RESEARCH COMMUNICATION

PATH ANALYSIS FOR YIELD AND YIELD COMPONENTS IN RICE (*ORYZA SATIVA* L.)

M. Venkata Lakshmi[1], Y.S. Uneetha[2], A. Appalaswamy[3] and Hari Ram Kumar Bandi[4]

[1]Assistant Professor, Dept., Genetic & Plant Breeding, Centurion University of Technology & Management, Parlakhemundi, Gajapathi, Odisha, India.
[2]Assistant Professor, Dept., Genetics & Plant Breeding, ANGRAU-Hyderabad, Andhra Pradesh, India.
[3] Principal scientist, Dept., Genetics & Plant Breeding, ANGRAU-Hyderabad, Andhra Pradesh, India
[4]Ph.D. Scholar, Dept., Genetics & Plant Breeding, Agricultural College, Bapatla, Guntur, Andhra P, India.
Email: venkatalakshmi@cutm.ac.in

Received-07.05.2016, Revised-23.05.2016

Abstract: Seventy rice genotypes were studied for estimating the direct and indirect influence on grain yield. Path analysis revealed that the characters kernel length followed by days to maturity, number of effective tillers per plant, plant height, number of grains per panicle and 1000-grain weight were directly influencing the grain yield per plant. Hence, these characters need to be considered while designing a selection strategy for yield improvement of rice.

Keywords: Rice, Path analysis, Yield and Yield attributing traits

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important food crops in the world, both in terms of area (151.0 million hectares) and production (597.8 million tonnes). It is consumed by more than half of the world's population living in the developing countries. About 90% of the world's rice is grown and consumed in Asia. In India rice is cultivated in an area of 42.9499 million ha with an average production of 105.23 million tonnes and productivity of 2.462 tonnes ha^{-1}. In Andhra Pradesh, rice is cultivated in an area of 3.234 million ha with a production of 11.51 million tonnes and productivity of 3.126 tonnes ha^{-1} (http://www.indiastat.com/searchresult.aspx, 2012-2013). Due to various socio-economic constraints, a chance of bringing more area under rice cultivation is very remote. Hence to achieve the target of increased rice production, it requires raising the production per unit area. Attempts are being made worldwide, to break the yield barrier in rice breeding strategies. As the grain yield is a complex trait dependent on many component traits and as it responds poorly to the direct selection, the knowledge on yield and its component traits, their direct and indirect effects on grain yield will be useful for the improvement of grain yield. The objective of present study was to study the direct and indirect influence of some yield components on grain yield in rice.

MATERIAL AND METHOD

The experimental material comprised of seventy genotypes of rice which was raised in a randomized block design with three replications at College farm, Agricultural college, Naira, Srikakulam, during *Kharif* 2012. Each genotype planted with a spacing of 20 cm between the rows and 15 cm with in the row. Ten plants of each genotype in each replication were selected at random and mean of the plant observations were recorded for yield attributing characters. The characters studied were days to fifty per cent flowering, days to maturity, number of effective tillers per plant, plant height, panicle length, number of grains per panicle, 1000-grain weight, grain yield per plant, kernel length, kernel breadth and L/B ratio. The mean values were used for the analysis of variance. Path analysis was carried out following the methods of Singh and Chaudhary (1979) and Dewey and Lu (1959), respectively.

RESULT AND DISCUSSION

Path coefficient analysis (Table 1) showed that the genotypic values were in general higher than the phenotypic values which indicated the effect of environment on these traits. Maximum positive direct effect of kernel length followed by number of ear bearing tillers per plant, number of grains per panicle, 1000- grain weight, days to maturity and plant height was noticed in the present study on grain yield per plant, which were similar to the findings of Gyanendra Pal *et al*. (2011), Yadav *et al*. (2011), Bagheri *et al*. (2011) and Haider *et al*. (2012). Days to fifty per cent flowering had also recorded positive direct effects on grain yield per plant (Kole *et al*. 2008). Negative direct effects on grain yield per plant were recorded by kernel breadth, L/B ratio and panicle length (Kole *et al*. 2008 and Satish Chandra *et al*. 2009). High indirect effects of days to fifty per cent flowering, panicle length, 1000-grain weight

*Corresponding Author

and L/B ratio were observed through kernel breadth, while number of grains per panicle was noticed to exert high indirect effect through number of ear bearing tillers per plant and 1000-grain weight. Similarly, the indirect effect of L/B ratio on grain yield was noticed to be through kernel length and kernel breadth. Thus, the characters kernel length, days to maturity, number of productive tillers per plant, plant height, number of grains per panicle and 1000-grain weight could be considered as the most important characters for selection in order to improve the grain yield.

Table 1. Genotypic and phenotypic path coefficients for yield, yield components and quality traits in rice

Character		Days to 50% flowering	Days to maturity	Number of ear bearing tillers/plant	Plant height	Panicle length	Number of grains per panicle	1000 grain weight	Kernel length	Kernel breadth	Length breadth ratio	Correlation with grain yield per plant
Days to 50% flowering	G	**-0.0592**	0.1788	0.1125	0.0699	-0.1041	-0.074	-0.0222	-0.0143	0.3964	-0.3751	0.1088
	P	**0.047**	0.0634	0.0403	0.05	-0.0602	-0.0362	-0.0109	-0.0047	0.1518	-0.1368	0.1039
Days to maturity	G	-0.0369	**0.2872**	-0.052	0.1206	-0.0592	-0.0102	0.0034	-0.2344	0.3581	-0.1954	0.1811**
	P	0.0236	**0.1264**	-0.021	0.0778	-0.0368	-0.0064	0.0025	-0.0855	0.1188	-0.0611	0.1383*
Number. of ear bearing tillers/plant	G	-0.0119	-0.0267	**0.5595**	-0.0495	0.0728	-0.0842	-0.1511	-0.0832	0.1933	-0.223	0.1958**
	P	0.0072	-0.01	**0.2651**	-0.0284	0.0404	-0.0377	-0.0481	-0.0314	0.0659	-0.0759	0.1469*
Plant height	G	-0.0148	0.1238	-0.0989	**0.2797**	-0.1408	-0.0034	0.0819	0.1181	-0.0036	-0.1541	0.1878**
	P	0.0107	0.045	-0.0345	**0.2186**	-0.0935	-0.002	0.0337	0.0518	-0.0092	-0.0514	0.1693*
Panicle length	G	-0.0208	0.0573	-0.1372	0.1326	**-0.2968**	0.0223	0.0425	0.3783	-0.2374	-0.0886	-0.1478**
	P	0.0126	0.0206	-0.0475	0.0907	**-0.2253**	0.0073	0.02	0.1503	-0.0925	-0.023	-0.0869
No. of grains per panicle	G	0.0103	-0.0069	-0.1104	-0.0023	-0.0155	**0.427**	-0.1913	-0.0358	-0.0772	0.0977	0.0955
	P	-0.0074	-0.0475	-0.0434	-0.0019	-0.0072	**0.2307**	-0.0701	-0.0149	-0.0331	0.04	0.0893
1000 grain weight	G	0.0033	0.0025	-0.2104	0.057	-0.0314	-0.2032	**0.402**	0.0884	-0.766	0.6975	0.0396
	P	-0.003	-0.0434	-0.0748	0.0432	-0.0264	-0.0947	**0.1707**	0.0439	-0.318	0.2831	0.0258
Kernel length	G	0.0005	-0.0384	-0.0265	0.0188	-0.064	-0.0087	0.0203	**1.7544**	0.7618	-2.2717	0.1464**
	P	-0.0003	-0.0748	-0.0101	0.0137	-0.0409	-0.0042	0.009	**0.828**	0.3324	-0.9732	0.1415*
Kernel breadth	G	0.01	-0.0439	-0.0461	0.0004	-0.0301	0.0141	0.1314	-0.5704	**-2.3431**	2.7898	-0.0879
	P	-0.0069	-0.0101	-0.0168	0.0019	0.0201	0.0073	0.0522	-0.2647	**-1.0397**	1.2103	-0.0908
Length breadth ratio	G	-0.007	0.0178	0.0395	0.0136	-0.0083	-0.0132	-0.0887	1.2608	2.0679	**-3.1611**	0.1213
	P	0.0047	-0.0168	0.0147	0.0082	-0.0038	-0.0067	-0.0353	0.588	0.9182	**-1.3704**	0.1232

Bold: Direct effects *Significant at 5% level **Significant at 1% level

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