SHORT COMMUNICATION

CHARACTER CORRELATION IN DIFFERENT ENVIRONMENTAL CONDITIONS FOR YIELD AND YIELD COMPONENTS IN RICE (*ORYZA SATIVA* L.)

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Abstract: Association analysis gives an idea about relationship among the various characters and determines the component characters, on which selection can be based for genetic improvement in the grain yield. Three hundred seventy nine (379) lines of F_3 progenies of cross between Swarna x IR86931-B-6 and MTU1010 x IR86931-B-6 were conducted in field of research cum instructional farm, College of Agriculture, IGKV, Raipur (C.G.). Rice crop was grown in irrigated and water stress condition rainout shelter I (ROS I) and rainout shelter II (ROS II). In irrigated condition, grain yield showed highly significant and positive correlation with plant height (0.724), total tillers (0.919) and effective tillers (0.925). Under water stress condition, effective tillers possessed significant and positive association with plant height (0.695=ROS I; 0.453=ROS II) and with total tillers (0.969=ROS I; 0.967=ROS II). Similarly, total tillers exhibited significant and positive association with plant height (0.708=ROS I; 0.518=ROS II).

Keywords: Correlation, Rice (*Oryza sativa* L.), Yield

INTRODUCTION

Rice (*Oryza sativa* L.) is the most important cereal crop that has been referred as "Global Grain" Correlation studies provide a clear picture of characters association which is generally due to linkage, pleiotropy, physiological association in developmental and biochemical pathway. Though, the linkage is a cause of transient correlations particularly in population derived from crosses between two species. Pleiotropy is simply a property of a gene whereby it affects two or more characters, so that if the gene is segregating it causes variations in those characters. The characters which are correlated are of much interest since change in one character influenced the other one. Degree of association also affects the effectiveness of selection process. The degree of association between independent and dependent variables was suggested by Galton (1888), its theory was developed by Pearson (1904) and their mathematical utilization at phenotypic, genotypic and environmental levels was described by Searle (1961).

A positive correlation between desired characters is favourable to the breeder as it helps in selection; however, a negative correlation hinders the recovery of the combinations in both characters. When the characters are genetically correlated among themselves, in such situations any strong selection applied to one character also brings change in the other characters.

MATERIAL AND METHOD

Three hundred seventy nine (379) lines of F_3 progenies of cross between Swarna x IR86931-B-6 (90 lines) and MTU1010 x IR86931-B-6 (289 lines) were evaluated under irrigated, rainout shelter I (ROS I) and rainout shelter II (ROS II) conditions during *Kharif* 2012, at instructional cum research farm, COA, IGKV, Raipur (C.G.). The observations were recorded on plant height, total tillers per plant, effective tillers per plant and grain yield per plant under irrigated condition, under ROS I and ROS II conditions on three traits plant height, total tillers per plant, effective tillers per plant were recorded.

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RESULT AND DISCUSSION

Mean, range and standard deviation

The data of individual plant of the population were statistically analyzed to generate overall mean, range and standard deviation for irrigated, ROS I and ROS II conditions. In irrigated condition, the phenotypic data was recorded on four characters namely, plant height, total tillers, effective tillers and grain yield per plant and whereas, in ROS I and II, the data was taken on only three characters viz., plant height, total tillers and effective tillers per plant.

Grain yield under irrigated condition ranged from 1.08 to 102.30 g/ plant with population mean of 36.53 g/ plant and standard deviation of 32.26%.

Plant height under irrigated condition ranged from 69 cm to 193 cm with mean of 130.63 cm and standard deviation of 38.46% while under ROS I condition it ranged from 67 cm to 152 cm with mean of 101.8 cm and standard deviation of 42.47% and under ROS II condition it ranged from 60 cm to 156 cm with mean of 109.5 cm and standard deviation of 28.68%.

Total tillers under irrigated condition ranged from 2 to 40 with mean of 16.57 and standard deviation of 13.64%, while under ROS I condition it ranged from 2 to 17 with mean of 7.10 and standard deviation of 4.87% and under ROS II condition it ranged from 2 to 15 with mean of 17 and standard deviation of 3.38%.
Effective tillers under irrigated condition ranged from 2 to 38 with mean of 15.20 and standard deviation of 12.51%, while under ROS I condition it ranged from 2 to 17 with mean of 6.57 and standard deviation of 4.64% and under ROS II condition it ranged from 1 to 15 with mean of 6.23 and standard deviation of 3.28%.

Phenotypic correlation studies

Degree of association also affects the effectiveness of selection process. The degree of association between independent and dependent variables was suggested by Galton (1888), its theory was developed by Pearson (1904) and their mathematical utilization at phenotypic, genotypic and environmental levels was described by Searle (1961).
Correlation between other traits and grain yield under irrigated and Correlation between traits under ROS I and ROS II conditions are being presented in Table 1 and 2.
In irrigated condition, grain yield showed highly significant and positive correlation with plant height (0.724), total tillers (0.919) and effective tillers (0.925). This clearly indicates that all the three traits directly influence grain yield, therefore selection of these traits would be very effective. Similarly, Awan *et al.* (2007) investigated the contribution of tillers within a rice plant towards grain yield (cv. Super Basmati). Mohanan and Mini (2008) also reported relative contribution of rice tillers of different status towards yield. Shashidhar *et al.* (2005) recorded positive correlation of grain yield with plant height, productive tillers per plant, dry matter per plant, leaf weight per plant and harvest. Naik *et al.* (2005) reported that biological yield and effective tillers per plant had high positive direct effect on grain yield. Gomez *et al.* (2006) reported positive and significant correlation of panicle length and number of productive tillers with grain yield under stress. Patel *et al.* (2007) observed significant positive association of grain yield with number of productive tillers, plant height, straw yield and harvest index at genotypic level. Khan *et al.* (2009) reported grain yield per plant was correlated positively and significantly with plant height, panicle length, flag leaf area and number of grains per panicle at genotypic level. Genotypic correlation of plant height with number of tillers per plant was positive. Umadevi *et al.* (2009) reported that grain yield per plant was positively and significantly associated with days to 50% flowering, number of productive tillers per plant, number of secondary branches per panicle and straw yield.
Under ROS I and II condition, same trend was observed in correlation studies. Effective tillers possessed significant and positive association with plant height (0.695=ROS I; 0.453=ROS II), with total tillers (0.969=ROS I; 0.967=ROS II). Similarly, total tillers exhibited significant and positive association with plant height (0.708=ROS I; 0.518=ROS II).

Table 1. Phenotypic correlation between different traits under irrigated condition

	PH	**TT**	**ET**	**GY**
PH	1.000			
TT	0.743**	1.000		
ET	0.756**	0.991**	1.000	
GY	0.724**	0.919**	0.925**	1.000

* = Significant at 0.05 probability level
** = Significant at 0.01 probability level
PH = Plant Height
TT = Total Tillers
ET = Effective Tillers
GY = Grain Yield

Table 2. Phenotypic correlation between different traits under rainout shelter conditions

ROS I			
	PH	**TT**	**ET**
PH	1.000		
TT	0.708**	1.000	
ET	0.695**	0.969**	1.000
ROS II			
	PH	**TT**	**ET**
PH	1.000		
TT	0.518**	1.000	
ET	0.453*	0.967**	1.000

* = Significant at 0.05 probability level
** = Significant at 0.01 probability level
PH = Plant Height
TT = Total Tillers
ET = Effective Tillers

REFERENCES

Awan, T.H.; Ahmad, M.; Ali, I.; Anwar, M. and Manzoor, Z. (2007). Contribution of tiller within a rice plant to yield and yield components. J Agri Res, 45(3): 237-243.
Gomez, S.M.; Kumar, S.S.; Jeyaprakash, P.; Suresh, R.; Biji, K.R.; Boopathi, N.M.; Price, A.H. and Babu, R.C. (2006) Mapping QTLs

linked to Physio-Morphological and plant production traits under drought stress in Rice (*Oryza sativa* L.) in the target environment. American J Biochemistry and Biotech, 2(4): 161-169.

Khan, A.S.; Imran, M. and Ashfaq, M. (2009) Estimation of Genetic Variability and Correlation for Grain Yield Component in Rice (*Oryza sativa* L.). American-Eurasian J Agric & Environ Sci, 6(5): 585-590.

Mohanan, K.V. and Mini, C.B. (2008). Relative Contribution of Rice Tillers of Different Status Towards Yield . Int J Pl Breed Genet, 2: 9-12.

Naik, D.; Sao, A. and Sarawgi, A. (2005) Association Analysis for Quality and Yield Components in Some Indigenous Scented Rice Accessions. Indian J Plant Genetics Resources, 18(2): 266-268.

Patel, P.P.; Mehta, A.M. and Patel, J.S. (2007) Genetic analysis of new plant type and elite genotypes of rice. National syposium Cuttack, pp 65-70.

Shashidhar, H.E.; Pasha, F.; Janamatti, M.; Vinod and Kanbar, M.S. (2005) Correlation and path coefficient analysis in traditional cultivar and doubled haploid lines of rainfed lowland rice (*Oryza sativa* L.). Oryza , 42: 156 – 158.

Umadevi, M.; Veerabadhiran, P. and Manonmani, S. (2009) Genetic Variability, heritability, genetic advance and correlation for morphological traits in rice genotypes. Madras Agric J, 96 (7-12): 316-318.