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RESEARCH ARTICLE

Correlation study between yield components in WA based rice hybrids

■ **Ashish Goswami and Vishal Seth**

SUMMARY

Twenty hybrids along with three cytoplasmic sterile lines (IR 58025A, IR 98897, IR 56256A, DRR 9A and DRR10A) and eighteen pollen parents were studied for character association for yield and its components. Correlation studies in conjunction with heterosis estimates gives some idea as to the relative importance of each of the components to final grain yield. It also gives some idea about the changed relationship between character pairs in parents as well as in hybrids, although it is a established fact that nature and magnitude of associations would vary with the composition of the material. In present study, simple correlation co-efficients were estimated at both phenotypic and genotypic levels in parents as well as hybrids, separately. It was observed that the magnitude of association varied in hybrids and parents. In hybrids the yield was primarily influenced by 100 grain weight, effective tillers per plant and number of fertile grains per panicle. In case of parents grain yield per plant found to be significantly and positively correlated with days to 50% flowering, panicle length, effective tillers per plant and number of fertile grains per panicle. Characters like effective tiller number per plant and fertile grains per panicle were significantly and positively correlated with each other as well as with grain yield per plant.

Key Words : Rice, Hybrids, Correlation, Character association

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Recently due to accelerated research efforts in India during last decade, made it the second country in the world after China to release hybrids in rice, which is now being considered as an important landmark. Vietnam is another country, which is growing hybrids at commercial scale, but they have used hybrids developed in China. Grain yield is a complex character and is controlled by many factors. Selection for desirable yield components should also consider for increasing overall grain yield. The correlation co-efficient may also help to identify characters that have little or no importance in the selection programme. The existence of correlation may be attributed to the presence of linkage or pleiotropic effect of genes or physiological and developmental relationship or environmental effect or in

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
Ashish Goswami, Department of Genetics and Plant Breeding, Udai Pratap Autonomous College, Varanasi (U.P.) India
Email : ashishgoswamiupc2013@gmail.com

Address of the Co-authors:
Vishal Seth, Department of Genetics and Plant Breeding, Udai Pratap Autonomous College, Varanasi (U.P.) India

combination of all (Oad *et al.*, 2002). During present investigation nature and magnitude of association of various component traits to grain yield was determined through simple correlation analysis. In the present study, simple correlation co-efficients between character traits have been estimated at both genotypic and phenotypic levels in parents and hybrids, separately. Correlation studies in conjunction with heterosis estimates gives some idea as to the relative importance of each of the components to final grain yield. It also gives some idea about the changed relationship between character pairs in parents as well as in hybrids, although it is an established fact that nature and magnitude of associations would vary with the composition of the material.

MATERIAL AND METHODS

A study was undertaken during the *Kharif*, 2015, at Agricultural Farm, Udai Pratap Autonomous College, Varanasi, U.P. to assess the correlation of yield and its components in 28 F1 hybrids and 23 parents (5 CMS lines and 18 pollinators). The crosses were effected with IR 58025A, IR 79156A, IR 68897A, DRR 10A and DRR 9A (CMS lines) and 18 pollinators (Pusa Basmati-1, Type-3, NDR-97, Pusa Sugandh-3, NDR-6093, NDR-359, Sarju-52, Pusa Sugandh-4, NDR-80, Badshah Bhog, Tarori Basmati, HUR-105, JR-32, Malviya-36, HUBR-2-1, MTU-7209, BPT-5204 and Kala Namak) during *Kharif*, 2012. The trial consisted of 28 F1 hybrids and 18 parents were transplanted at a spacing of 20 cm x 15 cm in a Randomized Block Design with three replications with single seedling per hill. Each plot consisted of three rows of 10 plants each. The F1 hybrids were surrounded by their respective pollen parents in order to eliminate border effects and consequently more number of plants were made available for recording the observations. Recommended agronomic cultural practices were followed to raise a good crop. Observations were recorded on five randomly selected plants in each replication for nine quantitative traits, *viz*., days to 50% flowering, days to maturity, plant height, panicle length, effective tiller number per plant, number of fertile grains per panicle, 100 seed weight and grain yield per plant. Genotypic and phenotypic correlation co-efficients were computed as suggested by Johnson *et al*. (1955). The test of significance for correlation co-efficients were compared according to Fisher and Yates (1938) at n-2 degrees of freedom at 5% and 1% level of significance, respectively.

RESULTS AND DISCUSSION

Simple correlation co-efficients between yield and its components as well as among yield components were computed in parents and hybrids separately at genotypic and phenotypic levels and are presented in Table 1 and 2, respectively. In parents grain yield per plant was found to be significantly and positively correlated with days to

Table 1 : Genotypic and phenotypic co-rrelation coefficients between 9 character affecting grain yield among parents

Characters		Days to maturity	Plant height	Panicle length	Effective tiller no. per plant	No. of fertile grains per panicle	100 grain weight	Grain yield per plant	Spikelet density
Days to 50%	G	0.957**	0.117	0.607*	0.718**	0.464	0.013	0.666**	0.158
flowering	P	0.934**	0.115	0.595*	0.658**	0.432	0.013	0.542*	0.144
Days to maturity	G		0.185	0.472	0.693**	0.503	0.084	0.639*	0.302
	P		0.179	0.452	0.619*	0.464	0.082	0.506	0.271
Plant height	G			-0.309	-0.333	-0.367	0.025	-0.172	-0.228
	P			-0.305	-0.298	-0.329	0.025	-0.139	-0.184
Panicle length	G				0.650*	0.557*	-0.215	0.666**	0.004
	P				0.583*	0.503	-0.211	0.573*	-0.025
Effective tiller no.	G					0.871**	0.231	0.917**	0.604*
per plant	P					0.721**	0.201	0.677**	0.471
No. of fertile	G						0.198	0.908**	0.832**
grains per panicle	P						0.185	0.670**	0.849**
100 grain weight	G							0.258	0.353
	P							0.214	0.312
Grain yield per	G								0.643*
plant	P								0.415

* and ** indicate significance of values at P=0.05 and 0.01, respectively G: Genotpic P: Phenotypic

Table 2 : Genotypic and phenotypic correlation co-efficients between 9 characters affecting grain yield among F_1 hybrids

Characters		Days to maturity	Plant height	Panicle length	Effective tiller no. per plant	No. of fertile grains per panicle	100 grain weight	Grain yield per plant	Spikelet density
Days to 50%	G	0.80*	0.309	-0.287	-0.466*	-0.657**	-0.419	-0.633**	-0.644**
flowering	P	0.769*	0.303	-0.224	-0.445	-0.619**	-0.413	-0.583**	-0.603**
Days to maturity	G		0.596**	-0.464*	-0.515*	-0.816**	-0.510*	-0.786**	-0.776**
	P		0.579**	-0.388	-0.477**	-0.770**	-0.497*	-0.704**	-0.727**
Plant height	G			-0.347	-0.309	-0.690**	-0.332	-0.733**	-0.620**
	P			-0.267	-0.287	-0.660**	-0.331	-0.697**	-0.588**
Panicle length	G				0.549*	0.386	0.192	0.401	0.212
	P				0.388	0.319	0.155	0.308	0.184
Effective tiller no. per	G					0.560*	0.390	0.529*	0.473*
plant	P					0.510*	0.371	0.455*	0.428
No. of fertile grains	G						0.428	0.971**	0.980**
per panicle	P						0.407	0.881**	0.978**
100 grain weight	G							0.453*	0.397
	P							0.426	0.375
Grain yield per plant	G								0.938**
	P								0.838**

* and ** indicate significance of values at P=0.05 and 0.01, respectively G: Genotypic P: Phenotypic

50% flowering, panicle length, effective tiller number per plant and number of fertile grains per panicle, both at phenotypic and genotypic level. Grain yield per plant was found to be significantly and positively associated with days to maturity only at phenotypic level. This indicates that environment has considerable effect on the duration of genotypes. The findings are quite similar to the observations reported by several workers such as Morais (1980), Manuel and Rangaswamy (1993), Sharma and Sharma (2007) and Ravindra Babu *et al.* (2012). During present investigation plant height was found to be negatively correlated with grain yield per plant. This observation was in conformity with the earlier reports of Amirtha Devarathinam (1983) and Tahir *et al*. (1988) but contradictory to the reports of Morais (1980) and Lu *et al*. (1988). In hybrids on the other hand correlation of effective tiller number per plant, number of fertile grains per panicle and 100 grain weight were found to be highly significant and positive with grain yield per plant. The present investigations are in accordance with the reports of Junhua and Shoujun (1991), Mahetre *et al.* (1994) and Chandra *et al*. (2009). Studies on hybrids revealed that association of days to 50% flowering, days to maturity and plant height with grain yield per plant was highly significant and negative, which is in accordance with Amirtha Devarathinam (1983) and Mahetre *et al.* (1994) but not in conformity with the reports of Morais (1980), Jangle *et al.* (1987) and Junhua and Shoujun (1991) as far as association of plant height and grain yield is concerned.

Study of association between components of yield in parents suggested that effective tillers per plant was positively and significantly associated with days to 50% flowering, days to maturity and panicle length, both at the phenotypic and genotypic levels. Characters like effective tiller number per plant and fertile grains per panicle were significantly and positively correlated with each other as well as with grain yield per plant. Study of association among the component traits of yield in hybrids showed positive and significant correlation between days to 50% flowering and days to maturity, plant height and days to maturity, panicle length and effective tiller number per plant, panicle length and number of fertile grains per panicle, effective tiller per plant and number of fertile grains per panicle. Highly significant and positive correlation had been observed among characters like 100 grain weight with number of fertile grains per panicle as well as with grain yield per plant. In hybrids panicle length was found to be positively correlated with 100 grain weight, grain yield per plant and spikelet density but it was not significant. Spikelet density showed almost similar behaviour with other traits as showed by grain yield per plant. These observations are in accordance with earlier reports of Jangle *et al*. (1987); Junhua and Shoujun (1991); Manuel and Rangaswamy (1993); Reddy *et al.* (2013) and Kumar and Nilanjaya (2014).

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