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# Character Association Analysis for Yield, Yield Attributes in Swarna X Type 3 Ril Population of Rice

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**ABSTRACT**

*The present study was undertaken with the objective to determine the degree of association between grain yield and yield attributing traits in Swarna x Type 3 RIL population of rice. 100 RIL populations were evaluated for identifying their efficiency with respect to eight characters. The correlation studies revealed that grain yield per plant showed strong positive significant association with plant height and 1000-seed weight. Positive non- significant association of grain yield per plant was observed with days to 50 per cent flowering, panicle length, number of filled grains per panicle.*

***Key words:*** *Rice, Food crop, Yield, Productivity*

## INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most predominant food crops in India in terms of area, production and consumer preference. India is the second largest producer and consumer of rice in the world.

Rice is the premier food crop in India occupying nearly 43.0 million hectares with annual production of 106.54 million tonnes and productivity of 2424 Kg ha-1 per hectare[8]. Area under rice cultivation Telangana State in nearly 1.65 million hectares while the production is 4.3 million tonnes and productivity in 3162 kg ha-1. To meet the demands of growing population and to achieve food security in the country the present production levels need to be increased by two million tonnes every year.

It is estimated that 120 million tonnes of rice is required to feed the increasing population by 2020. The selection criteria may be yield or one or more of the yield component characters. However, breeding for high yield crops require information relationship of yield with other agronomic characters and the degree of environmental influence on the expression of these component characters. Since grain yield in rice is quantitative in nature and polygenically controlled, effective yield improvement and simultaneous improvement of yield components are imperative. To enhance the yield productivity, correlation studies between yield and yield components are pre requisite to plan a meaningful breeding programme to develop high yielding inbreds and hybrids.

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## MATERIAL AND METHODS

The experiment was conducted at Indian Institute of Rice Research Farm, Ramachandrapuram, Hyderabad, India, during *kharif*, 2017. The experimental material comprised of 100 RILs of F7 population derived from Swarna and Type 3 along with four checks (Swarna, Type 3, BPT 5204, Chittimutyalu) laid out in Augmented Block Design. All the recommended package of practices was followed along with necessary prophylactic plant protection measures to raise a good crop.

Five representative plants for each population were randomly selected to record observations on the quantitative characters under study. Data on days to 50% flowering (DFF) recorded at flowering stage while, plant height (PH), panicle length (PL), number of productive tillers per plant (NPT) were recorded at harvest and panicle weight, number of filled grains per panicle (FGP), test-weight (TW) and grain yield per plant (GY) were recorded after harvest.

***Statistical analysis***

Simple correlation coefficients were calculated for grain yield and its components using the formulae given by Webber and Moorthy.

## RESULTS AND DISCUSSION

Grain yield is a complex character and is dependent on its contributing traits. A study was envisaged on character association, to assess the relationships among yield and its components and to have an insight into the causes for higher yield in hybrids and varieties. Simple correlations were worked out on yield and yield contributing characters in 100 RIL population of rice (Table 1).

**Days to 50 % flowering**

The character days to 50 per cent flowering recorded a non-significant positive correlation with grain yield per plant (0.0807), test weight (0.1433), panicle weight (0.1232), number of filled grains per panicle (0.0690). It showed negative and significant correlation with plant height (-0.2523**) and non–significant negative for panicle length (-0.0135), number of productive tillers per plant (-0.0674).

The Similar findings were recorded by Nandan, Sarker *et al*.[22] for number of filled grains per panicle, Rao *et al.*[19] for 1000 seed weight, Madhavilatha *et al.*[12], Chandra *et al*[6], Rao *et al.*[19] for single plant yield, Rao *et al.*[19] for panicle length.

**Plant height (cm)**

The trait plant height had shown a significant positive correlation with single plant yield (0.2150*). It had positive non-significant correlation with plant height (0.1145), number of productive tillers per plant (0.0901), panicle weight (0.0103), test weight (0.0233), negative significant correlation with days to 50 % flowering (-0.2523**) and negative non-significant correlation with number of filled grains per panicle (-0.0247).

The results are in accordance with Rao *et al.*[19] for number of productive tillers per plant, Nandan for number of filled grains per panicle Sala and Geetha[21] for panicle length, Dhurai *et al*.[7] for 1000 seed weight, Rajendra Prasad *et al*.[15] for panicle weight. Reddy *et al*.[20], Patel *et al.*[14], Biswash *et al*.[4], Thippeswamy *et al*.[24], Kalyan *et al.*[9] and Priya *et al*.[16] for single plant yield.

**Panicle length (cm)**

Panicle length registered non-significant positive correlation with plant height (0.1145), number of filled grains per panicle (0.0153), grain yield per plant (0.0306) and non-significant negative correlation with days to 50 % flowering (-0.0135), 1000 grain weight (-0.0399), number of productive tillers per plant (-0.0059), panicle weight (-0.0874).

Similar results were reported by Rao *et al.*[19] for days to 50 % flowering, Raju[18], Sala and Geetha[21] for plant height, Rahman *et al.*[17] for number of filled grains per panicle, Dhurai *et al.*[7] for 1000 seed weight, Dhurai *et al.*[7] for number of productive tillers per plant,

Madhavilatha *et al.*[12], Krishna *et al.*[10], Seyoum *et al.*[23] for single plant yield.

**Panicle weight**

Panicle weight exhibited significant positive correlation with 1000 grain weight (0.2880**), non-significant positive correlation with days to 50% flowering (0.1232), plant height (0.1034), single plant yield (0.1099), non-significant negative correlation with plant height (-0.0874), number of productive tillers per plant (-0.0282), filled grains per panicle (-0.0229).

Prasad *et al.*[15] also reported similar results for 1000 seed weight and plant height.

**Number of productive tillers per plant**

Number of productive tillers per plant exhibited non-significant positive correlation with plant height (0.0901), grain yield per plant (0.0378). It had negative non-significant correlation with days to 50% flowering (-0.0674), panicle length (-0.0059), number of filled grains per panicle (-0.0551), panicle weight (-0.0282) and test weight (-0.0406).

The results were in conformity with Rao *et al.*[19] for plant height, Dhurai *et al.*[7] for panicle length, Seyoum *et al.*[23], Rahman *et al.*[17] for single plant yield, Rao *et al*[19] for 1000 seed weight.

**Number of filled grains per panicle**

Number of filled grains per panicle exhibited a non-significant positive correlation with days to 50 % flowering (0.0690), panicle length (0.0153), grain yield per plant (0.1027) and 1000 seed weight (0.0203) whereas non-significant negative correlation with plant height (-0.0247), number of productive tillers per plant (-0.0551) and panicle weight (-0.0229)

Similar findings were reported by Nandan , Sarker *et al.*[22] for days to 50 % flowering, Nandan for plant height, Rahman *et al.*[17] for panicle length, Biswash *et al.*[4], Thippeswamy *et al.*[24], Lakshmi *et al.*[11] for 1000 seed weight, Rahman *et al.*[17], Rashid for single plant yield.

**1000 grain weight**

Thousand grain weight showed highly significant positive correlation with panicle weight (0.2888**), grain yield per plant (0.3937**) and non-significant negative correlation with panicle length (-0.0399), number of productive tillers per plant (-0.0406) and positive non-significant correlation with days to 50% flowering (0.1433), plant height (0.0233), number .of filled grains per panicle (0.0203). This trait acts as an selection criterion for improvement of grain yield per plant.

Basavaraja *et al.*[3], Chakraborty and Chaturvedi[5], Naseem *et al.*[13] , Patel *et al.*[14], Rahman *et al.*[17], Rao *et al.*[19], Rashid , Anil kumar *et al.*[1] , Ashok *et al.*[2], Kalyan *et al.*[9], Lakshmi *et al.*[11], Priya *et al.*[16] for grain yield per plant.

**Grain yield per plant**

Grain yield per plant had significant positive association with plant height (0.21500*), 1000 seed weight (0.3937**). The trait recorded a non- significant positive association with days to 50 per cent flowering (0.0807), panicle length (0.0306), number of productive tillers per plant (0.0378), panicle weight (0.1099), number of filled grains per panicle (0.1027).

Similar kind of association was revealed by Madhavilatha *et al.*[12], Rao *et al.*[19] for days to 50% flowering, Nandan , Reddy *et al.*[20], Patel *et al.*[14], Biswash *et al.*[4], Thippeswamy *et al.*[24], Priya *et al.*[16] for plant height, Seyoum *et al.*[23], Rahman *et al.*[17] for number of productive tillers per plant, Madhavilatha *et al.*[12], Seyoum *et al.*[23] for panicle length, Rahman *et al.*[17] for number of filled grains per panicle, Basavaraja *et al.*[3] , Naseem *et al.*[13] , Patel *et al.*[14], Rahman *et al.*[17], Rao *et al.*[19], Anil kumar *et al.*[1], Ashok *et al.*[2], Lakshmi *et al.*[16] and Priya *et al.*[16] for 1000 seed weight.

**Table 1: Phenotypic correlation co-efficient for yield and yield attributes in RIL population of rice**

| | DFF | PH | PL | NT | PW | FGP | TW | SPY |
|---|---|---|---|---|---|---|---|---|
| DFF | 1.0000 | -0.25237** | -0.01350 | -0.06742 | 0.12325 | 0.06909 | 0.14333 | 0.08072 |
| PH | | 1.0000 | 0.11451 | 0.09012 | 0.10340 | -0.02478 | 0.02336 | 0.21500* |
| PL | | | 1.0000 | -0.00590 | -0.08740 | 0.01530 | -0.03999 | 0.03064 |
| NT | | | | 1.0000 | -0.02825 | -0.05510 | -0.04068 | 0.03782 |
| PW | | | | | 1.0000 | -0.02298 | 0.28880** | 0.10992 |
| FGP | | | | | | 1.0000 | 0.02035 | 0.10278 |
| TW | | | | | | | 1.0000 | 0.39373** |
| Fe | | | | | | | | -0.40593** |
| Zn | | | | | | | | -0.42433** |
| SPY | | | | | | | | 1.0000 |

*Significant at 5% probability level

** significant at 1% probability level

DFF = Days to 50% flowering PH = Plant height (cm) PL = Panicle length

NT = Number of tillers plant$^{-1}$ PW = Panicle weight (g) FGP = Filled grains per panicle

SPY = Single plant yield (g) TW = Test weight (g) Fe = Iron

Zn = Zinc

## CONCLUSION

From present studies revealed that grain yield showed strong positive significant association with plant height and 1000-seed weightThe positive significant correlation of these traits on yield resulted in strong genetic correlation. Hence, due emphasis should be given to these traits in formulating selection criteria to bring yield as well as grain quality improvement.

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