



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2026.v26.no.1.147>

GENETIC ANALYSIS OF THE INTERRELATIONSHIPS AMONG GRAIN YIELD AND ASSOCIATED TRAITS IN DRY DIRECT-SEEDED RICE (*ORYZA SATIVA* L.)

V. Sridhar^{1*}, N. Lingaiah¹, G. Shiva Prasad¹ and K. Sumalini²

¹Agricultural Research Station, Kampasagar, Nalgonda –508 207, Telangana, India.

²Department of Genetics and Plant Breeding, College of Agriculture, Professor Jayashankar Telangana Agricultural University, Rajendranagar, Hyderabad – 500 030, Telangana, India.

*Corresponding author E-mail : sridharphd@pjtau.edu.in

(Date of Receiving-04-12-2025; Date of Revision-20-01-2026; Date of Acceptance-09-02-2026)

ABSTRACT

The study was conducted on thirty rice genotypes including released varieties and advance breeding lines to establish the nature of relation between grain yield and yield components by partitioning its components into direct and indirect effects by using simple correlation and path analysis for making efficient selection strategy in rice breeding programs aimed at developing varieties suitable for dry direct-seeded systems. The results from this study depicts that grain yield exhibited highly significant and positive association with grain filling percentage followed by seedling vigour index, no. of effective tillers/m², no. of filled grains/panicle and panicle length. However, it exhibited significant negative association with days to 50% flowering and non-significant negative association with plant height and test weight. Path coefficient analysis revealed that highest positive direct effect on grain yield was exerted by grain filling percentage followed by seedling vigour index, no. of filled grains/panicle, panicle length. Therefore, the traits grain filling percentage, seedling vigour index number of filled grains per panicle, and panicle length should be given emphasis in making selection strategy for yield improvement or developing varieties suitable for dry direct-seeded systems.

Key words : Rice, Dry DSR, Correlation, Path coefficient, Vigour Index, Yield traits.

Introduction

Rice (*Oryza sativa* L.) is a major staple food for much of the developing world, particularly in Asia. Traditionally, rice is established through transplanting. Challenges such as declining groundwater levels, peak-season labor shortages and soil degradation are associated with this conventional practice which has accelerated the need for alternative crop establishment methods (Jagdeep and Singh, 2024; Dey *et al.*, 2025). Dry Direct-seeded rice, one of the oldest cultivation practices, is gaining popularity due to its lower input requirements. Dry DSR offers several advantages, including reduced labor and water use, earlier crop maturity, lower production costs, improved soil structure for subsequent crops, reduced methane emissions and greater flexibility in cropping systems (Mishra *et al.*, 2023). Strong seedling

vigour promotes vigorous early growth, improves nutrient uptake and weed competitiveness, thereby contributing to stable crop establishment and yield stability under variable environments (Maila *et al.*, 2025) With appropriate management practices- such as selecting suitable cultivars, timely sowing, optimal seed rates, effective weed control, and maintaining adequate soil moisture- DDSR can achieve yields comparable to transplanted rice. Grain yield is a complex trait, and the identification of superior genotypes based on yield alone is challenging due to the integrated plant architecture, where component traits are governed by a large number of genes. Understanding the degree of association among yield-contributing traits is therefore crucial, as it helps in identifying key characters that should be given greater emphasis during the selection process. Correlation analysis

measures the degree of association between traits but does not explain cause-and-effect relationships. To overcome this limitation Wright (1921) developed the concept of Path analysis, but the technique was first used for plant selection by Dewey and Lu (1959). It is a statistical technique used to partition observed correlation coefficients into direct and indirect effects of individual yield components on grain yield. This analysis provides a clear and quantitative understanding of trait interrelationships, thereby facilitating the formulation of efficient and effective selection strategies in crop improvement programs especially under dry DSR systems.

Materials and Methods

A total of thirty rice genotypes including released cultivars and advanced cultures were used in the present research for studying the correlation and path analysis. The experiment was conducted following Randomised Block Design with 3 replications during *Kharif*, 2021 at Agricultural Research Station, Kammasagar, Nalgonda, Telangana situated between 16.8536 N latitude and 79.4569 longitudes at 152 m above mean sea level. Each genotype was directly sown by dibbling in unpuddled soil, at a distance of 15 cm between plants and 20 cm between rows with a plot size of 10.5 m² each. Normal agronomical practices and plant protection measures with external inputs such as supplementary irrigation and fertilizers were given at appropriate time to maintain a consistent and healthy crop stand.

Data were recorded on a total of nine morphological traits. Data on plant height, no. of effective tillers/ m², panicle length, no. of filled grains/panicle, grain filling percentage, seedling vigour index were recorded on five randomly selected plants in each plot. Days to 50 % flowering, grain yield were recorded on plot basis and test weight was recorded per replication in each genotype.

Correlation and Path coefficient analysis was carried out using Windostat Version 9.1 software to determine the direct and indirect effects of traits on grain yield. Correlation analysis among yield related traits is essential for understanding the relationships among traits and for identifying key selection criteria that can simultaneously enhance multiple components of ultimate grain yield. Path coefficient analysis is used to estimate the relationships between traits by partitioning correlation coefficients into direct and indirect effects.

The data collected on all the characters were subjected to standard methods of analysis of variance (Panse and Sukhatme, 1985). The approach outlined by Singh and Chaudary (1995) was used to estimate

correlations. The correlation coefficients were compared to the table values at (n-1) degrees of freedom at the 5% and 1% levels of significance, in order to identify significance of the data and Path coefficient analysis was carried out at the genotypic and phenotypic levels as subjected by Wright (1921) and discussed by Dewey and Lu (1959).

Results and Discussion

The analysis of variance revealed significant differences among the genotypes for all the characters studied indicating that the data generated from the above diverse material would yield reliable information (Table 1). The estimates of simple correlation coefficients at phenotypic and genotypic levels computed between nine characters under study are presented in Table 2. The direct and indirect effects of nine characters on grain yield, estimated through path coefficient analysis using phenotypic and genotypic correlations, are presented in Table 3.

Correlation between grain yield and its components:

High genotypic correlations, in general, as compared to their phenotypic counterparts indicated the existence of strong inherent association between the characters which might be due to the masking or modifying effect of the environment on the genetic association between the characters.

Genotypic and phenotypic correlations revealed that grain yield had significant positive association with grain filling percentage (0.728/0.362), seedling vigour index (0.513/0.231), no. of effective tiller s/m² (0.261/0.110), no. of filled grains/panicle (0.119/0.202) and panicle length (0.110/0.022). The positive significant association of the grain yield indicates that all these characters were important for yield improvement. Similar kind of association was revealed by Umarani *et al.* (2019), Muthuvijayaragavan and Jebaraj (2022) and Shrivastav and Verma (2023) for number of effective tillers, Umarani *et al.*, (2019), Shrivastav and Verma (2023), Gilbert *et al.* (2023), Anurag Kumar *et al.* (2025), Islam *et al.* (2025), Singh *et al.* (2026) and for panicle length, Rashad Khan *et al.* (2022), Gilbert *et al.* (2023), Shrivastav and Verma (2023), Anurag Kumar *et al.* (2025) and for number of filled grains per panicle, Singh *et al.* (2023), Shrivastav and Verma (2023), Anurag Kumar *et al.* (2025) for grain filling percentage, Umarani *et al.* (2019), Singh *et al.* (2023) and Singh *et al.* (2026) for no. of filled grains/panicle, Adebisi *et al.* (2010), Gilbert *et al.* (2023), Vamsi Krishna *et al.* (2025) and Akanksha Singh *et al.* (2025) for seedling vigour index. Hence, these

Table 1 : Analysis of variance for mean squares of nine morphological traits in rice.

Source of Variation	df	Mean Sum of Squares								
		DFP	PH	NFT	PL	NFG	TW	GFP	SVI	GY
Replication	2	0.16	1.98	22.5	7.97	15.99	0.363	30.1	12000	975667
Genotype	29	290.96**	471.45**	19558.7**	19.94**	2589.34**	68.10**	226.77**	980388**	2701805**
Residuals/Error	58	5.58	66.32	174.1	4.39	291.36	8.99	56.05	92690	1106653

d.f: degree of freedom, DFP: Days to 50% flowering, PH: Plant Height (cm), NFT: No. of effective tillers/m², PL: Panicle length (cm), NFG: No. Of filled grains/panicle, TW: Test weight (g), GFP: Grain filling percentage, SVI: Seed Vigour Index, GY: Grain yield (kg/ha) ** Significant at 1% level of significance.

characters could be considered as criteria for selection for higher yield as these were mutually and directly associated with grain yield.

Grain yield showed significant negative association with days to 50% flowering (-0.739/-0.388) followed by non-significant negative correlation with plant height (-0.171/0.124) and test weight -0.029-0.013) (Table 1). The similar results were reported by Priyanka *et al.* (2016), Vikas Dubey *et al.* (2018), Saleh *et al.* (2020), Muthuvijayaragavan and Jebaraj (2022), Shrivastav and Verma (2023), Yash *et al.* (2024), Akanksha Singh *et al.* (2025) for days to 50 per cent flowering, Vikas Dubey *et al.* (2018), Saleh *et al.* (2020), Saran *et al.* (2023), Muthuramu and Thangaraj (2023) for plant height and Fentie *et al.* (2021), Giri *et al.* (2023) for test weight. According to NeWall and Eberhart (1961) when two characters show negative phenotypic and genotypic correlation it would be difficult to exercise simultaneous selection for these characters in the development of a variety. Hence, under such situations, judicious selection programme might be formulated for simultaneous improvement of such important developmental and component characters.

Inter correlation among yield components

Days to 50% flowering exhibited significant positive association with plant height, significant but negative association with grain filling percentage and vigour index and non-significant associations with no. of effective tillers/m², panicle length, no. of filled grains/ panicle, test weight. Plant height showed significant positive association with panicle length, positive but non significant association with no. of effective tillers/m², test weight and a non-significant negative association is seen with no. of filled grains/ panicle and vigour index. No. of effective tillers/m² expressed significant positive association with test weight and vigour index, non significant positive association is seen with panicle length and grain filling percentage and significant negative association is seen with no. of filled grains/panicle. Panicle length exhibited non significant association with no. of filled grains/panicle, grain filling percentage, test weight and vigour index. No. of filled grains per panicle showed non significant negative association with test weight and non-significant associations with grain filling percentage and vigour index. Test weight expressed significant positive association with vigour index and non-significant negative association with grain filling percentage. Grain filling percentage showed significant positive correlation with vigour index and had a low level of positive indirect effect on grain yield through days to 50% flowering, plant

Table 2 : Estimates of genotypic (rg) and phenotypic (rp) correlation coefficients among grain yield and yield attributing traits in rice.

Trait	CC	DF	PH	NFT	PL	NFG	TW	GFP	SVI	GY
DF	rg	1.000	0.289	-0.078	-0.004	-0.031	-0.206	-0.619**	-0.377	-0.739**
	rp	1.000	0.207*	-0.075	0.027	-0.017	-0.169	-0.448 **	-0.323 **	-0.388**
PH	rg		1.000	0.072	0.729**	-0.101	0.047	-0.486*	-0.101	-0.171
	rp		1.000	0.071	0.473 **	-0.147	0.009	-0.225 *	-0.119	-0.124
NFT	rg			1.000	0.204	-0.099	0.305	0.134	0.242	0.261*
	rp			1.000	0.143	-0.069	0.233 *	0.092	0.225 *	0.146*
PL	rg				1.000	-0.236	0.170	-0.188	0.103	0.110*
	rp				1.000	-0.170	0.143	-0.022	-0.106	0.022*
NFG	rg					1.000	-0.587**	-0.229	0.066	0.119*
	rp					1.000	-0.453 **	-0.041	0.064	0.202*
TW	rg						1.000	-0.057	0.413	-0.029
	rp						1.000	-0.008	0.235 *	-0.013
GFP	rg							1.000	0.150	0.728**
	rp							1.000	0.084	0.362**
SVI	rg								1.000	0.513*
	rp								1.000	0.231*

CC: Correlation Coefficients, d.f: degree of freedom, DFF: Days to 50% flowering, PH: Plant Height (cm), NFT: No. of effective tillers/m², PL: Panicle length (cm), NFG: No. Of filled grains/panicle, TW: Test weight (g), GFP: Grain filling percentage, SVI: Seed Vigour Index, GY: Grain yield (kg/ha) *Significant at 5 per cent level; **Significant at 1 per cent level.

height, no. of effective tillers/m² and vigour index and negative indirect effect through panicle length and no. of filled grains/panicle. Seedling Vigour index expressed a significant association with no. of effective tillers/ m² and test weight.

Path co-efficient analysis

Grain yield is a complex trait in rice and depends on several component traits, which are mutually related. Mere change in any one of the component trait would ultimately disturb the complex. Hence, these related traits have to be analyzed for their direct effects and indirect effects through other component characters on grain yield. Therefore, the total correlations were partitioned into direct and indirect effects. Path coefficient analyses were estimated both at genotypic and phenotypic levels to resolve the direct and indirect effects of different characters on grain yield of rice under dry DSR conditions

Direct effects

Path coefficient analysis (Table 3) revealed that highest positive direct effect on grain yield was exerted by grain filling percentage (0.699/0.245) followed by seedling vigour index (0.315/0.111), no. of filled grains/panicle (0.266/0.211), panicle length (0.106/0.081), no.

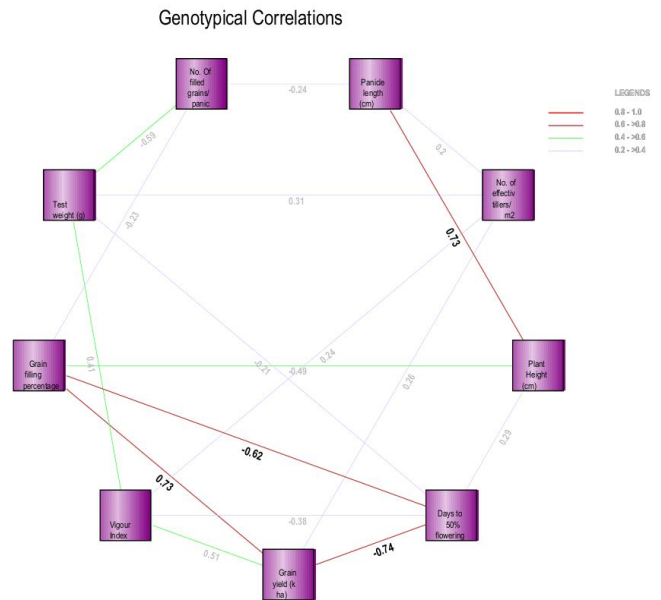


Fig. 1 : Genotypic correlations for grain yield and yield components in rice.

of effective tillers/m² (0.081/0.089) indicating that the selection for these traits was likely to bring about an overall improvement in grain yield directly. Therefore, it is suggested that preference should be given to these

Table 3 : Direct and indirect effects of yield component traits on grain yield in rice genotypes.

Trait	CC	DF	PH	NFT	PL	NFG	TW	GFP	SVI	GY
DF	G	-0.250	-0.072	0.019	0.001	0.008	0.051	0.155	0.094	-0.739**
	P	-0.232	-0.048	0.017	-0.006	0.004	0.039	0.104	0.075	-0.388**
PH	G	0.063	0.220	0.016	0.160	-0.022	0.010	-0.107	-0.022	-0.171
	P	-0.004	-0.021	-0.001	-0.010	0.003	-0.000	0.004	0.002	-0.124
NFT	G	0.006	0.005	0.081	0.016	-0.008	0.024	0.010	0.019	0.261*
	P	-0.006	0.006	0.089	0.012	-0.006	0.021	0.008	0.020	0.146*
PL	G	-0.000	0.077	0.021	0.106	-0.025	0.018	-0.020	0.011	0.110*
	P	0.002	0.038	0.011	0.081	-0.013	0.011	-0.001	-0.008	0.022*
NFG	G	0.008	-0.027	-0.026	-0.063	0.266	-0.156	-0.061	0.017	0.119*
	P	0.003	-0.031	-0.014	-0.036	0.211	-0.095	-0.008	0.013	0.202*
TW	G	0.014	-0.003	-0.021	-0.011	0.040	-0.068	0.003	-0.028	-0.029
	P	0.002	-0.000	-0.003	-0.002	0.007	-0.015	0.000	-0.003	-0.013
GFP	G	-0.433	-0.340	0.094	-0.131	-0.160	-0.040	0.699	0.105	0.728**
	P	-0.110	-0.055	0.022	-0.005	-0.010	-0.000	0.245	0.020	0.362**
SVI	G	-0.119	-0.032	0.076	0.032	0.020	0.130	0.047	0.315	0.513*
	P	-0.036	-0.013	0.025	-0.011	0.007	0.026	0.009	0.111	0.231*

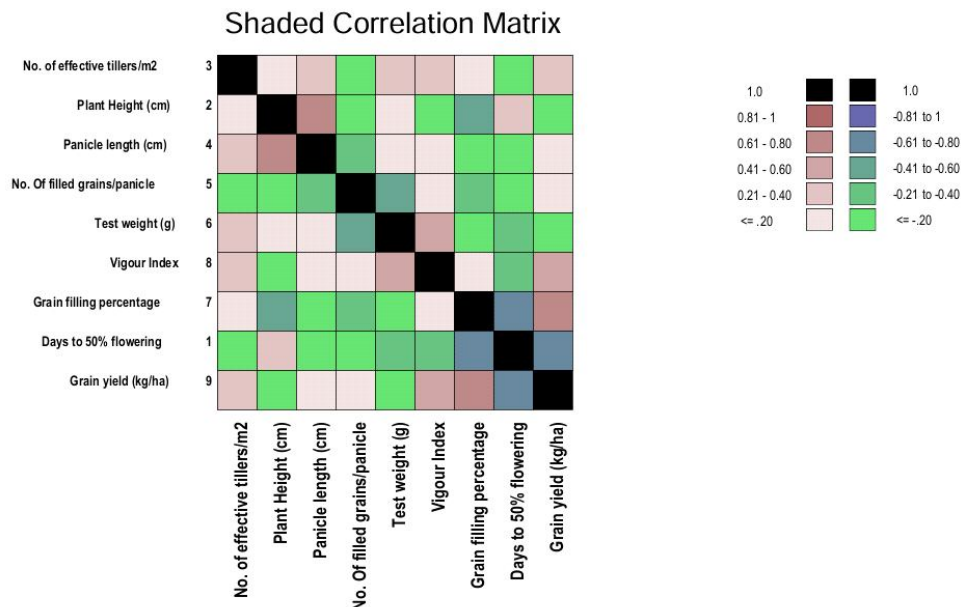
CC: Correlation Coefficients, d.f: degree of freedom, DFF: Days to 50% flowering, PH: Plant Height (cm), NFT: No. of effective tillers/m², PL: Panicle length (cm), NFG: No. Of filled grains/panicle, TW: Test weight (g), GFP: Grain filling percentage, SVI: Seed Vigour Index, GY: Grain yield (kg/ha)

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

Bold values - Direct effects; Normal values - Indirect effects.

G - Genotypic level; P - Phenotypic level

Residual effect: Genotypic = 0.338, Phenotypic = 0.457

**Fig. 2 :** Shaded correlation matrix for grain yield and yield traits in rice.

characters in the selection programme to isolate superior lines with genetic potentiality for high yield in rice genotypes. These results are in agreement with the findings of Adebisi *et al.* (2010), Akanksha Singh *et al.* (2025) for seedling vigour index, Umarani *et al.* (2019)

Rashad Khan *et al.* (2022) Shrivastav and Verma (2023) for number of filled grains per panicle, Rashad Khan *et al.* (2022) and Shrivastav and Verma (2023) for panicle length, Umarani *et al.* (2019) and Shrivastav & Verma (2023) for grain filling percentage and Vikas Dubey *et al.*

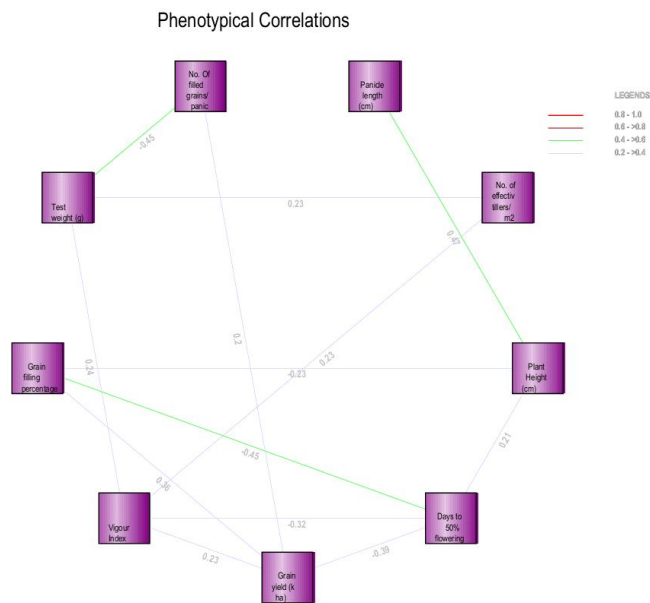


Fig. 3 : Phenotypic correlations for grain yield and yield traits in rice.

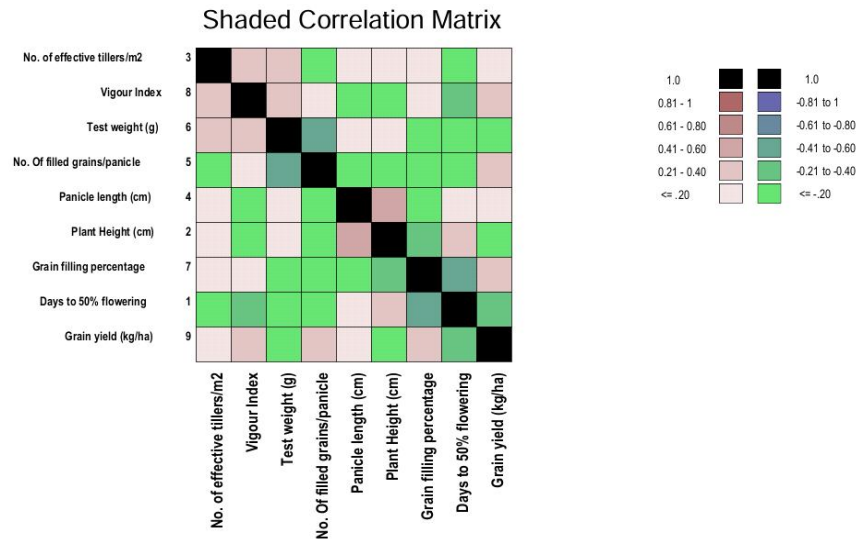


Fig. 4 : Shaded correlation matrix for grain yield and yield traits in rice.

al. (2018), Fentie *et al.* (2021) and Giri *et al.* (2023) for number of effective tillers.

Plant height recorded both positive (0.220) and negative direct effect (-0.021) on grain yield at phenotypic and genotypic levels, respectively Saleh *et al.* (2020), Anurag Kumar *et al.* (2025), Rashad Khan *et al.* (2022). The characters days to 50% flowering (-0.250/-0.232), and test weight (-0.068/-0.015) exhibited negative direct effects both at genotypic and phenotypic levels. These results were in conformity with the findings of Umarani *et al.* (2019), Saleh *et al.* (2020), Rashad Khan *et al.* (2022), Muthuvijayaragavan and Jebaraj (2022), Giri *et al.* (2023), Shrivastav and Verma (2023), Singh *et al.* (2023), Saran *et al.* (2023) and Akanksha Singh *et al.*

(2025).

Indirect effects

Days to 50% flowering showed indirect positive effect on grain yield through panicle length, test weight but exhibited indirect negative effect through plant height, no. of effective tillers/m², no. of filled grains/ panicle, grain filling percentage and vigour index. Plant height exhibited low level of indirect positive effect on grain yield through no. of effective tillers/m², panicle length and showed indirect negative effects through days to 50% flowering, no. of filled grains/panicle, grain filling percentage and vigour index. No. of effective tillers/m² exhibited indirect positive effect on grain yield through days to 50% flowering, panicle length, grain filling percentage and vigour index and indirect negative effects through plant height, no. of filled grains/ panicle and test weight. Panicle length recorded indirect positive effect of panicle length on grain yield is expressed via no. of

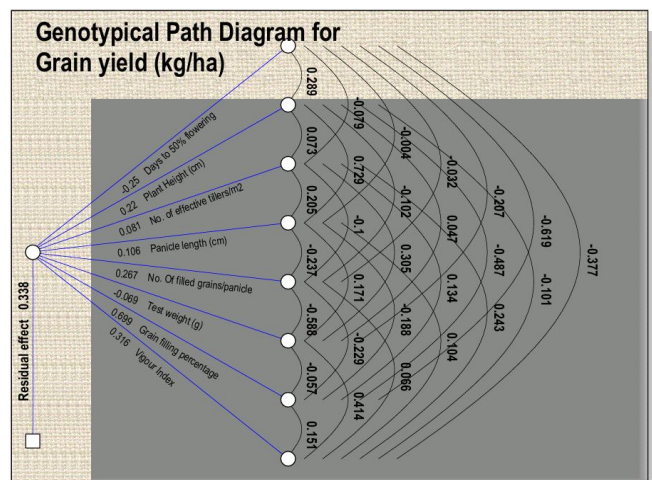


Fig. 5 : Genotypic path diagram of grain yield and yield traits in rice.

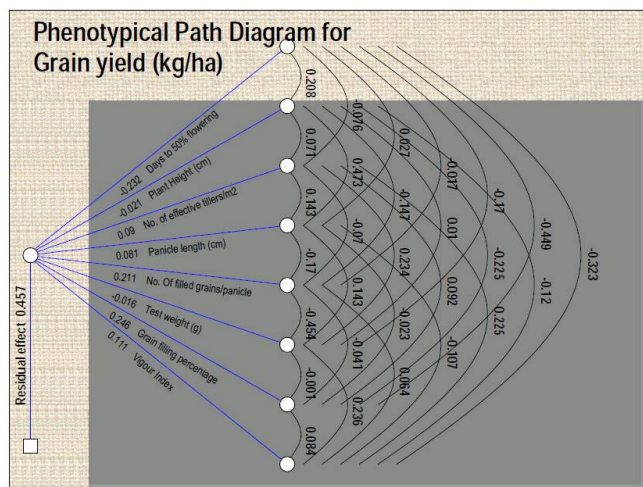


Fig. 6 : Phenotypic path diagram of grain yield and yield traits in rice.

effective tillers/m² and indirect negative effects through grain filling percentage and vigour index. No. of filled grains per panicle had indirect positive effects on grain yield via days to 50% flowering, plant height, test weight and vigour index and indirect negative effects via no. of effective tillers/m², panicle length and grain filling percentage. Test weight had low level positive direct effects with days to 50% flowering, no. of effective tillers/m², panicle length and vigour index. Grain filling percentage showed a low level of positive indirect effect on grain yield through days to 50% flowering, plant height, no. of effective tillers/m² and vigour index and negative indirect effect through panicle length and no. of filled grains/panicle. Seedling Vigour index exhibited indirect positive effect on grain yield via days to 50% flowering, plant height, no. of effective tillers/m², no. of filled grains/panicle and grain filling percentage and indirect negative effect via panicle length and test weight.

Conclusion

A critical analysis of both character association and path analysis among the yield components were made and found that the genotypic correlations were higher than the phenotypic correlation coefficients demonstrating that, the observed relationships among the various traits were due to genetic causes. Grain yield had positive and significant associations with grain filling percentage, seedling vigour index, no. of effective tillers/m², no. of filled grains/panicle and panicle length at genotypic and phenotypic levels. In contrast, grain yield had negative association with days to 50% flowering, plant height and test weight. Path coefficient analysis revealed that grain filling percentage, seedling vigour index, no. of filled grains/panicle, panicle length had the direct effects on grain yield with positive correlation at both at genotypic

and phenotypic levels, indicates the direct selection through these traits will be effective. Thus, selection of genotypes based on grain filling percentage, seedling vigour index, number of filled grains per panicle, and panicle length should be given emphasis when formulating selection criteria in rice breeding programs aimed at developing varieties suitable for dry direct-seeded systems.

References

- Adebisi, M.A., Okelola C.O., Alake Vaughan and Ajala M.O. (2010). Interrelationship between seed vigour traits and field performance in new rice for Africa (Nerica) genotypes (*Oryza sativa* L.). *J. Agric. Sci. Env.*, **10(2)**, 15-24.
- Akanksha Singh, S.C., Vimal Suraj Kumar, Bishawajit Kumar and Vaishnavi N. (2025). Genetic variability, heritability and trait association analysis in rice (*Oryza Sativa* L.) genotypes under eastern uttar pradesh agro-climatic conditions. *Plant Archives*, **25(2)**, 1355-1360.
- Anurag, Kumar, Pratishruti S. and Chakraborty N.R. (2025). Path and principal component analysis based trait selection for enhancing yield of aromatic rice in F₆ generation. *Plant Archives*, **25(2)**, 697-702.
- Chilaparathi, Vamsi Krishna, Lakshmi Narayana R., Nirmal Kumar V.A.R. and Keerthi S.Y. (2025). Assessment of Correlation and Path Analysis for early Seedling Vigour traits in Rice (*Oryza sativa* L.) under Laboratory conditions. *J. Adv. Biol. Biotechnol.*, **28(12)**, 322-332.
- Dejen, Bekis Fentie., Bayuh Belay Abera and Hussein Mohammed Ali (2021). Association of Agronomic Traits with Grain yield of Lowland Rice (*Oryza sativa* L.) Genotypes. *Int. J. Res. Agricult. Sci.*, **8(3)**, (Online), 2348–3997.
- Dewey, D.R. and Lu K.H. (1959). Correlation and path coefficient analysis for components of crested wheat grass seed production. *Agron. J.*, **51**, 515-518.
- Dey, S., Abhishek K., Saraswathibatla S. and Das D. (2025). Economic suitability of direct seeded rice across different geographies in India. *PLOS ONE*, **20(4)**, e0321472. <https://doi.org/10.1371/journal.pone.0321472>.
- Gilbert, G.J., Jasmin A.S., Ramchander S., Petchiammal I.K., Samundeswari R. and Kumar D.P. (2023). Evaluation of rice accessions for anaerobic germination, yield and attributing parameters in direct-seeded rice condition. *Biological Forum – An Int. J.*, **15(9)**, 230–239.
- Giri, P., Behera B., Jena N.K. and Prajapati B. (2023). Correlation matrix and path analysis for yield attributes in rice under various establishment methods. *The Pharma Innov. J.*, **12(5)**, 1121–1126.
- Islam, M.Z., Chakrabarty T., Akter N., Khalequzzaman M., Prince M.F.R.K., Pittendrigh B.R., Tomita M. and Ali M.P. (2025). Genetic variability, correlation and path coefficient analysis of phenotypic traits and genetic diversity of Aman rice landraces (*Oryza sativa* L.). *Scientific Reports*,

- 15, 18606.
- Jagdeep, S. and Singh G. (2024). A review on direct seeded rice: A sustainable approach to paddy cultivation. *Int. J. Scient. Res. Engg Trends*, **10(5)**, 2395–566.
- Maila, S., Maganti S.M., Rao P.V.R., Amaravathi Y. and Raghavendra T. (2025). Assessment of genetic variability and path analysis for early seedling vigour traits in rice (*Oryza sativa* L.) under laboratory and dry direct-seeded conditions. *Plant Cell Biotechnol. Mole. Biol.*, **26(9–10)**, 371–382.
- Mishra, S., Chaubey A.K. and Pathak J. (2023). Direct seeded rice: prospects, constraints and future research work. *Indian Farming*, **73(9)**, 11–14.
- Muthuramu, S. and Thangaraj K. (2023). Heritable variation and association of yield traits in advanced rice genotypes grown under dry direct-seeded condition. *The Pharma Innov. J.*, **12(11)**, 891–894.
- Muthuvijayaragavan, R. and Jebaraj S. (2022). Correlation and path coefficient analysis in F₂ families of rice (*Oryza sativa* L.) under direct seeded condition. *J. Gen., Genom. Plant Breed.*, **6(2)**, 44–53.
- NeWall, L.C. and Eberhart S.A. (1961). Clone and progeny evaluation in the improvement of switch grass (*Panicum virgatum* L.). *Crop Science*, **1**, 117-121.
- Panase, V.G. and Sukhatme P.V. (1985). *Statistical Methods for Agricultural Workers*. ICAR, New Delhi. 235 - 246.
- Priyanka, G., Senguttuvel P., Sujatha M., Raju N., Sravan Beulha P., Naganna P., Revathi P., Kemparaju K.B., Prasad A.S., Hari, Suneetha K., Brajendra, Sreedevi, B., Bhadana V.P., Sundaram R.M., Madhav, Sheshu Rao, Subba L.V., Padmavathi G., Rao, Sanjeeva, Kumar, R. Mahender, Subrahmanyam D. and Ravindrababu V. (2016). Correlation between traits and path analysis co-efficient for grain yield and other components in direct seeded aerobic rice (*Oryza sativa* L.). *Adv. Res. J. Crop Improv.*, **7(1)**, 40-45, DOI: 10.15740/HAS/ARJCI/7.1/40-45.
- Rashad Khan, A., Anandan T.K., Mishra D., Lenka and Ranjith P. (2022). Maximizing Rice Production via Direct seeded Rice: Insights from Correlation and Path analysis. *Biological Forum- An Int. J.*, **14(4a)**, 794.
- Saleh, M.M., Salem K.F.M. and Elabd A.B. (2020). Definition of selection criterion using correlation and path coefficient analysis in rice (*Oryza sativa* L.) genotypes. *Bull. Nat. Res. Centre*, **44**, 143.
- Saran, D., Gauraha D., Sao, A., Sandilya, V.K. and Kumar R. (2023). Correlation and path coefficient analysis for yield and yield attributing traits in rice (*Oryza sativa* L.). *Int. J. Plant Soil Sci.*, **35(18)**, 94–101.
- Shrivastav, S.P. and Verma O.P. (2023). Correlation and Path Coefficients Analysis for Yield and its Contributing Traits in Rice (*Oryza sativa* L.) under Sodic Soil. *J. Rice Res.*, **16(1)**, 32-40.
- Singh, A.K., Dwivedi D.K., Kumar D., Singh A., Dixit S., Khan N.A. and Kumar A. (2023). Genetic variability, character association and path coefficient analysis in rice (*Oryza sativa*) genotypes of semi-arid region of India. *Indian J. Agricult. Sci.*, **93(8)**, 844–849
- Singh, R.K. and Chaudhary B.D. (1985). *Biometrical methods in quantitative genetic analysis*. Kalyani Publishers, New Delhi, 308.
- Singh, S.K., Sirohi V., Bisane R.D., Krishna V.A., Poudel A.P. and Singh A. (2026). Deciphering genetic variability, correlation and path analysis for yield and yield-related traits in early rice (*Oryza sativa*) genotypes under the direct-seeded rice (DSR) system. *Agricult. Res.* DOI: 10.1007/s40003-025-00917-9.
- Umarani, E., Hemalatha V., Subbarao L.V., Neeraja C.N., Suneetha K. and Narender Reddy S. (2019). Studies on Character Association and Path Coefficient Analysis for Anaerobic Germination Traits, Yield and its Contributing Characters in Rice (*Oryza sativa* L.). *Int. J. Curr. Microbiol. App. Sci.*, **8(04)**, 355-362. DOI: <https://doi.org/10.20546/ijcmas.2019.804.039>.
- Vikas Dubey, Dwivedi D.K., Singh Akanksha, Rampreet and Chhavi (2018). Correlation and Path Coefficient Analysis of Yield Components in Rice under Drought Condition. *Int. J. Curr. Microbiol. App. Sci.*, **7**, 4116-4122.
- Wright, S. (1921). Correlation and causation. *J. Agricult. Res.*, **203**, 557-585.
- Yash, D. Barde, Madan R. Wandhare, Vandana S. Madke, Prema Manapure, Vedanti H. Bagade, Shital G. Kunte and Kartik C. Pardhi. (2024). Correlation and path analysis studies in rice (*Oryza sativa* L.). *Int. J. Adv. Biochem. Res.*, **8(9)**, 973-979.