Progressive Research – An International Journal
Vol. 4 (Special Issue) : 429-431 (2009), ISSN : 0973-6417

Society for Scientific Development in Agriculture and Technology, Meerut (U.P.) INDIA

CORRELATION AND PATH ANALYSIS IN HYBRID RICE (*ORYZA SATIVA* L.) GENOTYPES

Shanti Bhushan* and V.N. Sahai

Rice Section, Mithapur, Agricultural Research Institute (RAU, Pusa), Patna-800020

***Corresponding author** *(Shanti Bhushan)* **Email :** shantidixit@rediffmail.com

ABSTRACT

An experiment was laid out during *kharif* 2008 comprised, of 22 genotypes to study character interrelationship using correlation and path analysis. Correlation coefficient revealed that yield per plot expressed positive and significant correlation with number of fertile spikelet per panicle and spikelet fertility while it exhibited significant positive correlation with plant height at genotypic level although at phenotypic level it was positive but non-significant. The highest direct effect on plot yield was revealed by number of fertile spikelet per panicle followed by plant height, number of panicles per square meter and spikelet fertility (%).

Key words : *Rice, correlation, path analysis, genotype, plot yield.*

Rice the most important cereal crop in the world and is cultivated under diverse agro-ecosystems in India as well as in Bihar. Hybrid rice has tremendous potential in terms of yield to feed increasing human population by adding up high to the production figure in Bihar. Yield is complex character and is associated with number of component characters which are themselves interrelated, hence, direct selection for yield often misleads breeders. Character association of various component traits with yield and among themselves is, therefore, very important. The estimation of character association could identify the relative importance of independent character(s) that may be useful as indicator(s) for one or more characters. Path coefficient analysis partitions the genetic correlation between yield and its components into direct and indirect effects. The present study aimed at assessing association and path analysis between various components of grain yield to provide basis for selection and yield improvement in 22 genotypes of rice.

MATERIALS AND METHODS

The experimental material used in the present investigation comprised of 22 genotypes of rice coded as SLHRT-1 to SLHRT-17 and Savitri, Swarna, Salivahan, KRH-2 (national check) and Rajendra Mahsuri-1 as local check. The entire lines/varieties have been taken from Shallow Lowland Hybrid Rice Trial (SLHRT), *Kharif,* 2008 under All India Co-ordinated Rice Improvement Project (AICRIP) running at Agricultural Research Institute (ARI), Patna center. The 22 genotypes were grown in Randomized Block Design with three replications during *Kharif,* 2008-09 at the Research Farm, ARI, Patna. Each entry was represented by six rows of 4.5 meter row length. Spacing of 15 cm between plant-to-plant within the rows and 20 cm between rows was maintained. Recommended package of practices were followed to raise a healthy crop stand. Data were recorded on 5 randomly tagged plants per entry per replication for plant height, number of panicles per square meter, number of fertile spikelet per panicle, spikelet fertility (%), and plot yield (kg) and days to 50% flowering on plot basis. Correlation coefficients were calculated for all the character combinations at genotypic and phenotypic level by the formula given by Miller *et al.* (1958) while, path coefficient analysis was carried by Dewey and Lu (1959).

RESULTS AND DISCUSSION

In general, the genotypic correlation coefficients were higher in magnitude than the respective phenotypic correlation in general (Table-1) confirming the finding of Patil and Sahu (2009). This indicated phenotypic correlation might be due to masking effect of environment in genetic association between the characters (Johnson *et al.,* 1955). Yield per plot expressed positive and significant correlation with number of fertile spikelet per panicle and spikelet fertility while it exhibited significant positive correlation with plant height at genotypic level although at phenotypic level it was positive but non-significant. Sarawgi *et al.* (1997), and Rao and Shrivastava (1999) reported positive correlation of grain yield with fertile

Table-1 : Phenotypic and genotypic correlation coefficients for yield and its components in hybrid rice genotypes.

Characters	Correlation coefficient	Days to 50% flowering	Plant height (cm)	No. of panicles per sq. meter	No. of fertile spikelet per panicle	Spikelet fertility (%)
Plant height (cm)	Phenotypic	-0.03				
	Genotypic	-0.03				
No. of panicles per sq. meter	Phenotypic	-0.33**	-0.34**			
	Genotypic	-0.40**	-0.35**			
No. of fertile spikelet per panicle	Phenotypic	-0.07	0.17	0.12		
	Genotypic	-0.13	0.22	0.16		
Spikelet fertility (%)	Phenotypic	-0.28*	0.18	0.23	0.48**	
	Genotypic	-0.40**	0.23**	0.32**	0.61**	
Plot yield (Kg)	Phenotypic	-0.28*	0.21	0.20	0.37**	0.34**
	Genotypic	-0.39**	0.29*	0.23	0.44**	0.48**

* , ** Significant at 5% and 1% level of significance respectively.

Table-2 : Estimation of path coefficient based on genotypic coefficient correlation.

Characters	Days to 50% flowering	Plant height (cm)	No. of panicles per sq. meter	No. of fertile spikelet per panicle	Spikelet fertility (%)	Correlation with Plot yield
Days to 50% flowering	-0.24	-0.007	-0.05	-0.03	-0.05	-0.39**
Plant height (cm)	0.007	0.24	-0.05	0.06	0.03	0.29*
No. of panicles per sq. meter	0.10	-0.08	0.13	0.04	0.04	0.23
No. of fertile spikelet per panicle	0.03	0.05	0.02	0.26	0.08	0.44**
Spikelet fertility (%)	0.10	0.05	0.04	0.16	0.13	0.48**

Residual effect = 0.630

spikelets (filled grains) per panicle. Similarly, the correlation between plot yield and number of panicle per square meter was positive but non-significant at both the levels. Plot yield witnessed negative significant correlation with days to 50% flowering at genotypic and phenotypic level contradicting the finding of Shanthakumar *et al.* (1998) who reported positive significant association of grain yield per plant with days to 50 per cent flowering.

Path coefficient analysis was carried out at genotypic level considering the plot yield as dependent character and yield attributes as independent characters. Each component has two-path action viz., direct effect on plot yield and indirect effects through component characters, which were not revealed by correlation studies. The genotypic correlations were partitioned into direct and indirect effects on plot yield and the data is presented in Table-2. The highest direct effect on plot yield was revealed by number of fertile spikelet per panicle followed by plant height, number of panicles per square meter and spikelet fertility (%). Kumar *et al.* (1998) also reported positive direct effect of plant height on grain yield per plant. Days to 50 % flowering reported negative direct and indirect effect on plot yield. Plant height showed positive indirect effect by studied characters except number of panicles per square meter. Similarly number of fertile spikelet per panicle and spikelet fertility exhibited positive indirect effects with other traits resulting in significant positive correlation with plot yield. The above finding is in conformity with work of Sarawgi *et al.* (1997) and Prasad *et al. (*2001).who reported number of fertile spikelets (filled grains) per panicle had positive and significant correlation with grain yield per plant. Residual effect (0.630) indicated that the characters which were selected in this study were contributed to 37% to the yield. It is suggested that some other characters might have contribution in determining yield in the present study.

Thus, a conclusion can be drawn from association analysis; (correlation coefficient) that plant height, number of fertile spikelet per panicle and spikelet fertility showed positive and significant correlation with grain yield per plant at both genotypic and phenotypic

levels. Path coefficient analysis showed that grain yield per plant can be improved through direct selection of plant having height, number of fertile spikelet per panicle and spikelet fertility. Selection based primarily on these three characters will improve grain yield.

ACKNOWLEDGEMENT

We are thankful to Directorate of Rice Research (DRR), Hyderabad, India for providing the financial assistance and hybrid rice genotypes under All India Co-ordinated Rice Improvement Project (AICRIP) and Regional Director, ARI, Patna (Rajendra Agricultural University, Pusa, Bihar) for managing all the necessary inputs in time.

REFERENCES

1. Dewey, D.R. and Lu, K.H. (1959). A correlation and path coefficient analysis of components of crested wheatgrass seed Production. *Agron. J., 51:* 515 - 518.
2. Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimate of genetic and environmental variability in soybean. *Agron. J., 47:* 314-318.
3. Kumar, G.S., Mahadevappa, M. and Rudraradhya, M. (1998). Studies on genetic variability, correlation and path analysis in rice during winter across the locations. *Karanataka J. agric. Sci., 11(1):* 73-77.
4. Miller, D.A., Williams, J.C., Robinson, H.F. and Comstock, K.B. (1958). Estimates of genotypic and environmental variances and co-variances in upland cotton and their implication in selection. *Agron. J., 50 :* 126-131.
5. Patil, S. G. and Sahu, V N. (2009). Correlation and path analysis of rice germplasm accessions. *International Journal of Plant Sciences, 4(2) :* 426-428
6. Prasad, B., Patwary, A.K. and Biswas, P.S. (2001). Genetic variability and selection criteria in fine rice (*Oryza sativa* L.). *Pakistan Journal of Biological Sciences 4(10):*1188-1190.
7. Rao, S.S. and Shrivastava, M.N. (1999). Association among yield attributes in upland rice. *Oryza, 36 (1):* 13-15.
8. Sarawgi, A.K., Rastogi, N.K. and Soni, D.K. (1997). Correlation and path analysis in rice accessions from Madhya Pradesh. *Field Crop Res., 52 (112):* 161-167.
9. Shanthakumar, G., Madhevappa, M. and Rudraradhya. (1998). Studies on genetic variability, correlation and path analysis in rice *(Oryza sativa* L.) over seasons.*Karanatka J. agric. Sci., 11(1) :* 67-72.