and genetic advance as per cent of mean of yield and yield component characters in rice.

The experimental material comprised of 72 genotypes including 52 hybrids, 17 parents (4 CMS B lines and 13 restorers) and three checks (*viz*., MTUHR 2089, MTU 1075 and MTU 1010) were transplanted in a randomized block design in two replications with spacing of 20x15 cm during *rabi* 2010-11 at Regional Agricultural Research Station, Warangal. Ten competitive plants from each genotype in each replication were selected at random to record data on characters *viz*., plant height, number of ear bearing tillers palnt^{-1}, panicle length, number of filled grains panicle^{-1}, spikelet fertility per cent and grain yield plant^{-1}, whereas data on days to 50% flowering and test weight were recorded on plot basis. The mean data was subjected to standard method of analysis of variance (Panse and Sukhatme,1978). Genotypic and phenotypic co-efficient of variation (Burton and Devane, 1953), heritability and genetic advance as per cent of mean (Johnson *et al.*, 1955) were estimated.

In the present study, analysis of variance of 72 genotypes revealed the existence of highly significant differences among the genotypes for all the characters studied (Table 1). The estimates of phenotypic coefficient of variance (PCV) were slightly higher than those of genotypic coefficient of variance (GCV) for all the characters studied indicated minimum environmental influence and greater role of genetic factors on the expression of traits (Table 2). High PCV and GCV values were exhibited by grain yield plant^{-1}(32.03 and 29.70) and number of filled grains panicle^{-1} (24.53 and 23.35). Similar findings were earlier reported by Prasad *et al*. (2009), Mohan Lal and Chauhan (2011), Siva Parvathi *et al.* (2011) and Shiva Prasad *et al*. (2011). PCV and GCV were moderate for number of ear bearing tillers palnt^{-1} (15.73 and 13.42), spikelet fertility (10.81 and 10.03) and test weight (12.65 and 12.23). Similar findings were given by Saidaiah *et al.* (2010) for spikelet fertility and Satish (2000) for test weight. Low PCV and GCV values were recorded for the traits *viz.,* days to 50% flowering (8.54 and 8.43), plant height (10.27 and 9.66) and panicle length (6.33 and 5.70). Satish Chandra *et al*. (2009), Kuchanur *et al*. (2009), Saidaiah *et al.* (2010), Siva Parvathi *et al.* (2011) and Shiva Prasad *et al*. (2011) were also reported low PCV and GCV for days to 50% flowering whereas, for panicle length similar results were obtained by Mamta Singh *et al*. (2007) and Prasad *et al.* (2009).

High heritability was exhibited by all the yield and yield component traits. Since high heritability does not always indicate high genetic gain, heritability with genetic advance should be used in predicting selection of superior genotypes. High estimates of heritability coupled with high genetic advance as per cent of mean was observed for number of ear bearing tillers palnt^{-1} (72.80 and

Table 1. Analysis of variance for yield and yield contributing characters in rice (*Oryza sativa* L.) during *rabi,* 2010-11

Source Of Variations	D.F.	Days To 50% Flowering	Plant Height (Cm)	No. Of ear bearomg tollers plant^{-1}	Panicle Length (cm)	No. of filled grains panicle^{-1}	Spikelet fertility (%)	Test weight (g)	Grain yield plant^{-1} (g)
				MSS					
Replications	1	0.17	0.42	0.05	0.15	50.65	4.06	0.24	2.18
Genotypes	71	157.83**	232.88**	4.36**	5.44**	8558.47**	139.85**	9.85**	220.74**
Error	71	2.10	14.24	0.69	0.57	421.50	10.45	0.33	16.68

* Significant At 5% Level ** Significant At 1% Level

Table 2. Estimates of genetic parameters for yield and yield component characters during *rabi,* 2010-11.

S. No.	Character	Mean	Range		PCV (%)	GCV (%)	Heritability (%)	Genetic Advance As Per Cent Of Mean (5% GAM)
			Minimum	Maximum				
1.	Days to 50% flowering	104.72	87.50	124.50	8.54	8.43	97.40	17.13
2.	Plant height (cm)	108.24	85.50	130.00	10.27	9.66	88.50	18.72
3.	No. of ear bearing tillers per plant	10.10	7.40	15.10	15.73	13.42	72.80	23.59
4.	Panicle length (cm)	27.37	24.32	32.02	6.33	5.70	81.20	10.59
5.	No. of filled grains panicle^{-1}	273.18	150.00	409.80	24.53	23.35	90.60	45.79
6.	Spikelet fertility (%)	80.16	39.87	89.90	10.81	10.03	86.10	19.18
7.	Test weight (g)	17.84	12.85	23.16	12.65	12.23	93.50	24.36
8.	Grain yield plant^{-1} (g)	34.02	12.00	59.40	32.03	29.07	86.00	56.71

PCV = Phenotypic Coefficient Of Variation GCV = Genotypic Coefficient Of Variation

23.59), number of filled grains panicle^{-1} (90.60 and 45.79), test weight (93.50 and 24.36) and grain yield plant^{-1} (86.00 and 56.71). These results indicate the preponderance of additive gene action and hence direct phenotypic selection may be useful with respect to these traits. Similar findings for grain yield plant^{-1} and number of filled grains panicle^{-1} were reported by Umadevi *et al.* (2010) and Siva Parvathi *et al.* (2011) and for test weight, Saidaiah *et al.* (2010), Mohan Lal and Chauhan (2011) and Shiva Prasad *et al*. (2011) also observed similar findings.

High heritability with moderate genetic advance as per cent of mean was recorded for the traits *viz.,* days to 50% flowering (97.40 and 17.13), plant height (88.50 and 18.72), panicle length (81.20 and 10.59) and spikelet fertility (86.10 and 19.18). These results were in accordance with previous reports of Mamta Singh *et al.,* 2007, Saidaih *et al.,* 2010 and Siva Parvathi *et al.,* 2011. Thus, the characters *viz.,* number of ear bearing tillers palnt^{-1}, number of filled grains panicle^{-1}, test weight and grain yield plant^{-1} which recorded moderate to high PCV, GCV heritability and genetic advance as per cent of mean could be transmitted to the progeny with hybridization and phenotypic based selection.

LITERATURE CITED

Burton G W and Devane E W 1953 Estimating heritability in tall fescue (*Festuca arundiraceae*) from replicated clonal material. *Agronomy Journal,* 45: 478-481.

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

Kuchanur P H, Naresh D and Vijayakumar A G 2009 Genetic variability and divergence in New Plant Type rice genotypes. *Crop Improvement,* 36 (1): 20-24.

Mamta Singh, Kumar K and Singh R P 2007 Study of coefficient of variation, heritability and genetic advance in hybrid rice. *Oryza,*. 44 (1): 160-162.

Mohan Lal and Chauhan D K 2011 Studies of genetic variability, heritability and genetic advance in relation to yield traits in rice. Agricultural Science Digest. 31 (3): 220-222.

Panse V G and Sukhatme P V 1978 Statistical Methods for Agricultural Workers. ICAR, New Delhi. 103-108.

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

Saidaiah P, Sudheer Kumar S and Ramesha M S 2010 Variability for yield and yield component attributes in rice. *Crop Research,*. 39 (1, 2 & 3): 91-93.

Satish B 2000 Heterosis and combining ability analysis for yield and grain quality characteristics in rice (*Oryza sativa* L.). M.Sc. (Ag) Thesis. Acharya N. G. Ranga Agricultural University, Hyderabad, India.

Satish Chandra B, Dayakar Reddy T and Sudheer Kumar S 2009 Variability parameters for yield, its components and quality traits in rice (*Oryza sativa* L.). Crop Research. 38: 144-146.

Shiva Prasad G, Sujatha M, Chaitanya U and Subba Rao L V 2011 Studies on variability, heritability, genetic advance, correlation and path analysis for quantitative characters in rice (*Oryza sativa* L.). *Journal of Research ANGRAU,* 39 (4): 104-109.

Siva Parvathi P, Satyanarayana Rao V, Lal Ahamed M and Anil Kumar P 2011 Variability, heritability and genetic advance for yield and grain quality charactes in rice. *The Andhra Agricultural Journal,* 58 (1): 116-118.

Umadevi M, Veerabadhiran P, Manonmani S and Shanmugasundaram P 2010 Physico-chemical and cooking characteristics of rice genotypes. *Electronic Journal of Plant Breeding,* 1 (2):114-123.

Department of Genetic and Plant Breeding
Agricultural College
Bapatla 522 101
Andhra Pradesh

P V Padmavathi
P V Satyanarayana
Lal Ahamed M
Y Ashoka Rani
V Srinivasa Rao

(Received on 23.06.2012 and revised on 26.12.2012)