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Correlation Coefficient Analysis for Yield and its Components in Rice (*Oryza sativa* L.) Genotypes

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A B S T R A C T

Seventy genotypes of rice (*Oryza sativa* L.) were evaluated during *Kharif* 2014 to study the nature and extent of correlation among yield and yield attributing characters, number of tillers per plant, number of effective tillers per plant, plant height, panicle length, number of filled grains per panicle, 1000-grain weight, days to 50 per cent flowering, days to maturity, grain yield per plant. Character association studies revealed that the characters grain yield per plant showed significant positive association with plant height, number of tillers per plant, number of productive tillers per plant, number of filled grains per panicle and 1000 grain weight. This indicated that simultaneous selection of all these characters was important for yield improvement.

Introduction

To break the yield barriers in rice breeding strategies, attempts are being made. Crop yield is the end product of the interaction of a number of other interrelated attributes. A thorough understanding of the interaction of characters among themselves had been of great use in plant breeding. The efficiency of selection for yield mainly depends on the direction and magnitude of association between yield and its component characters and also among themselves. Character association provides information on the nature and extent of association between pairs of metric traits and helps in selection for the improvement of the character.

For the improvement of grain yield, the knowledge on the association between grain yield and its component characters will be helpful.

The present study was, therefore, undertaken to understand the association among grain yield and its component characters. Phenotypic and genotypic correlations were worked out on yield and yield contributing characters in 70 genotypes. In general, genotypic correlations were found to be higher than phenotypic correlations, which indicate that though there is strong inherent association between characters studies, its

expression is lessened due to influence of environment and considering the importance of phenotypic correlation

Materials and Methods

The present study comprised of 70 genetically diverse genotypes of rice (*Oryza sativa* L.) procured from different sources. The experiment was carried out at IIRR farm, ICRISAT campus, Patancheru, Hyderabad during *kharif* 2014. The experimental trial was laid out in Randomized Complete Block design with three replications under irrigated conditions. Each plot comprised of two 6 rows of 6 meter length spaced 30 cm apart with plant to plant spacing of 20 cm. Data on the basis of 5 randomly taken competitive plants excluding borders were recorded on grain yield per plant (g), plant height (cm), total number of tillers, number of effective tillers per plant, panicle length (cm), number of filled grains per panicle, 1000-grain weight (g) were recorded as individual plant basis while days to 50 per cent flowering and days to maturity were recorded on plot basis. The analysis was done as per Panse and Sukhatme (1985).

Results and Discussion

The days to 50 per cent flowering recorded a non-significant negative phenotypic correlation with grain yield per plant (-0.1170), plant height (-0.0685), number of filled grains per panicle (-0.0112), 1000 grain weight (-0.0871) and positive and significant correlation with panicle length (0.2103), Days to maturity (0.8365). The characters, number of tillers per plant (-0.1360), number of productive tillers per plant (-0.1408) showed negative and significant correlation association. The similar results were reported by Meenakshi *et al.,* (1999), Nagaraju *et al.,* (2013) for grain yield per plant. Nandhan *et al.,* (2010) for 1000 grain weight, plant height

and Days to maturity, Meenakshi *et al.,* (1999) for number of filled grains per panicle, Ravindra Babu *et al.,* (2012) for number of productive tillers per plant.

The plant height registered a significant positive phenotypic correlation with grain yield per plant (0.4117), number of tillers per plant (0.2973), panicle length (0.2708), number of productive tillers per plant (0.2749) and number of filled grains per panicle (0.4364) where as it is negative and significant correlation with days to maturity (0.2146) and it had negative non-significant correlation with 1000 grain weight (g) (-0.0573). The present results are in agreement with the results reported by Satish Chandra *et al.,* (2009), Rahman *et al.,* (2014) for number of productive tillers per plant, Satish Chandra *et al.,* (2009), Ravindra Babu *et al.,* (2012), Reddy *et al.,* (2013), Rao *et al.,* (2014) for panicle length, number of filled grains per panicle and 1000 grain weight, Mohanty *et al.,* (2012), Reddy *et al.,* (2013), Patel *et al.,* (2014) for grain yield per plant. Meenakshi *et al.,* (1999) for 1000 grain weight (g), days to maturity.

Number of tillers per plant exhibited significant positive phenotypic correlation with grain yield per plant (0.6214) and number of productive tillers per plant (0.9738). The character number of filled grains per panicle (-0.1930), panicle length (-0.2340), days to maturity (-0.2373), 1000 grain weight (-0.0619) showed negative non-significant correlation. Idris *et al.,* (2013) reported similar results for grain yield per plant.

Number of productive tillers per plant exhibited significant positive phenotypic correlation with grain yield per plant (0.6215) and number of filled grains per panicle (0.1655). It had significant negative correlation with panicle length (-0.2201),

1000 grain weight (-0.2305). The character days to maturity showed negative and non-significant correlation (-0.0248). The earlier results reported by Satish Chandra *et al.,* (2009), Ravindra Babu *et al.,* (2012), Nagaraju *et al.,* (2013), Patel *et al.,* (2014) for grain yield per plant Ravindra Babu *et al.,* (2012), Rahman *et al.,* (2014) for panicle length Padmaja *et al.,*(2011), Rahman *et al.,* (2014) for 1000 grain weight and Reddy *et al.,* (2013), for days to maturity were in agreement to the present results.

Panicle length registered significant negative phenotypic correlation with grain yield per plant (-0.2091) and positive significant correlation with days to maturity (0.1755). It had negative non-significant correlation with number of filled grains per panicle (-0.0499) and 1000 grain weight (-0.1294). The similar results were reported by Rao *et al.,* (2014) for number of filled grains per panicle, Vange *et al.,* (1999) for 1000 grain weight, Basavaraj *et al.,*(2011) for grain yield per plant.

Number of filled grains per panicle exhibited a significant positive phenotypic correlation with grain yield per plant (0.6056) where as negative and significant correlation with 1000 grain weight (-0.0707) and negative and non-significant correlation with days to maturity (-0.0913). Nayak *et al.,* (2001) for 1000 grain weight, Reddy *et al.,* (2013), Patel *et al.,* (2014) for grain yield per plant and for days to maturity reported similar results.

1000 grain weight showed a significant positive phenotypic correlation with grain yield per plant (0.4011). Similar results were reported by Satish Chandra *et al.,* (2009), Basavaraja *et al.,* (2011), Patel *et al.,* (2014), Rao *et al.,* (2014) for grain yield per plant. Days to maturity showed significant negative phenotypic correlations with grain yield per plant (-0.1937) and 1000 grain weight had

negative and non-significantly correlated (-0.0253). The results were reported by Nandan *et al.,* (2010) for grain yield per plant were in coincidence to the present results.

Phenotypic correlations revealed that grain yield per plant had significant positive association with Plant height (0.4117), number of tillers per plant (0.6214), number of productive tillers per plant (0.6215), number of filled grains per panicle (0.6056), 1000 grain weight (0.4011). The trait recorded a significant negative association with days to maturity (-0.1937), panicle length (-0.2091) and the character days to fifty per cent flowering showed negative non-significant with grain yield per plant (Table 1).

Grain yield per plant showed positive significant association with plant height, number of tillers per plant, number of productive tillers per plant, number of filled grains per panicle.

This indicated that all these characters were important for yield improvement. Similar kind of association was revealed by Mohanty *et al.,* (2012), Reddy *et al.,* (2013), Patel *et al.,* (2014) for plant height, Ravindra Babu *et al.,*(2012), Nagaraju *et al.,* (2013), Patel *et al.,* (2014) and Rao *et al.,* (2014) number of productive tillers per plant, Padmaja *et al.,* (2011), Reddy *et al.,* (2013) and Patel *et al.,* (2014) for number of filled grains per panicle. Hence, these characters could be considered as criteria for selection for higher yield as these were mutually and directly associated with grain yield.

The character 1000 grain weight also positively associated with grain yield per plant it indicates that these characters can be considered for selection for higher yield.

Table.1 Phenotypic (P) correlation coefficient analysis of yield and yield contributing characters in rice

Character	Days to 50% Flowering	Plant height (cm)	No. of tillers/ plant	No of prod. tillers / Plant	Panicle length (cm)	No. of filled grains/ panicle	Days to maturity	1000 Grain weight (g)	Grain yield/ Plant (g)
Days to 50%	**1.0000**	-0.0685	-0.1360*	-0.1408*	0.2103**	-0.0112	0.8365**	-0.0871	**-0.1170**
Plant height (cm)		**1.0000**	0.2973**	0.2749**	0.2708**	0.4364**	-0.2146**	-0.0573	**0.4117****
Number of tillers / plant			**1.0000**	0.9738**	-0.2340**	-0.1930**	-0.2373**	-0.0619*	**0.6214****
Number of prod. tillers / plant				**1.0000**	-0.2201**	0.1655*	-0.0248	-0.2305**	**0.6215****
Panicle Length (cm)					**1.0000**	-0.0499	0.1755*	-0.1294	**-0.2091****
Number of filled grains/panicle						**1.0000**	-0.0913	-0.0707**	**0.6056****
Days to maturity							**1.0000**	-0.0253	**-0.1937****
1000 Grain weight (g)								**1.0000**	**0.4011****

In conclusion, character association studies revealed that the characters grain yield per plant showed significant positive association with plant height, number of tillers per plant, number of productive tillers per plant, number of filled grains per panicle and 1000 grain weight. This indicated that simultaneous selection of all these characters was important for yield improvement.

A critical analysis of correlation indicated that emphasis should be directed towards selection of parents having higher number of productive tillers per plant coupled with higher number of filled grains per panicle, 1000 grain weight, plant height and panicle length also. As the yield component, filled grains per panicle are intern dependent on panicle length and plant height, attention should be paid towards increasing the panicle length, maintaining optimum plant height. Thus, a plant with medium height, sturdy culm with increased panicle length, higher number of filled grains per panicle and productive tillers per plant would be more desirable for selection to realize higher yield.

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