

Correlation and path analysis of rice germplasm accessions

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SUMMARY

An experiment was conducted during *kharif* 2000 comprised, of 100 genotypes to study character interrelationship using correlation and path analysis. Correlation coefficient revealed that days to 50 per cent flowering, number of effective tillers per plant and number of filled grains per panicle showed positive significant correlation with grain yield per plant. Path analysis revealed that days to 50 per cent flowering, plant height, panicle length, number of effective tillers per plant, number of filled grains per panicle and 100 seed weight had direct positive effect on grain yield per plant.

Key words : Correlation, Grain yield, Path analysis, Rice

Yield is complex character and is associated with number of component characters which are themselves interrelated. Such interdependence often affects their relationship with yield, thereby making correlation coefficient ineffective to get the information on actual contribution of each character to yield. Thus, correlations in conjunction with path analysis could give a better insight into cause and effect relationship between different pairs of characters. This will help in the simultaneous improvement of characters along with grain yield in breeding programme. Therefore, the present study was undertaken to study the association of different characters of rice germplasm accession

MATERIALS AND METHODS

The present research work was conducted at Research Farm, Department of Plant Breeding and Genetics, Indira Gandhi Agricultural University, Raipur (Chhattisgarh) during *kharif* 2000. The experimental material for this study was comprised of 100 genotypes. Each genotype was grown in single row in each replication. Normal agronomic practices were followed throughout the crop period. Five plants from each row were randomly selected and were tagged for recording characters *viz.*, days to 50 per cent flowering, flag leaf length, plant height, panicle length, number of effective tillers per plant, number of filled grains per panicle, 100 seed weight and grain yield per plants. 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

The genotypic correlation coefficients were higher than phenotypic correlation in general (Table 1). This indicated phenotypic correlation might be due to masking effect of environment in genetic association between the characters (Johnson *et al.*, 1955).

Grain yield per plant expressed positive significant correlation association with days to 50 per cent flowering, number of effective tillers per plant and number of fertile grains per panicle at both genotypic and phenotypic levels. Similar results have been reported by Choudhary and Das (1998), Shanthakumar *et al.* (1998a) who reported positive significant association of grain yield per plant with days to 50 per cent flowering. Sarawgi *et al.* (1997), and Rao and Shrivastava (1999) reported positive correlation of grain yield with fertile spikelets (filled grains) per panicle.

Days to 50 per cent flowering had positive significant correlation with number of filled grains per panicle and grain yield per plant at phenotypic and genotypic levels. It also expressed negative significant correlation with plant height, panicle length and 100 grain weight at phenotypic and genotypic levels. The correlation of this trait suggests that if genotypes with late maturity are selected then number of filled grains per panicle will be increased as these have shown high positive correlation association with this trait. Similar result was obtained by Shanthakumar *et al.* (1998a) for days to 50 per cent flowering, who observed significant correlation with yield per plant in wet season.

Flag leaf length showed positive significant

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Table 1 : Correlation co-efficient analysis of yield and yield attributing characters at phenotypic (P) and genotypic (G) levels

Characters	Characters							
		Flag leaf length	Plant height	Panicle length	No. of effective tillers per plant	No. of filled grains per panicle	100 seed weight	Yield per plant
Days to 50% flowering	P	-0.1191	-0.37**	-0.239*	0.097	0.459**	-0.289**	0.0302**
	G	-0.194*	-0.387**	-0.313*	0.102	0.496**	-0.374**	0.306**
Flag leaf length	P		0.181	0.271*	-0.082	0.194*	-0.185	-0.030
	G		0.260**	0.196*	-0.106	0.292**	-0.322	-0.043
Plant height	P			0.525**	-0.097	-0.086	0.338**	0.038
	G			0.718**	-0.100	-0.086	0.405**	0.039
Panicle length	P				-0.174	-0.074	0.197*	0.014
	G				-0.235*	-0.103	0.289**	0.018
No. of effective tiller per plant	P					-0.132	-0.137	0.693**
	G					-0.134	-0.172	0.648**
No. of filled grains per panicle	P						-0.296**	0.213*
	G						-0.332**	0.213*
100 seed weight	P							0.026
	G							0.032

* and ** indicates significance of values at P=0.05 and 0.01 is r=0.05, 98=0.194 and 0.01, 98=0.254, respectively

association with panicle length at phenotypic and genotypic levels. Similar result for flag leaf length was positively significantly correlated with panicle length (Shanthakumar *et al.*, 1998a; Shanthakumar *et al.*, 1998b and Sarawgi *et al.*, 1997). Plant height had positive significant correlation with panicle length and 100 grain weight at phenotypic and genotypic levels. The present finding is in agreement with Shanthakumar *et al.* (1998 a).

Panicle length showed positive significant correlation association with 100 grain weight at genotypic level. The present finding suggests that any increase in panicle length is likely to show increase in 100 grain weight and increase in number of effective tillers per plant and is likely to reduce in panicle length. Similar results was obtained for panicle length with 100 grain weight at genotypic level by Sarawgi *et al.* (1997). Number of effective tillers per plants showed positive correlation with grain yield per plant

at phenotypic and genotypic level.

Number of filled grains per panicle expressed positive correlation with grain yield per plant at phenotypic and genotypic levels. The present investigation is in conformity with Sarawgi *et al.* (1997) who reported number of fertile spike lets (filled grains) per panicle positively associated with grain yield per plant.

The merge residual effect in path coefficient indicated the importance of all yield contributing characters in deciding the yield (Table 2).

Days to 50 per cent flowering showed low positive direct effect on grain yield per plant and showed significant positive correlation of this trait. This finding is in conformity with work of Shanthakumar *et al.* (1998a). Flag leaf length showed negative and non significant correlation with grain yield per plant. This correlation was mainly due to negative direct effect of this trait and also indirect negative effect

Table 2 : Path coefficient analysis of direct and indirect of yield attributing characters on yield

Characters	Characters							
	Days to 50% flowering	Flag leaf length	Plant height	Panicle length	No. of effective tillers per plant	No. of filled grains per panicle	100 seed weight	Yield per plant
Days to 50% flowering	0.146	-0.021	-0.039	-0.004	0.068	0.160	-0.084	0.306**
Flag leaf length	0.012	-0.246	0.026	0.002	-0.070	0.099	-0.072	0.043
Plant height	-0.056	-0.064	0.100	0.009	-0.067	-0.029	0.091	0.039
Panicle length	-0.046	-0.048	0.072	0.013	-0.147	-0.035	0.065	0.018
No. of effective tillers per plant	0.015	0.026	-0.010	-0.003	0.666	-0.045	-0.039	0.648**
No. of filled grains per panicle	0.068	-0.072	-0.009	-0.001	-0.089	0.340	-0.075	0.213*
100 seed weight	-0.055	0.079	0.040	0.004	-0.114	0.113	0.225	0.019

* and ** indicates significance of values at P=0.05 and 0.01, respectively

via 100 grain weight, number of effective tillers per plant. The present finding is in conformity with result of Shanthakumar *et al.* (1998b) who reported flag leaf length had negative direct effect on grain yield per plant.

Plant height showed positive direct effect on grain yield per plant, but it had non significant positive correlation with grain yield per plant and also indirect positive effect via 100 grain weight. This result is in conformity with result obtained by Kumar *et al.* (1998).

Number of effective tillers per plant showed positive direct effect on grain yield per plant and had positive significant correlation with grain yield per plant. Number of filled grains per plant showed high positive direct effect on yield and its significant correlation with grain yield per plant. This was due to high positive indirect effect via days to 50 per cent flowering. The above finding is in conformity with work of Sarawgi *et al.* (1997) who

reported number of fertile spikelets (filled grains) per panicle had positive and significant correlation with grain yield per plant. 100 grain weight showed direct effect on grain yield per plant and had positive but non significant correlation with grain yield per plant.

Thus, a conclusion can be drawn from Association analysis; (correlation coefficient) that days to 50 per cent flowering, number of effective tillers per plant and number of filled grains per panicle 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 high number of effective tillers per plant, number of filled grains per panicle and 100 grain weight. Selection based primarily on these three characters will improve grain yield.

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