The Pharma Innovation Journal 2023; 12(7): 1529-1531

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(7): 1529-1531

www.thepharmajournal.com
Received: 07-05-2023
Accepted: 18-06-2023

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Correlation studies in rice (*Oryza sativa* L.) genotypes for yield and its yield contributing traits

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Abstract
Ten rice genotypes were evaluated with two check varieties for association studies of yield and its contributing traits to select the traits for yield improvement in upland condition. The experiment was laid out in randomized block design with three replications at research farm of upland Paddy Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during *Kharif* 2021. Twelve morpho-physiological characters or yield contributing traits like plant height, number of tillers, days to flowering and maturity, number of panicles, panicle length etc., were evaluated for correlation studies in twelve promising rice genotypes. Significant and positive association was observed between grain yield and its yield-contributing traits like plant height and Number of tillers. This association indicates increase in one or more of these traits results in an increase in grain yield. Hence, due consideration should be given to the traits while selecting rice genotypes. Among the ten genotypes studied genotypes *viz.* PBNR 14-07 and PBNR 14-11 recorded better performance and these are considered as the superior genotypes.

Keywords: Association, correlation, rice, *Oryza sativa* L

1. Introduction
Rice, *Oryza sativa* L. (2n = 24) is the most important food crop of world with its wide geographical distribution providing food to about half of the Indian population. This is the staple food for nearly 50% of the global population. India is the world's second-largest producer of rice, and the largest exporter of rice in the world.
India rice is grown on an area of 437.8 lakh hectares with a production of 118.4 million tons with productivity of 2705 kg/ha. (Annual Report, Ministry of Agriculture, Government of India 2020-21). The area under rice during 2020-2021 in Maharashtra is 1665 million hectares with a production of 34.76 million tons and productivity of 2087.4 kg/ha (Department of Agriculture, Maharashtra state). West Bengal, Uttar Pradesh, and Punjab are the top three rice producing states.
It is the predominant dietary energy source for 17 countries in Asia and the Pacific, 9 countries in North and South America, and 8 countries in Africa which provides 20% of the world's dietary energy supply, while wheat supplies 19% and maize (corn) 5%. Cooked un-enriched long-grain white rice is composed of 68% water, 28% carbohydrates, 3% protein, and 1% fat.
Knowledge about yield and yield contributing traits is essential for yield improvement as well as evolving a new variety. Information about the interaction of different yield contributing characters which can be known through correlation study is always important for breeding of genotypes. The present study aimed on physiological analysis of rice genotypes to search correlations between various morpho-physiological features and yield variability, and yield-contributing traits.

2. Materials and Methods
The present investigation was undertaken to study Correlation Studies in Rice Genotypes for Yield and its Yield Contributing Traits. The study was carried out at the research farm of upland Paddy Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during Kharif 2021. The experimental material consists of 10 promising rice genotypes including two checks *viz*., Avishkar and PBNR 03-2 listed in table 1. The experiment was laid out in a randomized block design with three replications. The field was prepared as per the requirement. The experimental material was sown by dibbling method. The recommended agronomical and plant protection practices were followed regularly as per needed. Observations were recorded on 5 randomly selected plants from each genotype for plant height, number of tillers, number of leaves, days to 50% flowering, days to maturity, LA, LAI,

plant dry weight, CGR, RGR, NAR and yield attributes *viz*., number of panicles per plant, panicle length, number of spikelets per panicle, number filled grains per panicle, number of unfilled grains per panicle, 1000 grain weight, grain yield per plant, grain yield per plot, harvest index. The data were analyzed statistically for correlation studies by the Pearson method.

Table 1: List of promising Rice Genotypes used for the study

Sr. No	Culture	Sr. No	Culture
1	PBNR14-07	7	PBNR15-02
2	PBNR14-11	8	PBNR15-05
3	PBNR14-15	9	PBNR15-10
4	PBNR14-17	10	PBNR15-12
5	PBNR14-18	11	Avishkar (check)
6	PBNR14-21	12	PBNR 03-2 (check)

3. Results and Discussion

Relationship between yield and yield-contributing traits was studied through analysis of correlation among the yield and its associated traits represented in Table 2. The non-significant values of studied characters clearly indicate the independent nature of the character.

5. Correlation

The results of correlation analysis under upland conditions indicated that among all the associations, 13 associations were highly significant and all of them were positively correlated and the same associations were significant and positively correlated. Besides 22 associations were positive and non-significant and 30 were non-significant and negatively correlated. The investigation revealed that the grain yield was significantly and positively correlated with plant height (0.5521**) and number of tillers (0.7214**). Similar findings given by Sadeghi *et al*., (2011) [1] revealed that grain yield was positively and significantly correlated with plant height and number of tillers. This was supported by Singh *et al*., (2002) [2]. Plant height exhibited a highly significant positive correlation with a number of tillers (0.6268**), leaf area (0.5416**). The number of leaves exhibited a highly significant positive correlation with leaf area (0.7233**), leaf area index (0.9071**), and crop growth rate (0.6648**). While Days to 50% flowering exhibited a highly significant positive correlation with days to maturity (0.5342**). Rao and Shrivastav (1999) [3] reported correlation analysis results had positive association of days to flowering with days to maturity. Leaf area exhibited a highly significant positive correlation with leaf area index (0.8829**), plant dry weight (0.5236**), and crop growth rate (0.6715**). Leaf area index exhibited a highly significant positive correlation with crop growth rate (0.7747**). Relative growth rate exhibited highly significant positive correlation with net assimilation rate (0.960**). The significant and positive correlations among characters suggest interrelation between morpho-physiological traits and yield. The negative and non-significant correlations revealed there may be inherent relationships among the genotypes.

Table 2: Correlation analysis of morpho-physiological parameters with grain yield

	PH	NoT	NoL	50%F	DtoM	LA	LAI	PDW	CGR	RGR	NAR	G. YIELD
PH	1	0.6268**	0.1684	-0.4723	-0.3536	0.5416**	0.4226	0.1506	0.3061	0.0155	-0.0424	0.5521**
NOT		1	0.0969	-0.0527	-0.3594	0.4602	0.3953	0.1977	0.3385	0.0262	0.0444	0.7214**
NOL			1	-0.2347	0.038	0.7233**	0.9071**	0.4715	0.6648**	-0.6027	-0.7116	0.1079
50%F				1	0.5342**	-0.3787	-0.2866	-0.1088	-0.0333	0.1101	0.1578	-0.0038
DTM					1	-0.2458	-0.09018	-0.00402	-0.0116	-0.0752	-0.0407	-0.1299
LA						1	0.8829**	0.5236**	0.6715**	-0.5033	-0.5622	0.3829
LAI							1	0.49	0.7747**	-0.5113	-0.5959	0.3686
PDW								1	0.1665	-0.9324	-0.8523	0.2837
CGR									1	-0.1493	-0.20946	0.2976
RGR										1	0.9603**	-0.0594
NAR											1	-0.0727
G. Yield												1

Note: Significance at the 5%and 1%levels are indicated by *, **respectively. here, PH=Plant height, NOT=Number of tillers, NOL= Number of leaves, 50% F = Days to 50% flowering, DTM= Days to maturity, LA= leaf area, LAI= Leaf area index, PDW= Plant dry weight, CGR= Crop growth rate, RGR= Relative growth rate, NAR= Net assimilation rate.

6. Conclusion

- From study it is concluded that higher yields were associated with plant height, number of tillers, number of panicles per plant, number of spikelets per panicle, number of filled grain per panicle, high number of grains per plant, test weight and harvest index.
- However, the grain yield was positively and significantly associated with plant height and number of tillers.
- The genotype PBNR 14-07 and PBNR 14-11 could be utilized in further breeding programme.

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