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Correlation and path analysis of yield and yield attributes in local rice cultivars (*Oryza sativa* L.)

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The associations among the yield components and direct and indirect influence of yield components on the grain yield of local rice were investigated at Agricultural college farm, Navile, Shimoga. The experiment was laid out in a 10 x 10 Simple Lattice Design with two replications which consisted of 100 local genotypes during *Kharif* 2010. The correlation analysis indicated that grain yield was significantly associated with panicle length, test weight, number of tiller per plant, number of productive tiller per plant, number of spikelet per panicle, per cent spikelet fertility and amylase per cent. Path co-efficient analysis revealed that days to 50 per cent flowering, plant height, panicle length, panicle number, number of productive tiller per plant, per cent spikelet fertility and amylase per cent had positive direct effect on grain yield. Hence, selection on these traits could be suggested to bring simultaneous improvement of yield and yield attributes.

Key words : Correlation, Path analysis, Rice, Yield

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INTRODUCTION

Grain yield and quality are complex characters and are associated with number of component characters which are themselves interrelated. Such independence often affects their relationship with yield, thereby making correlation ineffective. So, there is a need to path analysis is that it permits the partitioning of the correlation co-efficient into its components, one component being the path co-efficient that measures the direct effect of a predictor variable upon its response variable; the second component being the indirect effect(s) of a predictor variable on the response variable through another predictor variable (Dewey and Lu, 1959). Partition the correlation into direct and indirect effects to get the information on actual contribution of each character to yield. Therefore, the present investigation was undertaken to study the association and interrelationships of different yield and quality attributes in the selected lines of rice.

RESEARCH METHODOLOGY

The experimental material consisted of 100 diverse local genotypes of rice, which were grown at Agricultural college farm, Navile, Shimoga, in *Kharif* season 2010, in a 10 x 10 Simple Lattice Design with two replications Thirty days old seedlings were transplanted at the rate of one seedling per hill with a spacing of 30 x 20 cm. Recommended package of practices were followed to raise the crop. Observations were recorded on 13 yield and its attribute characters *viz.*, days to 50 per cent flowering, days to maturity, plant height, panicle length, panicle number, test weight, number of tillers per plant, number of productive tillers per plant, number of spikelet per panicle, per cent of spikelet fertility, protein per cent, amylase per cent and grain yield per plant. The genotypic and phenotypic correlations were determined as per Johnson *et al.* (1955). Path co-efficient analysis was done as suggested by Wright (1921) and as described by Dewey and Lu (1959).

RESEARCH FINDINGS AND ANALYSIS

The data in respect of correlation co-efficient analysis between important characters, both phenotypic and genotypic are presented in Table 1. In general, the genotypic correlation co-efficients were higher than phenotypic correlation co-efficients and this is due to the masking effect of environment in genetic association between the characters (Johnson *et*

al., 1955). The correlation of yield and yield contributing characters indicated that grain yield per plant was significantly associated with panicle length, test weight, number of tiller per plant, number of productive tiller per plant, number of spikelet per panicle, per cent spikelet fertility and amylase per cent. Eradasappa *et al*. (2007) reported similar findings for plant height, productive tillers per plant, panicle length, number of filled grains per panicle; Siva Kumar and Kannan Bapu (2005) for total number of tillers per plant, panicle length. It is desirable to select genotypes with more productive tillers

Table 1: Estimates of genotypic (above diagonal) and phenotypic (below diagonal) correlation coefficients for 13 characters in local rice genotypes

Traits	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
X_1	1.000	0.001	0.441**	0.110*	-1.111	-0.171	0.115*	-0.003	0.102*	0.075	0.057	0.125*	0.073
X_2	0.000**	1.000	0.443**	0.109*	-1.103	-0.172	0.118*	-0.002	0.103*	0.075	0.059	0.125*	0.075
X_3	0.105*	0.105*	1.000	0.172**	0.861**	-0.006	-0.092	-0.318	0.231**	0.017	0.001	-0.067	-0.019
X_4	0.066	0.066	0.074	1.000	0.401**	-0.006	0.038	0.517**	0.113*	-0.306	-0.081	0.159**	0.422**
X_5	-0.196	-0.195	-0.010	0.030	1.000	-1.071	-0.225	0.697**	-1.062	0.312**	-0.333	-0.555	-0.555
X_6	-0.115	-0.115	0.014	-0.069	-0.048	1.000	0.051	0.443**	-0.076	0.130*	0.036	0.014	0.116*
X_7	0.090	0.091	0.038	0.129*	-0.042	0.030	1.000	0.792**	0.171**	-0.083	0.111*	-0.039	0.124*
X_8	-0.053	-0.053	0.069	0.062	-0.015	0.170**	0.641**	1.000	0.273**	-0.006	-0.138	0.098	0.409**
X_9	0.088	0.089	0.154**	0.080	0.103*	-0.072	0.129*	0.129*	1.000	0.002	-0.079	0.101*	0.163**
X_{10}	0.040	0.039	0.034	-0.120	-0.082	0.110*	-0.016	0.001	0.003	1.000	-0.164	0.097	0.206**
X_{11}	0.056	0.057	-0.000	-0.043	-0.008	0.029	0.071	-0.066	-0.080	-0.165	1.000	0.098	-0.229
X_{12}	0.089	0.089	-0.041	0.094	-0.038	0.015	-0.021	0.046	0.097	0.095	0.098	1.000	0.168**
X_{13}	0.076	0.077	-0.032	0.018	0.036	0.076	0.053	0.208**	0.116*	0.155**	-0.171	0.117*	1.000

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

where,

X_1 - Days to 50 per cent flowering
X_2 - Days to maturity
X_3 - Plant height
X_4 - Panicle length(cm)
X_5 - Panicle number
X_6 - Test weight (g)
X_7 - No. of tiller per plant
X_8 - No. of productive tiller per plant
X_9 - No. of spikelet per panicle
X_{10} - per cent of spikelet fertility
X_{11} - protein %
X_{12} - Amylose%
X_{13} - Grain yield (g)

Table 2: Estimates of direct and indirect effects of yield components on grain yield at genotypic level in local rice cultivars

Traits	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
X_1	12.567	-12.337	0.002	0.005	-0.145	0.010	-0.043	-0.002	-0.011	0.022	-0.004	0.009	0.073
X_2	12.568	-12.337	0.002	0.005	-0.144	0.011	-0.044	-0.002	-0.011	0.022	-0.005	0.009	0.075
X_3	5.541	-5.459	0.005	0.008	0.112	0.000	0.034	0.237	-0.024	0.005	-0.000	-0.005	-0.019
X_4	5.541	-1.350	0.001	0.049	0.052	0.008	-0.014	0.385	-0.012	-0.090	0.006	0.012	0.422**
X_5	-13.964	13.611	0.004	0.020	0.131	0.065	0.084	-0.070	-0.073	-0.314	-0.024	-0.024	-0.555
X_6	-2.154	2.122	-0.000	-0.006	-0.140	-0.061	-0.019	0.329	0.008	0.038	-0.003	0.001	0.116*
X_7	1.450	-1.456	-0.000	0.002	-0.029	-0.003	-0.374	0.589	-0.018	-0.025	-0.009	-0.003	0.124*
X_8	-0.039	0.029	0.001	0.025	-0.012	-0.027	-0.297	0.744	-0.028	-0.002	0.011	0.007	0.409**
X_9	1.281	-1.269	-0.001	0.006	0.091	0.005	-0.064	0.203	-0.104	0.001	0.006	0.007	0.163**
X_{10}	0.946	-0.920	-0.000	-0.015	-0.139	-0.008	0.031	-0.004	-0.000	0.295	0.013	0.007	0.206**
X_{11}	0.716	-0.725	-0.000	-0.004	0.041	-0.002	-0.042	-0.103	0.008	-0.048	-0.077	0.007	-0.229
X_{12}	1.574	-1.540	-0.000	0.008	-0.043	-0.001	0.015	0.073	-0.011	0.029	-0.008	0.072	0.168**
X_{13}	12.567	-12.337	0.002	0.005	-0.145	0.010	-0.043	-0.002	-0.011	0.022	-0.004	0.009	0.073

Residual effect= 0.087

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

where,

X_1 - Days to 50 per cent flowering
X_2 - Days to maturity
X_3 - Plant height
X_4 - Panicle length(cm)
X_5 - Panicle number
X_6 - Test weight (g)
X_7 - No. of tiller per plant
X_8 - No. of productive tiller per plant
X_9 - No. of spikelet per panicle
X_{10} - per cent of spikelet fertility
X_{11} - protein %
X_{12} - Amylose%
X_{13} - Grain yield (g)

per plant with more panicle length and per cent spikelet fertility coupled with optimum amylase content to develop high yielding quality rice.

Path co-efficient analysis (Table 2) revealed that days to 50 per cent flowering, plant height, panicle length, panicle number, number of productive tiller per plant, per cent spikelet fertility and amylase per cent exhibited high positive direct effect and significant positive association with grain yield. Similar findings were reported by Siva Kumar and Kannan Bapu (2005) for total number of tillers per plant; Panwar and Mashiat Ali (2007) for number of productive tillers per plant and Panwar (2006) for number of filled grains per panicle. Among all these seven characters days to 50 per cent flowering exhibited highest direct effect on grain yield followed by number of productive tiller per plant, panicle number, panicle length. This indicates that, if other factors are held constant, an increase in days to 50 per cent flowering individually will reflect in an increased yield. Even number of spikelet per panicle had positive significant correlation with grain yield its direct effect on grain yield was negative. It is due to the maximum indirect effect of days to 50 per cent flowering which is nullifying its negative direct effect on grain yield. Hence, for improvement of this trait selection efforts would be more effective via days to 50 per cent flowering instead of selection based on number of spikelet per panicle alone. The residual effect (0.0854) was very low, indicating that much of the variation in yield has been accounted by the characters studied and that the choice of characters was appropriate.

It could be suggested that more emphasis should be given on days to 50 per cent flowering, plant height, panicle length, panicle number, number of productive tiller per plant, per cent spikelet fertility and amylase per cent to bring simultaneous improvement of yield and it's attributes among these 100 local rice genotypes as they showed high correlation in addition to maximum direct effects on yield.

LITERATURE CITED

Dewey, D.R. and Lu, K.H. (1959). A correlation and path co-efficient analysis of components of crested wheat grass seed production. *Agron. J.*, **51**(9):515-518.

Eradasappa, E., Nadarajan, N., Ganapathy, K. N., Shanthala, J and Satish, R.G. (2007). Correlation and path analysis for yield and its attributing traits in rice (*Oryza sativa* L.). *Crop Res.*, **34**(1,2,3): 156-159.

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

Panwar, L.L. (2006). Character association and path analysis in rice (*Oryza sativa* L.). *Ann. agric. Res. New series*, **27**(3): 257-260.

Panwar, L.L. and Mashiat, Ali (2007). Correlation and path analysis of yield and yield components in transplanted rice. *Oryza*, **44**(2): 115-120.

Siva Kumar, P. and Kannan Bapu, J.R. (2005). Character association in inter sub-specific rice hybrids involving wide compatible gene. *Crop Res.*, **30**(2):208-210.

Wright, S. (1921). Correlation and causation. *J. agric. Res.*, **20**: 557-585.