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

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ABSTRACT

The present study was undertaken with the objective to determine the degree of association between yield and it`s component characters in rice (Oryza sativaL.). Forty F_1 crosses of rice were evaluated during Kharif 2015 to study the nature and extent of correlation among yield and yield attributing characters, days to 50 per cent flowering, days to maturity, plant height, number of total tillers per plant, number of productive tillers per plant, panicle length, number of filled grains per panicle, spikelet fertility, biomass, harvest index, 1000-grain weight, grain yield per plant. The results revealed that grain yield per plant to be positively and significantly associated with days to maturity, number of productive tillers per plant, plant height and kernel length indicating importance of these traits as selection criteria in yield improvement programmes.

Key words: *Rice (Oryza sativa L.), Yield components and Correlation.*

INTRODUCTION

Rice (*Oryza sativa* L.) is the prime food crop in the world. In India about 65 per cent of the population has rice as major constituent in the diet. Mainly because of a still growing population demand for rice is expected to keep increasing in the coming decades. Rice contributes the 43% of total food grain production and 46% of total cereal production. India stands first in area and second in production. India is a major rice growing country of the world with an area 43.97 m ha, production 104.32 million tones and productivity of 2.4 t/ha.

Association of plant characters, determined by correlation coefficient, is useful as the basis of selecting the desirable plant. This permits evaluation of relative influence of various characters on grain yield. The studies on correlation values indicated the intensity and direction of character association in a crop. Hence, the knowledge on inter relationship of plant characters with seed yield and among themselves is of importance to the breeder for making importance in complex characters like grain yield, for which direct selection is not much effective.

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Hence, the association analysis was undertaken to determine the direction of selection and number of characters to be considered in improving the seed yield.

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. The study revealed that genetic improvement of grain yield in rice is admissible by selecting characters having high position correlation and positive direct effect.

MATERIAL AND METHODS

The study was carried out at Indian Institute of Rice Research, Rajendranagar, Hyderabad. The experimental material consisted of four lines (IR 68897 A, IR 79156 A,
APMS 6A and PUSA 5A) were crossed with eight testers (AR-9-21, AR-19-18, AR-7-75, AR-19-42, AR-7-65, TCP-650, TCP-657, TCP-661, TCP-585, TCP-643) during *Rabi* 2013-2014. All the 40 hybrids along with parents of four lines and ten testers were sown during*Kharif*2015. The experiment was laid out in Randomized Block Design (RBD) with two replications and 54 treatments (40 hybrids and 14 parents). Normal agronomical practices and plant protection measures with external inputs such as supplementary irrigation and fertilizers were given at appropriate time.Simple correlation coefficients (r) for grain yield and its components were calculated involving both hybrids and varieties by using the method given by Johnson *et al*.[6].

RESULTS AND DISCUSSION

The simple correlation coefficients were estimated among the twelve characters were depicted in Table 1. The characters *viz.,* days to 50 % flowering and days to maturity expressed significant positive association with plant height while it showed negative significant association with number of total tillers per plant, panicle length, spikelet fertility, harvest index and 1000 grain weight. Similar kind of results reported by Hasan *et al.*[5]; for spikelet fertility, Priyanka *et al*.[12]; for harvest index and Sakthivel[16]; Bhadru *et al.*[2] and Parimala[10]; for 1000-seed weight. Increased flowering duration resulted in increase of panicle length and number of filled grains per panicle, which intern helped to realize higher grain yield per plant.

Positive and significant correlation was observed for plant height with days to 50 per cent flowering and days to maturity. MadhaviLatha[7]; Ravindra Babu *et al.*[14] and Patel *et al.*[11]; reported a positive correlation between plant height and days to 50 per cent flowering and days to maturity.

It was observed that number of total tillers per plant exhibited significant positive association with number of productive tillers per plant, harvest index, 1000-seed weight and grain yield per plant. Golam *et al.*[3]; reported a strong association between total tillers per plant and productive tillers per plant.

It was observed that number of productive tillers per plant exhibited significant positive association with panicle length, number of filled grains per panicle, spikeletfertility, biomass, harvest index, 1000 grain weight and grain yield per plant. Parimala[10]; reported a strong association between productive tillers per plant and grain yield per plant.

Panicle length showed significant positive correlation with number of filled grains per panicle, spikelet fertility (%), biomass, harvest index, 1000 grain weight and grain yield per plant. Earlier researchers, Patel *et al.*[11]; for biomass, Ramanjaneyulu *et al*[13]; for harvest index reported similar results.

The trait number of filled grains per panicle is considered as an important component for realizing high yield, because it exhibited significant and positive association with number of productive tillers per plant, panicle length, spikelet fertility, 1000 grain weight and seed yield per plant. Similar results were also reported by Gopikannan and Ganesh[4].

The trait, spikelet fertility (%) was found to possess positive and significant association with number of productive tillers per plant, panicle length, number of filled grains per panicle, harvest index, 1000 grain

weight and grain yield per plant. Anis *et al.*[1]; reported similar results for spikelet fertility.

The trait, biomass was found to possess positive and significant association with number of productive tillers per plant, panicle length and grain yield per plant. Ramanjaneyulu *et al.*[13]; reported similar results for spikelet biomass.

The trait, harvest index was found to possess positive and significant association with number of productive tillers per plant, panicle length, spikelet fertility, 1000 grain weight and grain yield per plant. Ramanjaneyulu *et al.*[13]; reported similar results for harvest index.

The grain yield per plant had significant positive association with no. of total tillers per plant, no. of productive tillers per plant, panicle length, no. of filled grains per panicle, spikelet fertility, biomass per plant, harvest index and 100-seed weight (gm). Similar kind of observation were reported by Golan *et al.*[3]; for total number of tillers and productive tillers, Priyanka *et al.*[12]; for panicle length, Naseer *et al.*[9]; for spikelet fertility, Patel *et al.*[11] and Ramanjaneyulu *et al.*[13]; for biomass per plant, Ramanjaneyulu *et al.*[13]; and Priyanka *et al.* [11]; for harvest index and Roy *et al*.[15]; and Mishu *et al*.[8]; for 1000-seed weight. Hence, these traits could be considered as criteria for selection for higher yield as they were mostly inter related positively in addition to a positive association with grain yield.

From the study it was concluded that there is change in the association between different yield components, number of total tillers per plant, number of productive tillers per plant, panicle length, number of filled grains per panicle, spikelet fertility and 1000 grain weight are very crucial for higher yields, as they exhibited significant positive correlation with grain yield per plant.

Table 1: Simple correlation coefficients for grain yield and yield components

Characters	Days to 50% flowering	Days to maturity	Plant height	No. of total tillers per plant	No. of productive tillers per plant	Panicle length	No. of filled grains per panicle	Spikelet fertility	Biomass	Harvest index	100-seed weight	Correlation with Seed yield per plant (g)
Days to 50% flowering	1.000	0.999**	0.399**	-0.325*	-0.457	-0.486**	-0.239	-0.4516**	-0.141	-0.357**	-0.301*	**-0.355****
Days to maturity		1.000	0.403**	-0.323*	-0.457	-0.495**	-0.241	-0.447**	-0.146	-0.359**	-0.298*	**-0.358****
Plant height			1.000	-0.043	-0.204	-0.207	-0.2645*	-0.209	0.075	0.075	-0.270*	**-0.055**
No. of total tillers per plant				1.000	0.783**	0.037	0.233	0.258	0.207	0.289*	0.327*	**0.445****
No. of productive tillers per plant					1.000	0.276*	0.446**	0.450**	0.277*	0.280*	0.517**	**0.607****
Panicle length						1.000	0.497**	0.468**	0.401**	0.323*	0.216	**0.549****
No. of filled grains per panicle							1.000	0.632**	0.224	0.185	0.375**	**0.475****
Spikelet fertility								1.000	0.133	0.331*	0.458**	**0.415****
Biomass per plant									1.000	0.298*	-0.257	**0.8232****
Harvest index										1.000	0.14378	**0.403****
100-seed weight (gm											1.000	**0.301***
Correlation with Seed yield per plant (g)												**1.000**

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