Correlation Studies in Rice (*Oryza Sativa* L.) Restorers Lines

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ABSTRACT

The present investigation was carried out to study the nature and degree of association between yield and its component characters on grain yield in rice (*Oryza sativa* L.) during *kharif,* 2016. Fifty two restorers were evaluated for identifying their efficiency with respect yield and yield components. The correlation studies revealed strong positive association of yield with the traits *viz.,* plant height, number of ear bearing tillers per plant and number of filled grains per panicle indicating that direct selection can be practiced for these characters for these characters for improving single plant yield. Other traits *viz.,* pollen sterility recorded negative significant association with grain yield indicating selection for pollen sterility should be practiced for higher grain yield.

Keywords : *Correlation, rice, yield ,yield components.*

Rice (*Oryza sativa* L.) is one of the commonly consumed cereals and staple food for more than half of the world's population. The rising demand, saturation of cultivable field and low gross domestic production of rice are likely to cause a supply shortage of a crop in the near future (Dhanwani *et al.,* 2013). By the year 2025, about 785 million tonnes of paddy which is 70 per cent more than the current production will be needed to meet the growing demand (Manomani and Khan, 2003). Correlation analysis is the important biometrical technique to determine the yield components. Knowledge of correlation between yield and its contributing characters are basic to find out guidelines for plant selection. The characters that are positively correlated with yield are of considerably important to plant breeder for selection purpose. Correlation coefficient indicates the nature of association among the different traits. Keeping in view of the above facts, the present investigation was undertaken to know character association among yield and its contributing characters in 52 elite restorers of rice for ten quantitative characters.

MATERIAL AND METHODS

Fifty two restorer lines of rice were grown in randomized block design with two replications during *kharif,* 2016 at Andhra Pradesh Rice Research Institute and Regional Agricultural Research Station, Maruteru, West Godavari district of Andhra Pradesh, India. Each plot comprised of two 4 rows with plot size of 0.8 m^2 spaced 20 cm apart with plant to plant spacing of 15 cm. Fertilizer dose of 100 kg N +50 kg P_2O_5 + 50 kg K_2O per hectare, other recommended package of practices and plant protection measures were adopted to raise the crop healthy. Observations on ten randomly selected plants were recorded for the characters *viz*. days to fifty per cent flowering, days to maturity, plant height, number of ear bearing tillers per plant, pollen sterility (%), panicle length, number of filled grains per panicle, number of unfilled grains per panicle, spikelet fertility (%) and single plant yield. Phenotypic and genotypic correlations (r_p and r_g) were worked out by adopting the formulae suggested by Falconer (1964). The analysis of variance indicated significant variation among genotypes for all the traits. The correlation studies indicated varied levels of association among the traits (Table 1).

RESULTS AND DISCUSSION

Days to 50% flowering showed positive significant association with days to maturity (0.9996**/ -0.9665*). The trait showed significant negative correlation with panicle length (-0.2741*/-0.1953) and spikelet fertility (-0.3821*/-0.2384**) both at genotypic and phenotypic levels. At phenotypic level, a significant positive correlation was recorded with number of unfilled grains per panicle (0.2164*) and at genotypic level, this trait showed negative significant correlation with number of filled grains of panicle (-0.2166**). Days to 50% flowering recorded positive association with days to maturity indicating that increase in days to 50% flowering leads to simultaneous increase in the days to maturity. These results are in agreement with the findings of Nayak *et al.* (2016) and Ogunbayo *et al.* (2014). At genotypic level days to maturity showed positive significant association with number of unfilled grains per panicle (0.2664**) whereas negative significant association with panicle length (-0.3114**), number of filled grains per panicle (-0.2373) and spikelet fertility (-0.3270**). This trait showed positive

Table 1. Genotypic and Phenotypic Correlation Coefficient of 52 restorer lines of rice (*Oryza sativa* L.) during *kharif,* 2016.

S.No.	Characters	Days to 50% flowering	Days to maturity	Plant height (cm)	Number of ear bearing tillers per plant	Panicle length (cm)	Pollen sterility (%)	Number of filled grains per panicle	Number of unfilled grains per panicle	Spikelet fertility (%)	Single plant yield (g)
1	Days to 50% flowering	1.0000	0.9996**	0.1141	0.0205	-0.2741**	0.1208	-0.2166**	0.3220	-0.3821*	0.0034
2	Days to maturity	0.9665**	1.0000	0.0967	-0.0200	-0.3114**	0.1287	-0.2373*	0.2664**	-0.3270**	-0.0185
3	Plant height (cm)	0.0995	0.0908	1.0000	0.2188*	0.1956	-0.1097	-0.2541**	0.0979	-0.1923	0.2799**
4	Number of ear bearing tillers per plant	0.0232	0.0050	0.2080*	1.0000	-0.0174	0.0780	-0.1919	-0.1113	0.0503	0.2606**
5	Panicle length (cm)	-0.1953*	-0.1898	0.1905	-0.0009	1.0000	-0.1608	0.1679	-0.0315	0.0124	0.1783
6	Pollen sterility (%)	0.1183	0.1263	-0.1026	0.0735	-0.1129	1.0000	0.1794	-0.0474	0.1592	-0.2914**
7	Number of filled grains per panicle	-0.1544	-0.1462	-0.1817	-0.0757	0.1973*	0.1402	1.0000	0.1750	0.1106	-0.2791**
8	Number of unfilled grains per panicle	0.2164*	0.1586	0.1277	-0.0795	-0.0181	-0.0333	0.0773	1.0000	-0.9441**	-0.0686
9	Spikelet fertility (%)	-0.2384*	-0.1679	-0.1713	0.0602	0.0562	0.1021	0.2032*	-0.9389**	1.0000	-0.0841
10	Single plant yield (g)	0.0030	-0.0079	0.2694**	0.1897	0.1640	-0.2715**	-0.1960*	-0.0583	-0.0349	1.0000

Above diagonal genotypic correlation
Below diagonal phenotypic correlation
*Significant at 5% level
**Significant at 1% level

significant association number of unfilled grains per panicle indicating that increasing in days to maturity leads to simultaneous increase in the number of unfilled grains per panicle whereas negative significant association with panicle length, number of filled grains per panicle and spikelet fertility indicating that increase in the days to maturity leads to decrease in the panicle length, number of filled grains per panicle and spikelet fertility. Similar findings were reported by Nayak *et al.* (2016) and Hasan *et al.* (2011).

Plant height showed positive significant association with number of ear bearing tillers per plant (0.2694**/0.2799**) both at phenotypic and genotypic levels. At genotypic level, it showed negative significant correlation with number of filled grains per panicle (-0.2541**) which indicated that increase in plant height leads to increase in the number of ear bearing tillers per plant and single plant yield. This is in compliance with the findings of Nayak *et al.* (2016) and Prasad *et al.* (2015). Number of ear bearing tillers per plant recorded positive significant association with single plant yield (0.2606**) at genotypic level. The significant positive correlation of number of ear bearing tillers per plant with single plant yield at genotypic level suggested that there would be improvement in the grain yield with the increase in the number of ear bearing tillers per plant. Similar findings were reported by Sarwar *et al.* (2015) and Saikumar *et al.* (2014).

Panicle length showed positive significant correlation with number of filled grains per panicle (0.1973*) at phenotypic level. Panicle length recorded positive significant association with number of filled grains per panicle indicating long panicles will have more number of fertile grains per panicle. Similar findings were reported by Nayak *et al.* (2016) and Sarwar *et al.* (2015). Pollen sterility recorded negative and significant correlation with single plant yield (-0.2715**/-0.2914) at both genotypic and phenotypic levels indicating increase in pollen sterility leads to decrease in single plant yield. Thus indirect selection for this trait would bring simultaneous improvement in grain yield. Similar results were observed and reported by Akter *et al.* (2010).

Number of filled grains per panicle recorded positive significant association with single plant yield (0.1960*/0.2791**) both at genotypic and phenotypic levels. This trait showed positive significant correlation with spikelet fertility (0.2032*) at phenotypic level. Positive significant association of number of filled grains per panicle with single plant yield indicated that increase in number of fertile grains per panicle leads to simultaneous increase in single plant yield. Hence selection of plants with more number of filled grains per panicle will improve yield. Similar results were observed and reported by Hafena *et al.* (2016) and

Prasad *et al.* (2015). Number of unfilled grains per panicle showed negative significant association with spikelet fertility (-0.9389*/-0.9441**) at phenotypic as well as genotypic levels. The negative significant association of number of unfilled grains per panicle with single plant yield indicates that increase in number of unfilled grains per panicle leads to simultaneous decrease in single plant yield. Hence selection of plants with less number of unfilled grains per panicle will improve yield. Similar results were reported and observed by Ratna *et al.* (2015) and Ravindrababu *et al.* (2012). Spikelet fertility showed negative significant association with days to 50% flowering (-0.3821*), days to maturity (-0.3270) and number of unfilled grains per panicle (-0.9441**) at genotypic level, while it showed negative association with days to 50% flowering (-0.2384) and number of unfilled grains per panicle (-0.9389**) at phenotypic level. Similarly it showed positive significant association with number of filled grains per panicle (0.2032*) and similar results were observed and reported by Nayak *et al.* (2016).

CONCLUSION

The present findings on character association revealed that grain yield per plant was significant and positively correlated with the traits *viz.,* plant height, number of filled grains per panicle at both phenotypic and genotypic levels while number of ear bearing tillers per plant had positive significant association only at genotypic level, indicating that direct selection can be practiced for these characters for improving single plant yield. While the trait, pollen sterility recorded negative significant association with grain yield indicating that plants with low percent pollen sterility is practiced for improving the yield.

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