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Yield and its component traits association in diverse genotypes of rice (*Oryza sativa* L.)

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Abstract
A study was undertaken with the objective to determine the nature and degree of association between yield and it's component characters in diverse genotypes (33) of rice (*Oryza sativa* L.). The correlation studies revealed grain yield per plant had exhibited significant positive correlation with number of productive tillers per plant and thousand grain weight both at genotypic and phenotypic levels. Hence these characters should be given prime importance while selection for high yielding genotypes.

Keywords: Correlation, *Oryza sativa*

Introduction
Rice is a self pollinated cereal crop belonging to the family Gramineae (Synonym-Poaceae) under the order Cyperales and class Monocotyledon having chromosome number 2n:24 (Hooker, 1979) [7]. The genus *Oryza* includes a total of 25 recognized species out of which 23 are wild species and two, *Oryza sativa* L. and *Oryza glaberrima* are cultivated (Brar and Khush, 2003) [4]. Rice is the second largest produce cereal in the world in 158.3 million hectare area with annual production of about 685.24 million metric tons (Anonymous, 2011) and also the staple food for over one third of the world's population (Poehlman and Sleper, 1995) [11] and more than 90% to 95% of rice is produced and consumed in Asia (Viramani, 1996) [17]. Improvement in rice production depends on the strategies and selection method of any breeding programme, which requires information on yield and its contributing characters. Association of yield and yield components thus assumes an unique prominence as the basis for selecting desirable genotypes with high grain yield potential. Also, knowledge of the presence of association among the supplementary characters reveals that some of the latter are useful as indicators of yield. In reality, correlation values between yield and its components are equivocal due to inter relationship existing among the components. Since selection is usually concerned with improving a group of characters simultaneously, an understanding of inter-se correlations is the prime interest to the breeder. Hence, in the present investigation an attempt is made to understand the type of association existing between yield and its component characters.

Materials and Methods
The experimental materials for this study comprised of 33 rice genotypes collected from various places (Table 1). Seeds of the thirty three genotypes were sown in raised nursery seeds during Samba, 2015 (August-December). In each genotypes, one seedling per hill was transplanted in the main field after 25 days with the spacing of 25 cm between rows and 15 cm between plants in 3 m long rows. The experiment was carried out in randomized block design with three replications. An uniform population of 250 plants in a row was maintained. The agronomic practices and plant protection measures were carried out as standard recommendations. The data on days to first flowering (days), plant height (cm), number of tillers per plant, panicle length (cm), number of grains per panicle, thousand grain weight (g), grain length (cm), grain breadth (cm), kernel length (cm), kernel breadth (cm) and grain yield per plant (g) were recorded. The genotypic correlations among the characters were estimated as per method suggested by Goulden (1952) [6].

Results and Discussion
Genotypic and phenotypic correlation coefficients between grain yield and other ten characters are presented in Table 2. In general, genotypic correlation coefficients were higher than their corresponding phenotypic correlation coefficients indicating that there is a strong inherent association between the characters studied.

Grain yield per plant had exhibited significant positive correlation with number of productive tillers per plant and 1000 grain weight both at genotypic and phenotypic levels. The characters, plant height, days to first flower, number of grains per panicle, grain breadth, kernel length and kernel breadth also had non-significant positive correlation at both levels. Similar results were reported by Augustina *et al.* (2013) [2] and Atif Elsadig Idris and Khalid Abdalla Mohamed (2013) [1] for number of grains per panicle, Basavaraja *et al.* (2011) [3] for panicle length and Saravanan and Sabesan (2009) [14] for kernel breadth. This indicated that association between these characters could be utilized for increasing grain yield. This corroborates with the findings of Veera Naresh (2011) [16]. Thus suggesting that selection pressure applied for increasing the characters will eventually increase the grain yield per plant. The inter relationship among the individual characters, like plant height had significant positive correlation with grain breadth (Latha *et al.*, 2003; Raju *et al.*, 2003) [8, 12], number of productive tillers had significant positive correlation with grain yield per plant and significant negative correlation with panicle length (Shivani and Sree Rama Reddi, 2000) [15], while number of grains per panicle had significant negative correlation with grain breadth, 1000 grain weight had significant association with grain breadth and grain yield per plant. These results are in conformity with the findings of Raju *et al.* (2001) [13] for plant height, Ganapathy *et al.* (2006) [5] for number of productive tillers per plant. Malarvizhi (2006) [9] for panicle length with number of grains per panicle and Mustafa Sadeghi (2011) [10] for 1000 grain weight with grain length. This study revealed that the character *viz.*, number of grain per panicle, number of productive tillers per plant, 1000 grain weight, panicle length and kernel breadth might be applied with selection pressure to improve grain yield per plant.

Table 1: List of genotypes

S. No.	Name of genotype	Origin
1	ADT 36	TRRI, TN, India
2	ADT 37	TRRI, TN, India
3	ADT 38	TRRI, TN, India
4	ADT 39	TRRI, TN, India
5	ADT 40	TRRI, TN, India
6	ADT 41	TRRI, TN, India
7	ADT 42	TRRI, TN, India
8	ADT 43	TRRI, TN, India
9	ADT 45	TRRI, TN, India
10	ADT 46	TRRI, TN, India
11	ADT 47	TRRI, TN, India
12	ADT 48	TRRI, TN, India
13	ADT 49	TRRI, TN, India
14	ADT 50	TRRI, TN, India
15	Swarna	CRRI, Cuttack, India
16	MTU 1010	A.N.G.R.A.U Research station, A.P, India.
17	MTU 1001	A.N.G.R.A.U Research station, A.P, India.
18	PY 3	KVK, Pondicherry, India
19	BPT 5204	Agricultural college, Bapatla, A.P, India
20	TRY 2	Tamilnadu Agricultural University, Trichy
21	TRY 3	Tamilnadu Agricultural University, Trichy
22	MDU 4	Agricultural College & Research Institute, Madurai
23	ASD 16	Ambasamudram
24	ASD 19	Ambasamudram
25	Jai jailu	Land races, Telangana, India
26	Jai shriram	Land races, Telangana, India
27	PMK 3	ARS, Paramkudi, India
28	IR 72	IRRI, Philippines
29	CO 49	AC & RI, Coimbatore, India
30	CO 50	AC & RI, Coimbatore, India
31	NLR 34449	A.N.G.R.A.U Research station, A.P, India.
32	TN 1	Directorate of Rice Research, Hyderabad
33	IR 64	IRRI, Philippines

Table 2: Genotypic and phenotypic correlation analysis for eleven characters of rice

S. No.	Characters		Days to first flower (days)	Plant height (cm)	No. of tillers per plant	Panicle length (cm)	No. of. grains per panicle	Thousand grain weight (g)	Grain length (cm)	Grain breadth (cm)	Kernel length (cm)	Kernel breadth (cm)	Grain yield per plant (g)
1	Days to first flower (days)	G	1.00	0.17	0.13	-0.12	0.07	0.04	-0.16	0.19	-0.02	0.19	0.22
		p	1.00	0.17	0.12	-0.09	0.05	0.06	-0.16	0.16	-0.02	0.17	0.21
2	Plant height (cm)	G		1.00	0.04	0.32	-0.22	0.21	-0.15	0.37*	-0.09	0.22	0.17
		P		1.00	0.03	0.26	-0.22	0.21	-0.13	0.35*	-0.10	0.17	0.16
3	No. of productive tillers per plant	G			1.00	-0.47**	-0.12	0.04	-0.03	0.30	-0.00	-0.10	0.49**
		P			1.00	-0.25	-0.10	0.01	-0.06	0.17	-0.02	-0.08	0.40**
4	Panicle length (cm)	G				1.00	-0.16	-0.04	0.07	0.02	-0.00	-0.03	-0.33
		P				1.00	-0.11	0.00	0.09	0.04	-0.00	-0.01	-0.28

5	No. of. grains per panicle	G					1.00	-0.30	-0.10	-0.50**	-0.01	-0.21	0.26
		P					1.00	-0.28	-0.09	-0.45**	-0.01	-0.18	0.25
6	Thousand grain weight (g)	G						1.00	0.04	0.54**	0.15	0.37*	0.55**
		P						1.00	0.03	0.46**	0.12	0.30	0.50**
7	Grain length (cm)	G							1.00	-0.02	0.87**	-0.13	-0.06
		P							1.00	0.01	0.80**	-0.13	-0.06
8	Grain breadth (cm)	G								1.00	-0.03	0.58**	0.18
		P								1.00	-0.04	0.46**	0.15
9	Kernel length (cm)	G									1.00	0.04	0.10
		P									1.00	0.08	0.10
10	Kernel breadth (cm)	G										1.00	0.07
		P										1.00	0.07
11	Grain yield per plant (g)	G											1.00
		P											1.00

*Significant at 5 per cent level; **Significant at 1 per cent level

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