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Genetic Variability and Trait Interrelationship Studies for Yield and Yield Contributing Traits in Pink Brinjal (*Solanum melongena* L.) under sub-tropical plains of Jammu

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ABSTRACT

Pink brinjal or kashmiri baingan, is one of the most popular and widely consumed vegetables in J&K. It is preferred for its attractive colour, silky texture, tiny seeds and delectable flesh. The majority of farmers use their own saved seed or landraces, regionally accessible germplasm, as well as readily available private seed company cultivars from the local market. Pink brinjal growers in the Jammu region suffer greatly due to the lack of high yielding varieties/hybrids as well as the prevalence of insect pests and diseases during the summer and rainy season. The present investigation was conducted during the year 2024-2025 to estimate the magnitude of genetic variability, to find out the correlation between the traits under study and work out the path analysis for twenty-one quantitative, qualitative, seed and biotic stress traits in pink brinjal. The experiment was laid out in a Randomized Complete Block Design with 37 genotypes (8 parents, one check and 28 F_1 hybrids) replicated thrice. The analysis of genotypic and phenotypic coefficient variance revealed a higher magnitude of PCV than the corresponding GCV for all characters which indicated the effect of environment on the character expression. The highest PCV and GCV were obtained for unmarketable fruit yield per plant. High heritability coupled with high genetic advance was observed for fruit weight showing the influence of additive gene action on the characters hence, may be useful for selection. Fruit yield per hectare showed a positive and significant correlation with plant height, fruit diameter, number of fruits per plant, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant and total fruit yield per plant while fruit yield per hectare showed a negative and significant correlation with days to first flowering, days to first harvest, number of branches per plant, plant spread and fruit length. Marketable fruit yield per plant, unmarketable fruit yield per plant and seed vigor index showed maximum direct effect on fruit yield per hectare. The high direct effect of these traits appears to be the main factor for their strong association with fruit yield per hectare. Besides direct selection for fruit yield indirect selection through total fruit yield per plant, fruit diameter and fruit weight should be considered for further improvement in fruit yield per hectare of brinjal. The findings suggest that the identified traits can be considered as reliable selection indices for yield improvement in pink brinjal.

Keywords: *Correlation, GCV,Genotype, Heritability, Pink brinjal, Path coefficient, PCV, Variability.*

INTRODUCTION

Brinjal (*Solanum melongena* L) also known as eggplant or aubergine, belongs to the Solanaceae family with a diploid chromosome number of 2n=2x=24. It is a widely cultivated and popular vegetable grown across India and can be grown throughout the year. It is a perennial crop but commercially cultivated as an annual vegetable crop for its immature, unripe fruits which are used in making various cooked dishes. Brinjal is rich in nutrients including fat, carbohydrate, protein, fibre and essential vitamins such as Vitamin A, Vitamin C, and Vitamin B complexes like Thiamin, Riboflavin, and Niacin. It also contains significant amount of minerals including iron (0.9 mg/100 g) calcium (18 mg/100 g), magnesium (16 mg/100 g) and potassium (2 mg/100 g) [21].

India cultivates a wide variety of brinjal with significant differences in the size,shape and color of the fruits. Among the various types and colors of brinjal, pink brinjal or 'Gulabi Baingan" is one of the most popular vegetables of Jammu & Kashmir. It is widely used in local cuisine and valued for its color, smooth texture, very small seeds and tasty flesh**.** Traditionally cultivated in the Kashmir region for a very long time, its cultivation in the Jammu region gained prominence from 1990's. Today,a significant proportion of the pink brinjal grown in the Jammu region is being transported to the Kashmir valley during summer months. Most of the farmers rely on their own saved seed/landraces, locally available germplasm as well as available varieties of private seed companies from local market. However, the lack of high yielding variety/hybrid along with the prevalence of insect pests and diseases during summer/rainy season poses a major challenge among pink brinjal growers of Jammu region [2].

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Any crop improvement effort requires a good understanding of the level of genetic variability present in the genotypes for different traits. The improvement in fruit yield in any breeding program can only be achieved through the selection of the desired component characters and this crop offers huge genetic diversity for various morphological traits and has a lot of potential for improvement. Knowledge with respect of the nature and extent of association among yield and various component characters is necessary to achieve the improvement in the right direction. The association between different characters is estimated using correlation coefficients, which also identify the component characters that are accounted for selection and yield enhancement [7]. Since yield is a complicated phenomenon influenced by some components and selection based solely on correlations without considering cause and effect relationships into account might be deceptive. So, to get a clear view of this complex situation, the correlation coefficients of fruit yield and its components along with morphological and quality traits at genotypic and phenotypic levels were partitioned into direct and indirect effects through path coefficient analysis by taking total fruit yield per plant as dependent variable. Path coefficient analysis allows the coefficient of correlation to be divided into components of direct and indirect effects and quantifies the direct influence of one variable on another. In light of this, the current study sought to evaluate the relationships between various traits and the direct and indirect impacts of different components on fruit yield per plant among brinjal genotypes under subtropical plains of the Jammu region.

MATERIALS AND METHODS

The present study was undertaken in a randomized complete block design with 28 F_1 hybrids of pink brinjal along with eight parents and one standard check in three replications at experimental farm Division of Vegetable Science, Sher-e-Kashmir University of Agriculture Sciences and Technology, Main campus, Chatha, Jammu (J&K) during autumn- winter season of 2024-2025. All the eight parents viz., Baramulla Local Selection-01, Baramulla Local Selection-02, Ganderbal Local, Long Kashmiri, Kashmiri Long, SJPB-22-12, SJPB-22-08, Pink Long were collected from SKUAST- Jammu and crossed in half diallel mating design to produce 28 F_1 hybrids. The data was taken for 21 traits by randomly selecting five plants from each plot (Table 1). Phenotypic and genotypic coefficients of variability were calculated following the method proposed by [3], [8] and [10]. The broad-sense heritability (h^2) and expected genetic advance were also determined using these methods. Genotypic and phenotypic correlations as well as path analysis(Direct and indirect effects) were determined using the methods of [1] and [6].

RESULTS AND DISCUSSSION

Significant differences were observed among genotypes for all the studied characters. Variation for all characters was reported by [14], [11], [19] and [20].The broad range of variation was recorded for the seed vigour index (514.69 - 976.46) with a mean value of 776.66. There was great variation among the genotypes for yield which ranged from 121.25 to 343.75 q/ha (Table 1). The findings from the present research studies regarding various genetic variability parameters viz., phenotypic variance, genotypic variance, environmental variance, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h^2) and genetic advance as percentage of the mean (genetic gain) for all the 21 traits has been projected in Table 1. The traits under investigation showed a significantly higher phenotypic coefficient of variation (PCV) than the genotypic coefficient of variation (GCV), indicating that both genetic and environmental factors influenced the expression of the traits. The phenotypic and genotypic coefficient of variability was found to be high (>20%) for unmarketable fruit yield per plant, total phenol content , fruit weight, fruit yield per hectare ,marketable fruit yield per plant, fruit diameter and total fruit yield per plant. Similar findings were also reported by [18], [5] and [12].

Heritability and genetic advance: Heritability reflects how efficiently genotypic selection can be carried out based on phenotypic variation within an experimental population. Heritability (broad sense) ranged from 71.97% for days to first harvest to 99.48% for fruit weight. High heritability was observed for fruit weight, unmarketable fruit yield per plant , number of seeds per fruit, marketable fruit yield per plant, fruit yield per hectare, number of fruits per plant, plant spread, seed vigour index, number of branches per plant, ascorbic acid, fruit length , fruit diameter , plant height, total phenol content and total fruit yield per plant. The heritability along with genetic advance is more meaningful and provides a clearer understanding of the potential impact of selection on phenotypic traits. High heritability along with high estimates of genetic advance (>20%) was observed for fruit diameter, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant, total fruit yield per plant and fruit yield per hectare. The results are following the findings of [12], [22] and [26].

The traits viz., fruit diameter, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant, total fruit yield per plant and fruit yield per hectare show additive gene action, hence the selection is effective in improvement of these characters. Days to first flowering and days to first harvest showed non-additive gene action, thus heterosis breeding could be an effective approach for improvement. Comparable results have also been documented by [9], [17] and [24].

Character association: The productivity of any crop is primarily assessed based on yield per unit area. However, improving yield through direct selection is challenging as yield is complex polygenic character influenced by its various contributing characters as well as environmental conditions. Therefore, it is crucial to evaluate the relationship between yield per plant and its contributing characters, as well as the interrelationships among these traits. Understanding the strength and direction of these correlations helps determine how improvement in one character will cause simultaneous change in the other characters [23]. The results revealed that genotypic correlation coefficients were higher in magnitude than the phenotypic correlation coefficient values for almost all the characters under study (Table 2). Such a high level of genotypic association may be the result of the masking effect of the environment. Fruit yield per hectare was positively and significantly correlated with plant height, fruit diameter, number of fruits per plant, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant and total fruit yield per plant. Fruit yield per hectare was negatively and significantly correlated with days to first flowering, days to first harvest, number of branches per plant,

plant spread, and fruit length. These correlations were found in the same trends both at genotypic and phenotypic levels. Fruit yield per hectare was positively and significantly correlated with plant height, fruit diameter, number of fruits per plant, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant and total fruit yield per plant at phenotypic level also. These results conform with the findings of [15], [16] and [4].

Path coefficient analysis is a valuable method for partitioning the correlation coefficients into the direct and indirect effects of independent variables on a dependent variable, especially when multiple variables are included in a correlation study (Table 3). As more variables are introduced, their indirect relationships become more complex. Two characters may show correlation, just because they are correlated with a common third one. In such cases, path coefficient analysis helps critically assess the underlying factors contributing to correlation and determine the relative significance of each factor. In this study, fruit yield was considered the dependent variable, while all other traits were treated as independent variables [23]. Path coefficient analysis revealed that maximum direct effect on fruit yield per hectare was exerted by marketable fruit yield per plant followed by unmarketable fruit yield per plant and seed vigor index, while the maximum negative direct effect was shown by germination percentage followed by plant height and days to first harvest and days to first flowering. Maximum positive indirect towards fruit yield per hectare was shown by marketable fruit yield per plant via total fruit yield per plant, followed by fruit weight and fruit diameter. The positive and direct effect of marketable fruit yield per plant and unmarketable fruit yield per plant was also reported earlier in brinjal [25], [2]; negative direct effect of plant height [13], days to first flowering and days to first harvest [4].

SUMMARY

Pink Brinjal is an important member of the Solanaceae family having potential applications across various sectors. Thirty-seven genotypes were evaluated at the Experimental farm, Division of Vegetable Science, (Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu), from September to January 2024-2025 for studying variability in quantitative, qualitative, and seed traits. In studying genetic parameters, unmarketable fruit yield per plant, total phenol content , fruit weight, fruit yield per hectare ,marketable fruit yield per plant, fruit diameter and total fruit yield per plant showed high estimates of PCV and GCV, indicating the substantial variation present in germplasm. Most of the studied traits demonstrated high heritability with high to low genetic advance as a percent of the mean, suggesting the influence of additive gene action for controlling traits. Thus, selection is effective for improvement in these pink brinjal genotypes. Character association showed that plant height, fruit diameter, number of fruits per plant, fruit weight, total phenol content, marketable fruit yield per plant, unmarketable fruit yield per plant and total fruit yield per plant were positively correlated with fruit yield per hectare suggesting that selection for these component traits will be effective in improving the fruit yield in pink brinjal**.** Although these traits exhibited significant association with fruit yield per hectare, only marketable fruit yield per plant, unmarketable fruit yield per plant had a high direct positive effect on fruit yield per hectare, highlighting the effectiveness of direct selection for the improvement of these traits. It would therefore, be rewarding to lay stress on the identified characters with high heritability, positive correlation and strong direct or indirect effects on fruit yield for the improvement of yield and related characters. The study provides a valuable basis for breeders aiming to develop high-yielding pink brinjal cultivars suited to the agro-climatic conditions of Jammu region.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

Table 1. Estimates of variability parameters for different characters in Pink Brinjal (Solanum melongena L.)

Characters	Mean ± SE	Range		Heritability(%)	GeneticAdvance	Genetic Advance as % of Mean	Coefficient of variation	
		Min.	Max.				GCV (%)	PCV (%)
DFF	39.94±0.79	36.27	44.58	78.12	4.72	11.82	6.49	7.34
DFH	64.22±1.15	56.24	70.73	71.97	5.59	8.71	4.98	5.87
PH	57.51±0.75	52.00	74.00	95.68	8.01	13.92	6.91	7.06
NBPP	6.66±0.08	4.50	8.59	97.39	1.87	28.01	13.78	13.96
PS	75.25± 0.93	47.70	93.63	97.69	21.49	28.56	14.03	14.19
FL	14.84±0.21	8.15	18.00	96.31	3.82	25.72	12.72	12.96
FD	5.71±0.14	3.22	7.47	95.80	2.38	41.72	20.69	21.14
NFPP	25.45±0.38	14.15	33.70	97.69	8.90	59.25	17.18	17.38
FW	71.77±0.86	41.15	115.95	99.48	42.52	59.25	28.84	28.91
AA	10.38±0.14	8.32	13.71	97.28	2.96	28.46	14.01	14.20
TPC	1.30±0.05	0.58	2.45	95.32	0.88	67.73	33.68	34.50
NSPF	256.32±0.98	215.10	288.33	99.04	35.52	13.86	6.76	6.79
G (%)	80.48±1.02	69.46	86.72	87.55	9.10	11.31	5.87	6.27
SVI	776.66±6.61	514.69	976.46	97.67	265.38	34.17	16.78	16.98
MFYPP	1.66±0.02	0.85	2.40	98.59	0.73	43.76	21.39	21.55
UMFYPP	0.25±0.01	0.01	0.79	99.36	0.38	150.93	73.50	73.74
TFYPP	1.93±0.02	1.11	2.75	93.75	0.78	40.64	20.38	21.05
FYPH	238.32±4.00	121.25	343.75	98.41	111.56	46.71	22.86	23.04

DFF- days to first flowering, **DFH**-days to first harvest, **PH**- plant height (cm), **NBPP**- number of branches per plant, **PS**-plant spread(cm^2), **FL**-fruit length (cm), **FD**- fruit diameter (cm), **NFPP**- number of fruits per plant, **FW**- fruit weight (g), **AA**- Ascorbic acid (mg/100g), **TPC**- total phenol content (mg/100g), **NSPF**- number of seeds per fruit, **G (%)** – germination (%), **SVI**- seed vigour index, **MFYPP**- marketable fruit yield per plant (kg), **UMFYPP**- unmarketable fruit yield per plant (kg), **TFYPP**- total fruit yield per plant (kg), **FYPH**- fruit yield per hectare (q/ha)

Table 2: Genotypic and phenotypic correlation coefficients among various characters in Pink Brinjal (Solanum melongena L.)

Characters	R	DFH	PH	NBPP	PS	FL	FD	NFPP	FW	AA	TPC	NSPF	G (%)	SVI	MFYPP	UMFYPP	TFYPP	FYPH
DFF	r_g	0.653**	-0.183	-0.089	0.024	-0.376**	0.162	-0.557**	0.116	0.252**	0.329**	-0.336**	0.328**	0.321**	-0.227*	-0.215*	-0.243*	-0.281**
	r_p	0.584**	-0.141	-0.089	0.020	-0.315**	0.123	-0.489**	0.094	0.218*	0.289**	-0.294**	0.291**	0.279**	-0.203*	-0.183	-0.198*	-0.239*
DFH	r_g		-0.348**	0.154	0.269**	0.054	-0.242**	-0.505**	-0.126	0.269**	0.076	-0.058	0.253**	0.317**	-0.542**	-0.621**	-0.636**	-0.702**
	r_p		-0.289**	0.135	0.220*	0.049	-0.207*	-0.418**	-0.109	0.255**	0.074	-0.048	0.221*	0.272**	-0.460**	-0.524**	-0.532**	-0.595**
PH	r_g			-0.170	-0.263**	0.056	0.333**	0.267**	0.235**	0.196	0.347**	0.315**	0.222**	0.301**	0.487**	0.181	0.534**	0.474**
	r_p			-0.161	-0.255**	0.055	0.310**	0.259**	0.232**	0.195	0.326**	0.309**	0.204*	0.292**	0.469**	0.177	0.507**	0.453**
NBPP	r_g				0.617**	0.425**	-0.333**	-0.218*	-0.539**	-0.015	-0.425**	0.072	-0.350**	-0.243**	-0.622**	-0.060	-0.542**	-0.533**
	r_p				0.599**	0.412**	-0.320**	-0.214*	-0.531**	-0.015	-0.405**	0.073	-0.328**	-0.236*	-0.612**	-0.057	-0.523**	-0.525**
PS	r_g					0.412**	-0.522**	-0.082	-0.608**	0.296**	-0.092	0.372**	-0.287**	-0.289**	-0.652**	-0.204*	-0.598**	-0.618**
	r_p					0.404**	-0.502**	-0.079	-0.597**	0.288**	-0.090	0.369**	-0.263**	-0.282**	-0.640**	-0.200*	-0.571**	-0.605**
FL	r_g						-0.463**	-0.057	-0.164	0.076	-0.110	0.536**	-0.085	0.047	-0.434**	-0.159	-0.381**	-0.417**
	r_p						-0.453**	-0.052	-0.162	0.077	-0.102	0.522**	-0.079	0.045	-0.424**	-0.155	-0.345**	-0.407**
FD	r_g							-0.129	0.774**	-0.191*	0.334**	-0.152	0.386**	0.305**	0.673**	0.235*	0.583**	0.647**
	r_p							-0.123	0.755**	-0.179	0.337**	-0.148	0.351**	0.295**	0.657**	0.232*	0.550**	0.629**
NFPP	r_g								-0.141	-0.173	-0.194*	0.262**	-0.305**	-0.316**	0.443**	0.115	0.484**	0.408**
	r_p								-0.139	-0.168	-0.189*	0.259**	-0.271**	-0.309**	0.436**	0.111	0.468**	0.397**
FW	r_g									0.012	0.482**	-0.017	0.389**	0.325**	0.676**	0.106	0.533**	0.595**
	r_p									0.012	0.466**	-0.017	0.362**	0.317**	0.667**	0.105	0.516**	0.589**
AA	r_g										0.695**	0.249**	-0.005	-0.069	-0.061	-0.051	-0.075	-0.071
	r_p										0.672**	0.242**	-0.002	-0.063	-0.059	-0.050	-0.060	-0.069
TPC	r_g											0.337**	0.238*	0.173	0.302**	0.091	0.289**	0.285**
	r_p											0.329**	0.209*	0.166	0.292**	0.094	0.276**	0.275**
NSPF	r_g												-0.146	-0.104	-0.063	0.036	0.039	-0.036
	r_p												-0.140	-0.102	-0.061	0.038	0.033	-0.036
G (%)	r_g													0.961**	0.190*	-0.278**	0.042	0.042
	r_p													0.900**	0.179	-0.263**	0.023	0.036
SVI	r_g														0.107	-0.314**	-0.021	-0.043
	r_p														0.108	-0.309**	-0.020	-0.039
MFYPP	r_g															0.233*	0.884**	0.916**
	r_p															0.231*	0.850**	0.904**
UMFYPP	r_g																0.582**	0.612**
	r_p																0.564**	0.606**
TFYPP	r_g																	0.966**
	r_p																	0.929**

** and * Significant at 1% and 5% level of probability, respectively

DFF- days to first flowering, **DFH**-days to first harvest, **PH**- plant height (cm), **NBPP**- number of branches per plant, **PS**-plant spread(cm^2), **FL**-fruit length (cm), **FD**- fruit diameter (cm), **NFPP**- number of fruits per plant, **FW**- fruit weight (g), **AA**- Ascorbic acid (mg/100g), **TPC**- total phenol content (mg/100g), **NSPF**- number of seeds per fruit, **G (%)** – germination (%), **SVI**- seed vigour index, **MFYPP**- marketable fruit yield per plant (kg), **UMFYPP**- unmarketable fruit yield per plant (kg), **TFYPP**- total fruit yield per plant (kg), **FYPH**- fruit yield per hectare (q/ha)

Table 3: Estimation of direct and indirect effects on fruit yield in pink Brinjal (Solanum melongena L.)

Traits	DFF	DFH	PH	NBPP	PS	FL	FD	NFPP	FW	AA	TPC	NSPF	G (%)	SVI	MFYPP	UMFYPP	TFYPP	FYPH
DFF	**-0.014**	-0.040	0.014	0.005	0.000	0.003	0.015	0.011	-0.004	0.027	-0.024	-0.009	-0.076	0.083	-0.174	-0.082	-0.014	-0.281**
DFH	-0.009	**-0.061**	0.026	-0.008	0.003	0.000	-0.022	0.010	0.005	0.029	-0.006	-0.001	-0.059	0.082	-0.416	-0.237	-0.037	-0.702**
PH	0.003	0.021	**-0.075**	0.009	-0.003	0.000	0.030	-0.005	-0.009	0.021	-0.026	0.008	-0.052	0.078	0.374	0.069	0.031	0.474**
NBPP	0.001	-0.009	0.013	**-0.054**	0.007	-0.004	-0.030	0.004	0.021	-0.002	0.032	0.002	0.082	-0.063	-0.478	-0.023	-0.031	-0.533**
PS	0.000	-0.016	0.020	-0.033	**0.011**	-0.004	-0.047	0.002	0.023	0.032	0.007	0.010	0.067	-0.075	-0.501	-0.078	-0.035	-0.618**
FL	0.005	-0.003	-0.004	-0.023	0.005	**-0.009**	-0.041	0.001	0.006	0.008	0.008	0.014	0.020	0.012	-0.333	-0.061	-0.022	-0.417**
FD	-0.002	0.015	-0.025	0.018	-0.006	0.004	**0.089**	0.003	-0.030	-0.020	-0.025	-0.004	-0.090	0.079	0.517	0.090	0.034	0.647**
NFPP	0.008	0.031	-0.020	0.012	-0.001	0.001	-0.012	**-0.020**	0.005	-0.019	0.014	0.007	0.071	-0.082	0.340	0.044	0.028	0.408**
FW	-0.002	0.008	-0.018	0.029	-0.007	0.001	0.069	0.003	**-0.038**	0.001	-0.036	0.000	-0.091	0.084	0.519	0.041	0.031	0.595**
AA	-0.004	-0.016	-0.015	0.001	0.003	-0.001	-0.017	0.003	0.000	**0.107**	-0.052	0.006	0.001	-0.018	-0.046	-0.019	-0.004	-0.071
TPC	-0.005	-0.005	-0.026	0.023	-0.001	0.001	0.030	0.004	-0.018	0.074	**-0.074**	0.009	-0.055	0.045	0.232	0.035	0.017	0.285**
NSPF	0.005	0.004	-0.024	-0.004	0.004	-0.005	-0.014	-0.005	0.001	0.027	-0.025	**0.026**	0.034	-0.027	-0.048	0.014	0.002	-0.036
G (%)	-0.005	-0.015	-0.017	0.019	-0.003	0.001	0.035	0.006	-0.015	-0.001	-0.018	-0.004	**-0.233**	0.249	0.146	-0.106	0.002	0.042
SVI	-0.005	-0.019	-0.022	0.013	-0.003	0.000	0.027	0.006	-0.012	-0.007	-0.013	-0.003	-0.224	**0.259**	0.082	-0.120	-0.001	-0.043
MFYPP	0.003	0.033	-0.036	0.034	-0.007	0.004	0.060	-0.009	-0.026	-0.006	-0.022	-0.002	-0.044	0.028	**0.768**	0.089	0.051	0.916**
UMFYPP	0.003	0.038	-0.014	0.003	-0.002	0.001	0.021	-0.002	-0.004	-0.005	-0.007	0.001	0.065	-0.081	0.179	**0.383**	0.034	0.612**
TFYPP	0.003	0.039	-0.040	0.029	-0.007	0.003	0.052	-0.010	-0.020	-0.008	-0.021	0.001	-0.010	-0.005	0.679	0.223	**0.058**	0.966**

** Significant at 1% level of probability, residual effect= 0.007, bold figures indicate the direct effects

DFF- days to first flowering, **DFH**-days to first harvest, **PH**- plant height (cm), **NBPP**- number of branches per plant, **PS**-plant spread(cm^2), **FL**-fruit length (cm), **FD**- fruit diameter (cm), **NFPP**- number of fruits per plant, **FW**- fruit weight (g), **AA**- Ascorbic acid (mg/100g), **TPC**- total phenol content (mg/100g), **NSPF**- number of seeds per fruit, **G (%)** – germination (%), **SVI**- seed vigour index, **MFYPP**- marketable fruit yield per plant (kg), **UMFYPP**- unmarketable fruit yield per plant (kg), **TFYPP**- total fruit yield per plant (kg), **FYPH**- fruit yield per hectare (q/ha)

REFERENCES

1. Al-Jibouri, H. A., Miller, P. A. and Robinson, H. V. 1958. Genotypic and environmental variance and co-variances in an upland cotton cross of interspecific origin. *Agronomy Journal*, 50:633-636.

2. Bandhral, V., Bhushan, A., Samnotra, R. K. and Kashyap, S. C. 2024. Genetic variability, Correlation and path analysis studies for yield and yield contributing characters in Pink Brinjal (*Solanum melongena* L.) under sub- tropical plains of Jammu. *Agriculture Association of Textile Chemical and Critical Reviews Journal,* 346-351.

3. Burton, G. W. and DeVane, E. H. 1953. Estimating heritability in tall fescue (*Festuca arundiaceae*) from replicated clonal material. *Agronomy Journal*, 45: 478-481.

4. Dash, S. P., Singh, J., Sharma, D., Thakur, P. and Nagraj, K. 2020. Correlation and path coefficient analysis studies on yield and its attributing characters in brinjal (*Solanum melongena* L.). *Journal of Entomology and Zoology Studies*, 8(3): 1106-1109.

5. Devaraju, I. K., Srinivasa, V., Lakshmana, D., Singh, T. H., Devappa, V. and Venugopalan, R. 2020. Studies on variability components for yield and its attributes in brinjal (*Solanum melongena* L.) under hill zone of Karnataka. *Journal of Pharmacognosy and Phytochemistry*, 9(2): 2200-2203.

6. Dewey, D. H. and Lu, K. H. 1959. A correlation and path analysis of components of crested wheat grass production. *Agronomy Journal*, 51:515-518.

7. Dhaka, S. K. and Soni, A. K. 2014. Genotypic and phenotypic correlation study in brinjal genotypes. *Annual Plant Soil Research*,16(1):53-56**.**

8. Hanson, C. H., Robinson, H. F. and Comstock, R. E. 1956. Biometrical studies of yield in segregating population of Korean lespedse. *Agronomy Journal*, 48: 267–82.

9. Jirankali, J. P., Reddy, N., Gangaprasad, S. and Manohara, S. N. 2019. Genetic variability for quantitative and qualitative characters in brinjal (*Solanum melongena* L.). *International Journal of Current Microbiology and Applied Sciences,*8(3):476-484.

10. Johnson, H. W., Robinson, H. F. and Comstock, R. E. 1955. Estimates of genetic and environmental variability in soyabean. *Agronomy Journal*, 47: 314-318.

11. Khan, S., Hussain, K., Khan, T., Shah, L. R., Ali, G., Dar, Z. A., Gulzar, A., Malik, A. A. and Khan, I. 2023. . Genetic variability, correlation and path analysis for yield components in brinjal (*Solanum melongena* L.). *The Pharma Innovation Journal*, 12(4): 773-781.

12. Konyak, W. L., Kanaujia, S. P., Jha, A., Chaturvedi, H. P. and Ananda, A. 2020. Genetic variability, correlation and path coefficient analysis of brinjal. *Journal of Agriculture*, 18(1): 13-21.

13. Kuswaha, C., Singh, L., Yadav, R. K., Kumar, S., Shweta, Singh, R. B. and Singh, K. P. 2024. Study about correlation and direct and indirect effect of various traits on Fruit yield of Brinjal (*Solanum melongena* L.). *Ecology, Environment & Conservation*, 30:S183-S187.

14. Malgondar, S., Naika, M. B. N., Nishani, S., Kanthraju V., Kamble, C. and Mukund, S. 2024. Genetic Variability, Correlation and Path Analysis for Yield and Yield Components in Brinjal (*Solanum melongena* L.).*Biological Forum – An International Journal*, 16(6): 23-28.

15. Mishra, D., Singh, A. K., Singh, P., Pal, A. K., Singh, B. K., Kumar, V., Singh, M. K. and Singh, R. K. 2024. Correlation coefficients and path analysis studies for yield and quality traits in brinjal (*Solanum melongena* L.). *International Journal of Advanced Biochemistry Research*, 8(3): 125-131.

16. Nazir, G., Hussain, K., Zehra, S. B, Masoodi, U. H. and Tabassum, S. 2022. A Study on Correlation and Path Coefficient Analysis of Brinjal (*Solanum melongena* L.) for Yield and Yield Contributing Traits . *International Journal of Plant & Soil Science*, 34(21): 763-768.

17. Sajjan, T. S., Devaraju, S. V., Lakshmana, D. and Singh, T. H. 2021. Genetic variability, interrelationships and path analysis for growth and yield attributes in F_4 segregating population of brinjal (*Solanum melongena* L.). *The Pharma Innovation Journal*, 10(12): 1376-1379.

18. Shah, I., Singh, D., Verma, S. K., Verma, A. and Bhatt, L. 2024. Assessment of variability, heritability and genetic advance in brinjal under Terai region of Uttarakhand. *International Journal of Advanced Biochemistry Research,* 8(8): 695-697.

19. Shanmugasundaram, K. A., Muthuvel, I. and Kousalya, R. 2024. Delineating the genetic variability, correlation, path and principal component analysis in brinjal genotypes. *Plant Science Today*, 11(4):01-07.

20. Sharma, P., Nair, R., Bhan, K. S. and Tiwari, S. 2022. Genetic variability for quantitative in brinjal (*Solanum melongena* L.). *Biological Forum- An International Journal*, 14(1): 47-49.

21. Singh, K. P. and Bahadur, A. 2015. Olericulture-Π: Vegetable production and improvement. New Delhi: Kalyani Publishers.

22. Soumya , Bangi, K., Deo, C., Singh, S., Bhutia, N. D., Tayeng, T., Hazarika, B. N., Debbarma, A., Sakhamo, K. and Dutta, R. 2023. Genetic Variability Studies in Brinjal (*Solanum melongena* L.) for Quantitative and Qualitative Characters. *International Journal of Environment and Climate Change*,13(10):4463-73.

23. Sujin, G. S., Karuppaiah, P. and Saravanan, K. 2017. Genetic variability and correlation studies in brinjal(*Solanum melongena* L.). *Indian Journal of Agricultural Research*, 51 (2): 112-119.

24. Tabasum, S., Nazir, G., Hussain, K., Ali, G., Nazir, N., Mushtaq, F., Hussain, Z. and Arizoo. 2024. "Analysis of Genetic Variability and Heritability in Brinjal (*Solanum melongena* L.) Genotypes". *Journal of Advances in Biology & Biotechnology,* 27 (4):198-205.

25. Tiwari, D., Yadav, G. C., Maurya, V. K., Kumar, A. and Sriom. 2019. Correlation coefficient and path analysis for yield and its component traits in Brinjal (*Solanum melongena* L.). *Journal of Pharmacognosy and Phytochemistry*, 8(1): 291-294.

26. Vasa, K., Acharya, G. C., Naresh, P., Koundinya, A., Sahu, G. S., Tripathy, P., Petikam, S., Adamala, A.R. and Singh, G. 2025. Assessment of genetic variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). *Plant Science Today* 12(1):1-6.