ASSESSMENT OF INTER–RELATIONSHIP AND ASSOCIATION OF YIELD TRAITS IN RICE (*Oryza sativa* L.) UNDER COASTAL SALINE CONDITION.

K.PALANIRAJA*
S. VENNILA
R. PARTHASARATHI

1. *Department of Genetics and Plant Breeding,
Faculty of Agriculture,
Annamalai University,
Chidambaram – 608 002,
Tamil Nadu, India.
2. Department of Genetics and Plant Breeding,
Faculty of Agriculture,
Annamalai University,
Chidambaram – 608 002,
Tamil Nadu, India.
3. Department of Microbiology,
Faculty of Agriculture,
Annamalai University,
Chidambaram – 608 002,
Tamil Nadu, India.

ABSTRACT

An experiment was conducted to evaluate the nature and magnitude of variability and character association among 30 rice genotypes. The experimental materials were evaluated in randomized block design with three replications during 2018 undercoastal saline condition. The divergent studies showed that the significant variation among the genotypes for all the characters studied. Correlation studies revealed that number of productive tillers per plant, 100 grain weight and panicle length registered, positive correlation with grain yield per plant. Path analysis revealed that the traits grain breadth and grain length had very high positive direct effect on grain yield. The traits days to first flowering, number of tillers per plant, Number of grains per panicle, grain breadth and grain length had high positive direct effect on grain yield per plant.

Keywords: Salinity, genetic divergence, path and correlation analysis.

INTRODUCTION

Rice (*Oryza sativa* L.) with the chromosome number of 2n=2x=24 which is the cultivated species. Rice accounts for 43% of the total food grain production of our country. India is the second largest producer and consumer of rice next to China. Apart from other effects of drought, salinity is the major cause of yield loss.The present investigation was carried out to study the importance of character association for genetic improvement of saline tolerant rice varieties of different morphological characters, association between the characters and direct and indirect effects of yield components on grain yield.

METHODS AND MATERIALS

The study was carried out with 30 rice genotypes collected from various locations, using Randomized block design (RBD) with three replications. Seeds of thirty genotypes were sown in raised nursery beds, in each genotype, one seedling per hill was transplanted in the main field after 25 days with spacing of 20cm x 20cm. recommended agronomic practices and need based plant protection measures were carried out for the better crop development. The survived genotypes were observed for 11 characters and subjected to correlation and path analysis to evaluate the character association and direct and indirect effects on grain yield.Observations on all the eleven characters were recorded on single plant basis in five randomly selected plants of each genotype per replication. The mean data were utilized for the statistical studies.

RESULT AND DISCUSSION

The analysis of variance was calculated for all the 11 characters and showed significant difference among the 30 genotypes for all the 11 characters.

The efficiency of selection for total yield mainly depends on the direction and magnitude of the association of the yield component traits. Johnson *et al*. (1955)[2] pointed out that characters with no values in themselves andare not normally measured in the selection programme are not worthy of inclusion in the selection scheme. Estimates of correlation between yield and yield component characters in rice genotypes were presented in the table 1.

In the present study, correlation analysis indicated that grain yield per plant exhibited significant positive correlation with days to first flowering and number of grainsper panicleat both phenotypic and genotypic level.Similar results were reported by (Sowmiya *et al.*, 2017)[1].However, correlation of yield and its components are not adequate in any selection programme.The association among the individual character may ultimately influence the yield.

The length of the panicle had significant positive correlation with days to first flowering at both phenotypic and genotypic level and number of productive tillers per plant with number of tillers per plant at both genotypic and phenotypic level.

The significant association of grain yield with number of grains per panicle at genotypic and phenotypic levelrevealed that preference of plants with panicles having more number of grains obviously yields higher. Also, significant association of grain yield with days to first flowering showed that under salinity plants complete its life cycle earlier and that escapes the plant from late season drought.

TABLE 1 PHENOTYPIC AND GENOTYPIC CORRELATION AMONG VARIOUS CHARACTERS IN RICE GENOTYPES

Characters		Days to first flowering	Plant Height	No. of tillers/ Plant	No. of productive tillers/ Plant	Panicle Length	No. of grains/ Panicle	100 Grain weight	Grain Length	Grain Breadth	L/B Ratio	Grain Yield/ plant
Days to first flowering	G	1.000	0.358*	0.389*	0.199	0.456*	0.220	-0.039	-0.086	0.373*	-0.420*	0.289*
	P	1.000	0.223	0.315	0.275	0.814**	0.027	-0.057	-0.139	0.164	-0.238	0.298*
Plant height	G		1.000	0.178	0.239	0.848**	-0.120	-0.026	0.133	0.172	-0.029	-0.038
	P		1.000	0.209	0.182	0.273	0.000	-0.029	0.119	0.094	-0.022	-0.029
No. of tillers/ Plant	G			1.000	0.883**	0.660**	-0.194	-0.274	-0.162	0.127	-0.156	0.249
	P			1.000	0.794**	0.082	-0.192	-0.222	-0.062	0.026	-0.019	0.207
No. of productive tillers/plant	G				1.000	1.041*	-0.145	-0.140	-0.207	0.211	-0.224	0.346
	P				1.000	0.126	-0.142	-0.088	-0.070	0.027	-0.011	0.352
Panicle length	G					1.000	0.002	0.578**	0.769**	0.126	0.499**	-0.097
	P					1.000	-0.119	0.144	0.201	0.035	0.053	-0.013
No. of grains/ Panicle	G						1.000	-0.256	-0.276	-0.174	-0.055	0.348*
	P						1.000	-0.222	-0.196	-0.154	0.035	0.357*
100 grain Weight	G							1.000	0.445**	0.211	0.122	-0.106
	P							1.000	0.322**	0.134	0.063	-0.103
Grain length	G								1.000	-0.087	0.570*	0.138
	P								1.000	-0.041	0.793*	0.047
Grain breadth	G									1.000	-0.862**	0.036
	P									1.000	-0.821*	-0.007
Grain L/B Ratio	G										1.000	-0.017
	P										1.000	0.003
Grain yield/ Plant	G											1.000
	P											1.000

G- Genotypic correlation effect P- Phenotypic correlation effect *,** Significant at 5 and 1 percent level

The correlation co-efficient alone is insufficient to explain the relationship for effective manipulation of the characters, but path analysis furnishes a method for partitioning the correlation co-efficient into direct and indirect effect and measures the relative importance of the causal factor involved. Similar studies were carried out by many scientists like Pandey, 2012[3].

The estimated residual effect was 0.511 (Table 2). The traits number of grains per panicle (1.310) and grain L/B ratio (1.787) had very high positive direct effect on grain yield. The traits number of tillers per plant (0.533), number of productive tillers per plant (0.551) andgrain breadth (0.508) had high positive direct effect on grain yield per plant. Panicle length (0.219) had moderate positive direct effect on grain yield per plant. Plant height (-0.654), 100 grain weight (-0.332) and grain length (-0.521) had high negative direct effect on grain yield per plant. Similar results were reported by Sumithra *et al.*, 2019[5].

Among the grain quality, grain lengthhad very high positive indirect effect via grain L/B ratio (i.e.) 1.081 and had low negative indirect effectvia number of grains per panicle and grain breadth on grain yield per plant, (i.e.) -0.184 and -0.140, respectively. Grain breadth had low negative indirect effect via panicle length (-0.173); very high and moderate positive indirect effect via grain L/B ratio(1.627) and number of tillers per plant(0.299), respectively on grain yield per plant. Hence, these traits should be given prime importance, while selection for high yielding genotypes.

Grain L/B character had low positive indirect effect via number of productive tillers per plant(0.167) on grain yield per plant. It had very high negative indirect effect via100 grain weight(-1.137) and grain breadth (-1.380) on grain yield per plant. The obtained datas of path effects are furnished graphically in Fig 1.

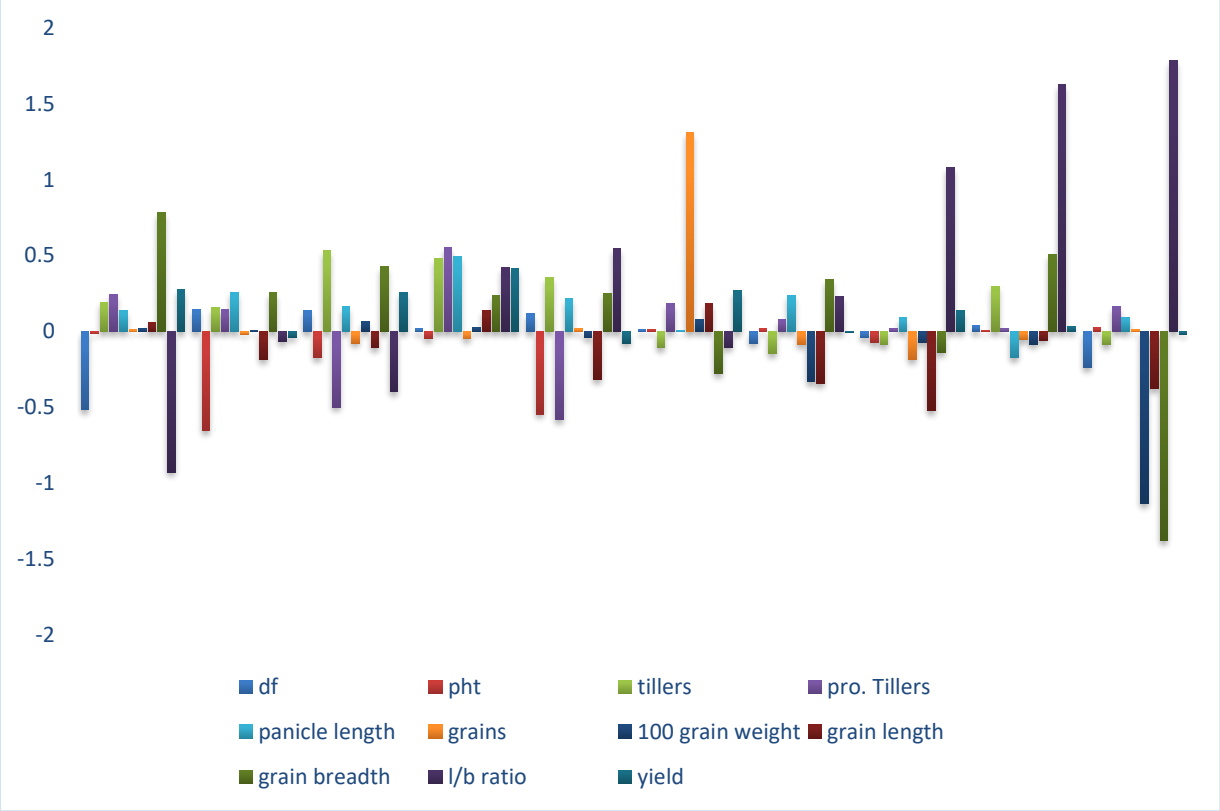
The character such as total number of tillers per plant, number of productive tillers per plant, grain length, grain L/B ratio recorded variable performance for direct and indirect effect and more similarly for correlation co-efficient. Hence, selection for such characters would be postponed to further generations until there is favourable and constant association of genes controlled the characters.

TABLE 2 PATH CO-EFFICIENT ANALYSIS DEPICTING THE DIRECT AND INDIRECT EFFECTS OF VARIOUS CHARACTERS IN RICE GENOTYPES.

Characters	Days to first flowering	Plant height	Total number of tillers per plant	No. of productive tillers/plant	Panicle length	No. of grains/ panicle	100 Grain Weight	Grain Length	Grain breadth	L/B Ratio	Grain Yield/ Plant
Days to first Flowering	**-0.513**	-0.014	0.194	0.246	0.138	0.010	0.016	0.056	0.784	-0.927	0.279
Plant height	0.147	**-0.654**	0.159	0.144	0.259	-0.018	0.008	-0.187	0.254	-0.065	-0.038
No. of tillers/ Plant	0.139	-0.172	**0.533**	-0.499	0.167	-0.076	0.068	-0.105	0.430	-0.396	0.260
No. of Productive Tillers/plant	0.021	-0.049	0.482	**0.551**	0.493	-0.050	0.024	0.140	0.239	0.424	0.416
Panicle Length	0.118	-0.545	0.356	-0.583	**0.219**	0.018	-0.043	-0.314	0.253	0.546	-0.077
No. of grains/ panicle	0.015	0.014	-0.105	0.182	0.006	**1.310**	0.080	0.185	-0.280	-0.104	0.268
100 grain Weight	-0.076	0.016	-0.148	0.079	0.241	-0.090	**-0.332**	-0.342	0.340	0.231	-0.005
Grain Length	-0.043	-0.072	-0.088	0.016	0.093	-0.184	-0.072	**-0.521**	-0.140	1.081	0.138
Grain Breadth	0.039	0.007	0.299	0.018	-0.173	-0.054	-0.082	-0.057	**0.508**	1.627	0.036
L/B ratio	-0.236	0.028	-0.085	0.167	0.094	0.009	-1.137	-0.377	-1.380	**1.787**	-0.017

Residual effect = 0.511

FIG. 1. DIRECT AND INDIRECT PATH EFFECTS OF ALL THE ELEVEN CHARACTERS OF RICE GENOTYPES



In Fig 1. The characters (Df – days to first flowering, pht- plant height, tillers- number of tillers/plant, pro.tillers- number of productive tillers/plant, panicle length, grains – number of grains/panicle, 100 grain weight, grain length, grain breadth, grain l/b ratio, yield- grain yield per plant) depicts the direct and indirect effects of rice genotypes.

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