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Direct and indirect effect for different traits in eggplant (*Solanum melongena*) L

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Abstract
The genetic progress in any breeding programme is actually dependent on the variation in the present gene pool. Eggplant being native to India has diverse indigenous germplasm that can serve as a source of parental gene pool for any breeding programme. The present investigation was therefore conducted at the Department of Horticulture (Vegetable Science), AKS University, Satna during 2018-19 utilizing 12 diverse genotypes to generate information related to their genetic control. It was found that majority of the characters were highly heritable in nature. Fruit weight, plant height, fruit length, fruit girth, fruit yield per plant and number of fruits per plant had high heritability, high GCV and high genetic advance as percentage of mean, suggesting additive gene action for control of these traits. Days to 50% flowering, number of primary branches and days to first harvest exhibited moderate amount of GCV, heritability and genetic advance as percentage of mean indicating non-additive gene action. Correlation and path analysis revealed that yield per plant was significantly positively correlated with fruit weight and fruit girth. Path coefficient analysis revealed that fruit weight and fruit girth had maximum direct positive effect on yield. Other characters like plant height and showed indirect effect mostly via fruit weight and fruit girth. It was also observed that fruit weight, fruit set percentage and number of primary branches expressed direct positive influences on yield but plant spread and petiole length had direct negative effect on yield. Therefore, fruit length, girth and weight are important characters which may be included in selection criteria for improvement in fruit yield per plant.

Keywords: Genetic variability, heritability, genetic advance, correlation coefficient, path coefficient

1. Introduction

Brinjal (*Solanum melongena* L.) known as eggplant in USA and aubergine in France and UK, 2n= 2x=24 is one of the few cultivated solanaceous species originating in the old world. It is known as brinjal in India, where was domesticated long ago and, where the greatest diversity is found. It is a major vegetable crop in several countries like India, Japan, Indonesia, china, Bulgaria, Italy, France, the USA, and several African Countries. Production and productivity in major eggplant growing countries is as follows. World production of brinjal is estimated to be about 14.6 million tonnes. Daunay (2008) has covered eggplant breeding quite extensively. According to his Compilation, there are reports that S. incannum, a wild form of S. melongena is found in southern India. S. incannum differentiated progressively, in south East Asia in to a closely related species, the wild S. melongena which is still found growing in natural conditions in large areas from southern and eastern India to southern china, Philippines and Indonesia and this has been described by former botanist as S.cumingii. Under domestication process, this wild form gave rise to S.ovigerum (small round / oblong fruits with white, green or violet colour).

Brinjal is an annual herbaceous plant. Inflorescence is often solitary but sometimes it constitutes a cluster of 2-5 flowers. Solitary or clustering nature of inflorescence is a varietal character. Flower is complete, actinomorphic and hermaphrodite. Calyx is five lobed gamopetalous with margins of lobes incurved. There are five stamens which are free and inserted at the throat of corolla. Anthers are cone- shaped, free and with apical dehiscence. Ovary is hypogenous, bicapellary and with basal placentation. Heterostyly in a common feature. Four types of flower have been reported depending upo the length of style. These are as follows:

1. Long styled with large ovary,
2. Medium styled with medium size ovary,
3. Pseudo styled with rudimentary ovary,
4. True short styled with very rudimentary ovary,

Fruit setting flowers consist of long and medium styled flowers. Fruit setting in long styled flowers normally, varies from 70 to 85% and that in medium styled flowers from 12 to 55%.The non- fruit setting flowers consist of short styled flowers in which androecium is fertile but stigma is smaller with underdeveloped papillae.

China is the largest producer of brinjal and contributes about 68.7 percent of the world's brinjal production while India occupies second position in production with a share of 23.3 percent. In India, brinjal occupies fourth position among the vegetable crops and contributed 8% of the total production.

Madhya Pradesh produces about 3% of the total brinjal production of the country with the production of 0.28m MT from an area of 0.02m ha having productivity of 12.00MT/ha.

The success of any crop improvement programme largely depends upon the nature and magnitude of the genetic variability existing in breeding material with which plant breeder is working. Effectiveness of selection directly depends on the amount of heritability and genetic advance as percent of mean for a particular character. Heritability is of interest to the plant breeder primarily as a measure of the value of selection for a particular character in various types of progenies and as an index of transmissibility (Hayes *et al.*, 1955). So the concept of heritability is important to evaluate the relative magnitude of the effect of genes and environments on total phenotypic variability. Improvement of yield can be achieved by selection of characters having high heritability coupled with genetic advance. Hence, an insight into the magnitude of variability present in available accessions of brinjal is of utmost importance to a plant breeder for starting a judicious breeding programme. Knowledge of association between different characters serves two purposes from breeder's point of view. Firstly, inter-character relationships are very important for indirect selection for characters that are not easily measured and for those that exhibit low heritability. Secondly, this information makes available to the breeder the sources of information as the nature, extent and direction of selection pressure among the characters. As several characters are of interest to the breeder, it is important to know the concurrent change that would result in the unselected economic characters when selection pressure is applied for the improvement of certain other traits. Adams and Grafius (1971) [2] have mentioned that yield should be considered as end product of a number of traits and breeder should not ignore the principle of balance among these traits. So, it is beneficial to know correlation among the various characters which may provide information necessary in a breeding programme when selection is based on two or more characters simultaneously. This consideration becomes more useful when one visualizes yield as a complex trait and product of the interaction of several traits.

India, being the primary centre of origin has accumulated wide range of variation in this crop. A great genetic variation with regard to colour, maturity, fruit shape, vegetative characters and spinyness of the plants exists among the indigenous material. The wide range of variability was observed in respect of morphological traits. The genetic variance of any quantitative trait is composed of additive variance (heritable) and non-additive variance (non-heritable). Therefore, it becomes necessary to partition the observed phenotypic variability into its genotypic (partly heritable) and environmental (non-heritable) components with suitable parameters, such as phenotypic and genotypic coefficient of variation and heritability in broad sense. Effectiveness of selection directly depends on the amount of heritability and genetic advance as per cent mean of the character. Thus, the improvement in yield is possible only through selection of the desired component characters.

A study of correlation between different characters provides an idea of association. It could be effectively exploited to formulate selection strategies for improving yield and quality. Association of characters like yield, its components, and other economical traits is important for making selection in the breeding programme. It suggests the advantage of a scheme of selection for more than one character at a time (Kalloo, 1994) [34]. Correlation coefficient analysis measures the mutual relationship between various plant characters and determines the component characters, on which selection can be based for genetic improvement in yield, whereas, path analysis split the correlation coefficients into direct and indirect effects, thereby assists in the selection of genotype. On the basis of these studies, the quantum importance of individual character will facilitate the selection programme for better gains. Path analysis also measures the relative importance of causal factors involved. This is simply a standardized partial regression analysis, where in total correlation values were subdivided into causal factors (Shipley, 2000).

The present experiment have been design to grow 12 varieties of brinjal in agro- climatic conditions of satna (M.p) with following objective:

1. To estimate the genetic variability for yield and yield attributed traits.
2. To identify genotypic and phenotypic correlation for different quantitative traits in eggplant.
3. To identify HYV variety of eggplant for satna region.
4. To identify direct and indirect effect for quantitative traits in eggplant.

2. Materials and Methods

The present investigation entitled "Direct and indirect effect for different traits in eggplant" was carried out on well protected field of the instructional farm, AKS University, Satna (M.P.). The field experiment was conducted during *rabi* season of 2018. The materials used and the methodology adopted to carry out this research, and the periodical observations recorded in the field and in laboratory including chemical analysis work also referred in this chapter.

2.1 Experimental site

The present experiment was conducted at the instructional Farm, AKS University, Sherganj, Satna (M.P.) for *rabi* season 2018-19. The instructional farm site is situated at the latitude of 23°58' N and longitude of 80°81' east in mid northern part of vindhya division of M.P. State of India.

2.2 Experimental soil

The textural classification of the field soil was silty clay-loam. Before starting the experiment in *rabi* season 2018-19, the soil samples were collected randomly through a soil-auger from the different spots of the experimental plot up to 15 cm depth to form composite samples. These soils samples were subjected to determine the physico-chemical properties of the soil by following the standard chemical procedures as suggested by scientist

The soil was almost neutral in reaction, high in available nitrogen and sulphur, medium in E.C., organic matter, available phosphorus and potassium. The topography of the field was fairly uniform having mild slope to facilitate efficient drainage.

3. Results and Discussion

The present chapter deals with experimental findings and discussion obtained during the course of investigation entitled "Direct and indirect effect for different traits in Egg plant (*Solanum melongena* Linn.)". The experimental findings were statically analyzed and presented in appropriate Tables, graphs and few also depicted through figure, the obtained results are presented as under following heads:

1. Analysis of variance
2. Mean Performance of genotypes
3. Genetic variability
4. Correlation coefficient
5. Path coefficient analysis

3.1 Analysis of variance

The mean sum of squares values for all the fifteen characters are presented in table 4.1. The mean sum of squares due to the genotypes were significant for all the characters studied, suggesting the existence of high genetic variability among the genotypes for all the traits. The presence of large amount of variability might be due to diverse source of materials as well as environmental influence affecting the phenotype.

3.2 Mean performance of different agro-economic traits

The variability exploited in breeding programme is desired from the naturally occurring variants and wild relative of main crop species as well as from strains and genetic stocks artificially developed by human efforts. Through this study an attempt was made to assess the mean performance and extent of variability in 12 genotypes of brinjal. Table 4.2 depicts the mean performance of 12 genotypes of brinjal for 15 yield and yield attributes along with standard error of difference and critical difference, which is elaborated individually here as under:

3.2.1 Days to first flower

Days to first flower ranged from 30.23 to 43.78 with a grand mean of (38.78). Genotypes showed highest Days to first flower for Shweta (43.78) among all the genotypes. The lowest Days to first flower (30.23) was observed in VNR-218.

3.2.2 Days to 50% flowering

Days to 50% flowering ranged from 50.13 to 65.81 cm with a grand mean of 59.88 cm. The genotype Navina was recorded high Days to 50% flowering (65.81), whereas minimum Days to 50% flowering was observed for F1 Hybrid PK-213 (50.13).

3.2.3 Plant height (cm)

Plant height (cm) ranged from 56.88 to 92.35 cm with grand mean of 73.25 cm Genotype F1 Hybrid PK-213 (92.35cm) was recorded high Plant height (cm) among all the genotypes, whereas lowest days to Plant height (cm) was observed for Poonam (56.88).

3.2.4 No. of primary branches

No. of primary branches ranged from3.97 to 7.25 cm with a grand mean of 5.53. Genotype F1 Hybrid PK-213 (7.25) was recorded high No. of primary branches among all the genotypes while lowest value observed from the genotypes Poonam (3.97).

3.2.5 No. of flower per cluster

No. of flower per cluster ranged from 5.09 to 2.59 with a grand mean of 3.94 Genotype F1 Hybrid PK-213 (5.09) was recorded high No. of flower per cluster among all the genotypes while lowest value observed for the genotype Poonam (2.59).

3.2.6 No. of fruit per cluster

No. of fruit per cluster from 2.73 to 4.29 with a grand mean of 3.38 Genotype F1 Hybrid PK-213 (4.29) was recorded highest value of No. of fruit per cluster among all the genotypes, while lowest value observed for the genotype VNR-218 (2.73).

3.2.7 Fruit length (cm)

Fruit length (cm) ranged from 7.54 to 20.66 cm with grand mean of 14.99cm. VNR-218 (20.66), with observed high panicle length among all the genotypes lowest value observed for the genotype Brinjal Banasari Gol (7.54).

3.2.8 Fruit girth (cm)

Fruit girth (cm) ranged from 3.21 to 12.34 days with a grand mean of 6.66 days. The highest Fruit girth (cm) were noticed for Vishal (12.24) while minimum Fruit girth (cm) Shweta (3.21).

3.2.9 Average fruit weight (g)

Average fruit weight (g) ranged from 112.56 to 234.58 with a grand mean of 171.02 Genotype F1 Hybrid B No. 704 (234.58) exhibited highest Average fruit weight (g) among all the genotypes while lowest value observed Average fruit weight (g) for the genotype Shweta (112.56).

3.2.10 Fruit stalk length (cm)

Fruit stalk length (cm) ranged from 3.55 to 6.11 with grand mean of 5.05. Genotype Vishal (6.11) was record high Fruit stalk length (cm) among all the genotypes while lowest value observed for the genotype Shweta (3.55).

3.2.11 Days to maturity

Days to maturity ranged from 66.37 to 98.70 with a grand mean of 89.29. Shweta (98.70) exhibited high value of Days to maturity while lowest value observed for the Days to maturity genotype Vishal (66.37).

3.2.12 No. of fruit per plant

No. of fruit per plant ranged from 7.95 to 22.27 with a grand mean of 14.84. Genotype VNR-218 (22.27) g) exhibited high No. of fruit per plant among all genotypes while lowest value observed for the test weight Shweta (7.95).

3.2.13 Fruit yield (q ha^{-1})

Fruit yield (q ha^{-1}) varied from 167.44 to 481.89 with a grand mean of. 357.94. F1 Hybrid B No. 704 (481.89) exhibited high Fruit yield (q ha^{-1}) while lowest value observed for the Fruit yield (q ha^{-1}) Shweta (167.44).

3.2.14 Fruit yield per plot (kg)

Fruit yield per plot (kg) varied from 11.93 to 34.32 with a grand mean of. 25.49. F1 Hybrid B No. 704 (34.42) exhibited high Fruit yield per plot (kg) while lowest value observed for the Fruit yield per plot (kg) Shweta (11.93).

3.2.15 Fruit yield per plant (kg)

Fruit yield per plant (kg) varied from 1.19 to 3.43 with a grand mean of 2.55. Genotype F1 Hybrid B No. 704 (3.43)

exhibited high Fruit yield per plant (kg) while lowest value observed for the Fruit yield per plant (kg) Shweta (1.19).

3.2.16 Genotypic coefficient of variance

The estimation of genotypic coefficient of variance and phenotypic coefficient variance for all the characters are presented in (Table 4.3). The results are in confirmation to the findings of (Falconer, 1960). These values alone are not helpful in determining the heritable portion of variation**.** For this, estimates of heritability of these traits are necessary, which is reported in the following results. In general, estimates of PCV were higher than their corresponding GCV however good correspondence was observed between GCV and PCV for all characters. The genotypic coefficient variance value were categorized as low (0-10%), moderate (10-20%) and high (20% and above) given by Sivasubramanian and Madhavamenon (1973). Wide range of genotypic and phenotypic coefficient of variation (GCV and PCV) was observed for the characters ranging from average Fruit girth (cm) (GCV 41.25 and PCV 41.28) to Days to 50% flowering (GCV 8.42 and PCV 8.82). Higher magnitude of genotypic and phenotypic coefficient of variance (GCV and PCV) was recorded for fruit girth (cm), average fruit weight (g), no. of fruit per plant, fruit yield (q ha^{-1}), fruit yield per plot (kg), fruit yield per plant (kg) and fruit length (cm). While moderate estimates of GCV and PCV were observed for days to first flower, plant height (cm), no. of primary branches, no. of flower per cluster, no. of fruit per cluster, fruit stalk length (cm) and days to maturity. Low estimates of genotypic and phenotypic coefficient of variance was observed for days to 50% flowering. In the present investigation, high genotypic coefficient of variation and phenotypic coefficient of variation (>20%) were observed for leaf area and number of primary branches. Similar results were also obtained by Kumar *et al.*, (2011) [41], Shekar *et al.*, (2012) [71] and Karak *et al.*, (2012) [36] Lokesh *et al.*, (2013a) [45] and Nayak and Nagre (2013) [55]. It indicated the presence of high variability in the germplasm for selection and even the differences between PCV and GCV values were minimum, indicating that traits under study were less influenced by environment. Hence, these characters can be relied upon and simple selection can be practiced for further improvement.

3.2.17 Correlation coefficient at phenotypic level

Genotypic and Phenotypic correlation coefficient analysis revealed that Average fruit weight (g) showed negative significant association with No. of fruit per plant (-0.096** and -0.087**) at both genotypic and phenotypic level. While as positive significant association was observed with Fruti yield (q/ha) (0.684** and 0.661**), Fruit yield per plot (kg) (0.684** and 0.661**) and Fruit yield per plant (g) (0.684** and 0.661**) at both genotypic and phenotypic level. This indicated a strong genetic association between the traits and the phenotypic expression which was suppressed due to environmental influence. The previous studies also suggested that both genotypic and phenotypic correlation were similar in direction as reported by Sharma *et al*., (2000) [69] and Goto *et al*., (1953) [26]. Similar finding has also been reported by many workers *viz*. for fruit yield (Naliyadhara *et al*., 2007; Singh *et al*., 1983; Krusteva *et al*., 1985; Choudhary *et al*., 2013) [54, 38, 17], for average fruit weight (Krusteva, 1985; Jadhav *et al*., 2009) [38, 29], for primary branches per plant (Kumar *et al*., 1990 and Karak *et al*., 2012) [36], fruit circumference (Bora and Shadeque, 1993; and Pandey *et al*., 2016) [59] and fruit length (Pandey *et al*., 2016) [59].

4. Summary and Conclusion

The present investigation entitled "Direct and indirect effect for different traits in Egg plant (*Solanum melongena* Linn.)" was conducted in randomized block design with fifteen genotypes of Brinjal in three replications. The objectives were to assess the relative performance, estimation of genetic parameters, correlation coefficient, path coefficient for average fruit weight (g). The characters studied were *viz*. growth and yield parameter.

The salient results of the study and conclusion drawn from the experiment are summarized below:

Analysis of variance showed significant differences among the genotypes for the fifteen characters studied. Analysis of variance showed significant difference among the genotypes for the different characters at 0.1% and 5% significance.

Fruit yield (q ha^{-1}) varied from 167.44 to 481.89 with a grand mean of. 357.94. F1 Hybrid B No. 704 (481.89) exhibited high Fruit yield (q ha^{-1}) while lowest value observed for the Fruit yield (q ha^{-1}) Shweta (167.44).

Fruit yield per plot (kg) varied from 11.93 to 34.32 with a grand mean of. 25.49. F1 Hybrid B No. 704 (34.42) exhibited high Fruit yield per plot (kg) while lowest value observed for the Fruit yield per plot (kg) Shweta (11.93).

Fruit yield per plant (kg) varied from 1.19 to 3.43 with a grand mean of 2.55. Genotype F1 Hybrid B No. 704 (3.43) exhibited high Fruit yield per plant (kg) while lowest value observed for the Fruit yield per plant (kg) Shweta (1.19).

Higher magnitude of genotypic and phenotypic coefficient of variance (GCV and PCV) was recorded for fruit girth (cm), average fruit weight (g), no. of fruit per plant, fruit yield (q ha^{-1}), fruit yield per plot (kg), fruit yield per plant (kg) and fruit length (cm).

In the present investigation, the heritability estimate were found to be high (>60) for almost all the characters *viz* high for days to first flower, days to 50% flowering, plant height (cm), no. of primary branches, no. of flower per cluster, no. of fruit per cluster, fruit length (cm), fruit girth (cm), average fruit weight (g), fruit stalk length (cm), days to maturity, no. of fruit per plant, fruit yield (q ha^{-1}), fruit yield per plot (kg) and fruit yield per plant (kg).

Genetic advance as per cent of mean was highest for days to first flower, plant height (cm), no. of primary branches, no. of flower per cluster, no. of fruit per cluster, fruit length (cm), fruit girth (cm), average fruit weight (g), fruit stalk length (cm), fruit yield (q ha^{-1}), days to maturity, no. of fruit per plant, fruit yield per plot (kg), fruit yield per plant (kg).

Genotypic and Phenotypic correlation coefficient analysis revealed that positive significant association was observed with Fruti yield (q/ha) (0.684** and 0.661**), Fruit yield per plot (kg) (0.684** and 0.661**) and Fruit yield per plant (g) (0.684** and 0.661**) at both genotypic and phenotypic level.

The direct positive effect on Average fruit weight (g) was exhibited by days to first flower, days to 50% flowering and no. of primary branches at both genotypic and phenotypic level and No. of flower per cluster only genotypic level and fruit length (cm), fruit girth (cm), Fruit yield per plot (kg) and fruit stalk length at both genotypic and phenotypic levels. Days to maturity and Fruit yield (q/ha) only phenotypic level and Fruit yield per plant (g) only genotypic level.

5. Conclusion

On the basis of mean performance of 12 genotypes of brinjal, Fruit yield (q ha^{-1}) F1 Hybrid B No. 704 (481.89), Fruit yield per plot (34.42kg) and Fruit yield per plant (3.43kg) was found superior in terms under Satna Agro-Climatic condition.

Table 4.1: Analysis of Variance for 15 Characters in 12 Genotypes of Brinjal (*Solanum melongena* Linn.)

S. No.	Character	Mean sum of square		
		Replications (df = 2)	Treatments (df = 11)	Error (df = 22)
1	Days to first flower	0.17	51.17**	0.16
2	Days to 50% flowering	3.06	78.78**	2.48
3	Plant height (cm)	1.93	402.87**	0.47
4	No. of primary branches	0.069	2.815**	0.011
5	No. of flower per cluster	0.040	1.322**	0.008
6	No. of fruit per cluster	0.0795	0.691**	0.056
7	Fruit length (cm)	0.006	41.91**	0.006
8	Fruit girth (cm)	0.018	22.66**	0.010
9	Average fruit weight (g)	22.07	5096.00**	4.71
10	Fruit stalk length (cm)	0.018	1.721**	0.0033
11	Days to maturity	3.44	279.59**	0.4300
12	No. of fruit per plant	1.417	43.54	1.12
13	Fruit yield (q ha^{-1})	374.98	29026.38**	847.032
14	Fruit yield per plot (kg)	1.9022	147.251	4.2900
15	Fruit yield per plant (kg)	0.0190	1.472**	0.0429

*, ** = significant at 5% and 1% level respectively.

Table 4.2: Mean performance for fruit yield and its components characters 12 genotypes of Brinjal (*Solanum melongena* Linn.)

S. No.	Characters / Genotypes	Days to first flower	Days to 50% flowering	Plant height (cm)	No. of primary branches	No. of flower per cluster	No. of fruit per cluster	Fruit length (cm)	Fruit girth (cm)	Average fruit weight (g)	Fruit stalk length (cm)	Days to maturity	No. of fruit per plant	Fruit yield (q ha^{-1})	Fruit yield per plot (kg)	Fruit yield per plant (kg)
1	Brinjal Banasari Gol	36.29	63.27	70.35	6.30	3.30	3.15	7.54	10.29	145.49	5.53	85.43	14.23	290.66	20.70	2.07
2	F1 Hyrbid B No. 992	40.33	61.58	72.34	5.30	3.52	3.30	17.58	6.45	133.48	5.30	75.77	12.32	231.10	16.46	1.65
3	Shweta	43.78	58.60	72.95	4.58	4.13	4.14	14.26	3.21	112.56	3.55	98.70	7.95	167.44	11.93	1.19
4	Poonam	35.43	61.22	56.88	3.97	2.59	2.75	9.30	5.36	165.40	5.19	95.70	16.48	382.79	27.26	2.73
5	VNR-218	30.23	59.64	81.34	5.15	4.28	2.73	18.66	7.22	121.16	5.91	94.52	22.27	378.71	26.97	2.70
6	F1 Hybrid PK-213	41.41	50.13	92.35	7.25	5.09	4.29	20.66	5.25	216.02	5.78	87.76	15.23	461.92	32.90	3.29
7	F1 Hybrid B No. 704	34.60	61.30	88.22	6.55	4.28	3.48	16.51	5.32	234.58	4.28	91.95	14.63	481.89	34.32	3.43
8	Nav Kiran	36.25	64.81	84.17	4.30	3.59	3.58	13.52	9.62	213.65	4.35	93.14	14.92	447.59	31.88	3.19
9	Navina	42.52	65.81	75.27	5.17	4.53	3.20	13.65	4.29	168.86	4.70	97.91	15.99	379.52	27.03	2.70
10	BSS-153	42.80	52.31	65.53	5.79	3.52	3.26	15.42	4.36	181.81	4.70	88.21	17.32	442.26	31.50	3.15
11	RA-154	41.27	54.60	59.47	6.19	4.30	3.59	17.54	6.22	143.96	5.23	96.02	17.59	355.25	25.30	2.53
12	Vishal	40.39	65.30	60.10	5.79	4.20	3.05	15.25	12.34	215.22	6.11	66.37	9.14	276.20	19.67	1.97
	Mean	38.78	59.88	73.25	5.53	3.94	3.38	14.99	6.66	171.02	5.05	89.29	14.84	357.94	25.49	2.55
	S.E.	0.24	0.91	0.40	0.06	0.05	0.14	0.05	0.06	1.25	0.03	0.38	0.61	16.80	1.20	0.12
	C.D. 5%	0.70	2.67	1.17	0.19	0.15	0.40	0.14	0.17	3.68	0.10	1.11	1.80	49.28	3.51	0.35
Range	Min.	30.23	50.13	56.88	3.97	2.59	2.73	7.54	3.21	112.56	3.55	66.37	7.95	167.44	11.93	1.19
	Max	43.78	65.81	92.35	7.25	5.09	4.29	20.66	12.34	234.58	6.11	98.70	22.27	481.89	34.32	3.43

*, ** = significant at 5% and 1% level respectively.

Table 4.3: Estimation of genetic variability, GCV, PCV, Heritability, Genetic advance and Genetic Advance as per cent of mean for 15 characters in Brinjal (*Solanum melongena* Linn.)

S. No.	Character	Genotypic coefficient of variation	Phenotypic coefficient of variation	Heritability in broad sense (h^2b)	Genetic Advance	Genetic Advance as % of mean
1	Days to first flower	10.63	10.68	0.99	8.45	21.79
2	Days to 50% flowering	8.42	8.82	0.91	9.91	16.56
3	Plant height (cm)	15.81	15.83	0.99	23.81	32.51
4	No. of primary branches	17.48	17.59	0.98	1.97	35.78
5	No. of flower per cluster	16.78	16.93	0.98	1.35	34.25
6	No. of fruit per cluster	13.63	15.33	0.79	0.84	24.96
7	Fruit length (cm)	24.93	24.94	0.99	7.69	51.34
8	Fruit girth (cm)	41.25	41.28	0.99	5.65	84.92
9	Average fruit weight (g)	24.08	24.12	0.99	84.74	49.55
10	Fruit stalk length (cm)	14.97	15.01	0.99	1.55	30.79
11	Days to maturity	10.80	10.82	0.99	19.82	22.20
12	No. of fruit per plant	25.33	26.32	0.92	7.45	50.23
13	Fruit yield (q ha^{-1})	27.07	28.27	0.91	191.21	53.42
14	Fruit yield per plot (kg)	27.07	28.27	0.91	13.61	53.42
15	Fruit yield per plant (kg)	27.07	28.27	0.91	1.36	53.42

Table 4.4: Genotypic correlation (rp) between yield and yield attributes for fifteen characters in Brinjal (*Solanum melongena* Linn.) genotypes

Characters		Days first flower	Days to 50% flowering	Plant height (cm)	No. of Primary Branches	No. of flower per clusters	No. of fruit per cluster	Fruit length	Fruit girth	Fruit stalk length	Days to maturity	No. of fruit per plant	Fruit yield (q/ha)	Fruit yield per plot (kg)	Fruit yield per plant (g)	Average fruit weight (g)
Days to first flower	G	1.000	-0.311	-0.246	0.153	0.263	0.587	0.0001**	-0.343	-0.285*	-0.109	-0.539	-0.324**	-0.324	-0.324	-0.031
	P	1.0	-0.299	-0.243	0.144	0.254	0.519	0.0001**	-0.341	-0.283*	-0.108	-0.522	-0.315**	-0.315	-0.315	-0.031
Days to 50% flowering	G		1.000	-0.116	-0.485	-0.305**	-0.526	-0.448**	0.509**	-0.054**	-0.195	-0.276	-0.277	-0.277	-0.277	0.034
	P		1.000	-0.109	-0.467	-0.295**	-0.439	-0.429**	0.483**	-0.052**	-0.182	-0.262	-0.261	-0.261	-0.261	0.034
Plant height (cm)	G			1.000	0.326	0.548	0.487**	0.400**	-0.154	-0.170	0.200	0.135	0.442	0.442**	0.442**	0.342
	P			1.000	0.323	0.542	0.435**	0.399**	-0.154*	-0.168	0.199	0.129	0.423	0.423**	0.423**	0.340
No. of primary branches	G				1.000	0.586	0.378**	0.329**	0.066	0.364	-0.294*	0.052	0.285	0.285	0.285	0.361
	P				1.000	0.581	0.340**	0.327**	0.066	0.361	-0.292*	0.059	0.282	0.282	0.282	0.360
No. of flower per cluster	G					1.000	0.566	0.677**	-0.159	0.091	0.041	-0.001	0.169	0.169	0.169	0.220
	P					1.000	0.505	0.671**	-0.157	0.092	0.041	0.000	0.161	0.161	0.161	0.217
No. of fruit per cluster	G						1.000	0.248**	-0.365	-0.442	0.175*	-0.451	-0.033*	-0.033	-0.033	0.164
	P						1.000	0.224**	-0.326	-0.386	0.172*	-0.375	-0.005*	-0.005	-0.005	0.156
Fruit length (cm)	G							1.000	-0.209	0.186	-0.071	0.271	0.177	0.177	0.177	0.020
	P							1.000	-0.208	0.186	-0.070	0.261	0.170	0.170	0.170	0.020
Fruit girth (cm)	G								1.000	0.555	-0.653**	-0.158**	-0.115	-0.115	-0.115	0.255
	P								1.000	0.553	-0.651**	-0.152**	-0.110	-0.110	-0.110	0.255
Fruit stalk length	G									1.000	-0.567**	0.308**	0.046	0.046	0.046	0.043
	P									1.000	-0.563**	0.290**	0.037	0.037	0.037	0.042
Days to maturity	G										1.000	0.440	0.282**	0.282	0.282	-0.276
	P										1.000	0.428	0.275**	0.275	0.275	-0.273
No. of fruit per plant	G											1.000	0.617	0.617**	0.617**	-0.096**
	P											1.000	0.644	0.644**	0.644**	-0.087**
Fruti yield (q/ha)	G												1.000	1.000**	1.000**	0.684**
	P												1.000	1.000**	1.000**	0.661**
Fruit yield per plot(kg)	G													1.000	1.000**	0.684**
	P													1.000	1.000**	0.661**
Fruit yield per plant (g)	G														1.000	0.684**
	P														1.000	0.661**

*, ** = significant at 5% and 1% level respectively.

Table 4.6: Direct and indirect effects of genotypics and phenotypic path coefficient for seventeen characters in ridged gourd genotypes

Characters		Days first flower	Days to 50% flowering	Plant height (cm)	No. of Primary Branches	No. of flower per clusters	No. of fruit per cluster	Fruit length	Fruit girth	Fruit stalk length	Days to maturity	No. of fruit per plant	Fruit yield (q/ha)	Fruit yield per plot (kg)	Fruit yield per plant (g)	Average fruit weight (g)
Days to first flower	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
	P	0.02	-0.01	-0.01	0.00	0.01	0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.03
Days to 50% flowering	G	-0.02	0.05	-0.01	-0.03	-0.02	-0.03	-0.02	0.03	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.03
	P	-0.03	0.11	-0.01	-0.05	-0.03	-0.05	-0.05	0.05	-0.01	-0.02	-0.03	-0.03	-0.03	-0.03	0.03
Plant height (cm)	G	0.02	0.01	-0.06	-0.02	-0.03	-0.03	-0.03	0.01	0.01	-0.01	-0.01	-0.03	-0.03	-0.03	0.34
	P	0.01	0.01	-0.06	-0.02	-0.03	-0.03	-0.02	0.01	0.01	-0.01	-0.01	-0.03	-0.03	-0.03	0.34
No. of primary	G	0.00	-0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.01	-0.01	0.00	0.01	0.01	0.01	0.36

branches	P	0.01	-0.03	0.02	0.07	0.04	0.02	0.02	0.00	0.03	-0.02	0.00	0.02	0.02	0.02	0.36
No. of flower per cluster	G	0.02	-0.02	0.04	0.05	0.08	0.04	0.05	-0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.22
	P	-0.01	0.01	-0.02	-0.03	-0.05	-0.02	-0.03	0.01	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.22
No. of fruit per cluster	G	-0.09	0.08	-0.08	-0.06	-0.09	-0.16	-0.04	0.06	0.07	-0.03	0.07	0.01	0.01	0.01	0.16
	P	-0.07	0.06	-0.06	-0.05	-0.07	-0.13	-0.03	0.04	0.05	-0.02	0.05	0.00	0.00	0.00	0.16
Fruit length (cm)	G	0.00	-0.04	0.03	0.03	0.06	0.02	0.08	-0.02	0.02	-0.01	0.02	0.01	0.01	0.01	0.02
	P	0.00	-0.08	0.07	0.06	0.12	0.04	0.18	-0.04	0.03	-0.01	0.05	0.03	0.03	0.03	0.02
Fruit girth (cm)	G	-0.04	0.06	-0.02	0.01	-0.02	-0.04	-0.02	0.12	0.07	-0.08	-0.02	-0.01	-0.01	-0.01	0.25
	P	-0.04	0.06	-0.02	0.01	-0.02	-0.04	-0.03	0.13	0.07	-0.09	-0.02	-0.01	-0.01	-0.01	0.26
Fruit stalk length	G	-0.03	-0.01	-0.02	0.03	0.01	-0.04	0.02	0.05	0.10	-0.05	0.03	0.00	0.00	0.00	0.04
	P	-0.06	-0.01	-0.03	0.07	0.02	-0.08	0.04	0.11	0.20	-0.11	0.06	0.01	0.01	0.01	0.04
Days to maturity	G	0.00	0.01	-0.01	0.01	0.00	0.00	0.00	0.02	0.01	-0.03	-0.01	-0.01	-0.01	-0.01	-0.28
	P	-0.01	-0.02	0.02	-0.04	0.00	0.02	-0.01	-0.08	-0.07	0.12	0.05	0.03	0.03	0.03	-0.27
No. of fruit per plant	G	0.52	0.27	-0.13	-0.05	0.00	0.44	-0.26	0.15	-0.30	-0.43	-0.97	-0.60	-0.60	-0.60	-0.10
	P	0.58	0.29	-0.14	-0.07	0.00	0.42	-0.29	0.17	-0.32	-0.48	-1.11	-0.72	-0.72	-0.72	-0.09
Fruti yield (q/ha)	G	0.64	0.55	-0.87	-0.56	-0.34	0.07	-0.35	0.23	-0.09	-0.56	-1.22	-1.98	-1.98	-1.98	0.68
	P	-0.11	-0.09	0.14	0.10	0.05	0.00	0.06	-0.04	0.01	0.09	0.22	0.34	0.34	0.34	0.66
Fruit yield per plot(kg)	G	-0.51	-0.44	0.70	0.45	0.27	-0.05	0.28	-0.18	0.07	0.45	0.97	1.58	1.58	1.58	0.68
	P	-0.51	-0.42	0.69	0.46	0.26	-0.01	0.28	-0.18	0.06	0.45	1.05	1.62	1.62	1.62	0.66
Fruit yield per plant (g)	G	-0.55	-0.47	0.75	0.48	0.29	-0.06	0.30	-0.20	0.08	0.48	1.05	1.70	1.70	1.70	0.68
	P	0.19	0.16	-0.25	-0.17	-0.10	0.00	-0.10	0.07	-0.02	-0.16	-0.38	-0.59	-0.59	-0.59	0.66

*, ** = significant at 5% and 1% level respectively.

References

1. Abul Hasnat Muhammad Solaimana, Takashi Nishizawa, Mahmuda Khatun, Shahabuddin Ahmad. Physio Morphological Characterization Genetic Variability and Correlation Studies in Brinjal Genotypes of Bangladesh. Computational and Mathematical Bio. 2015; 4(1):1-36.
2. Adams MW, Grafius JE. Yield components compensation: alternative interpretation. Crop Science. 1971; 11:33-35.
3. Akpan NM, Ogbonna PE, Onyia VN, Okechukwu EC, Atugwu IA. variability studies on ten genotypes of eggplant for growth and yield performance in south eastern Nigeria. J Animal Plant Sci. 2016; 26(4):1034-1041.
4. Ansari SF. Genetic analysis for earliness and heat tolerance along with yield attributing traits in brinjal (*Solanum melongena* L.). Ph. D. thesis, submitted to Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), 2010.
5. Ansari SF, Mehta N, Ansari S, Gavel GP. Variability studies in brinjal (*Solanum melongena* L.) in Chhattisgarh plains. Electronic Journal of Plant Breeding. 2011; 2(2):275-281.
6. Arunkumar B, Kumar SSV, Prakash JC. Genetic variability and divergence studies in brinjal (*Solanum melongena* L.). Bioinfolet. 2013; 10(2B):739-744.
7. Arunkumar B, Sunil Kumar SV, Chandra PJ. Genetic variability and divergence studies for morphoeconomic characters in brinjal (*Solanum melongena* L.). Inter. J Agri. Sci. 2014; 10:529-533.
8. Bansal S, Mehta AK. Phenotypic correlation and path coefficient analysis of some quantitative traits in eggplant. Indian. J Trop. Biodiversity. 2008; 16(2):185-190.
9. Bansal S, Mehta AK. Genotypic correlation and path analysis in brinjal (*Solanum* melongena L.). National journal of plant improvement. 2008; 10(1):34-36.
10. Bashar A, Hasan R, Alam N, Hossain MK, Nguyen VHA, Mahmudul Huque AKM. Assessment of trait efficiency and selection of parents in brinjal (*Solanum melongena* L.), Plant Gene and Trait. 2015; 6(7):1-18.
11. Baswana KS, Bhatia MK, Duhan. Genetic variability and heritability studies in rainy season brinjal (*Solanum melongena* L.). Haryana J Hort. Sci. 2002; 31(1-2):71-73.
12. Burton GM. Quantitative inheritance in grasses. Grassland Cong. 1952; 1:277-285.
13. Burton GW, De Vane EM. Estimating heritability in fall fescue (*Festuca circunclinaceae*) from replicated clonal material. Agron. J. 1953; 45:478-481.
14. Chaourasia HK, Shree S. Genetic variability in quantitative characters of brinjal (*Solanum melongena* L.). J Interacademicia. 2012; 16(2):196-202.
15. Chattopadhyay A, Dutta S, Hazra P. Characterization of genetic resources and identification of selection indices of brinjal (*Solanum melongena* L.) Grown in Eastern India Vegetable Crops Research Bulletin. 2011; 74:39-49.
16. Chaudhary P, Kumar S, Verma PPS. Correlation and path coefficient analysis in brinjal (*Solanum melongena* L.). Hort Flora Research Spectrum. 2013; 2(4):346-351.
17. Choudhary P, Kumar S, Verma PPS. Correlation and path coefficient analysis in brinjal (*Solanum melongena* L.). Hort Flora Resea. Spect. 2013; 2(4):346-351.
18. Chung WB, Jeong SJ, Oh JS, Hwang PS. Genetic analysis in F_1 generation in eggplant. Korean society for Horticultural crops Journal. 2003; 44(1):44-48.
19. Das B, Mishra SN, Sahu GS, Dash SK. Studies on variability and heritability in brinjal. Orissa J Hort. 2002; 30(1):54-58.
20. Dasmohapatra A, Sharma D. Correlation and Path Coefficient Analysis in Long Fruited Brinjal (*Solanum melongena* L.), Int. J Pure App. Biosci. SPI. 2018; 6(3):400-406.
21. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass seed production. Agron. J. 1959; 51:512-515.
22. Dhaka SK, Soni AK. Genetic variability in brinjal (*Solanum melongena* L.). Asian J Hort. 2012; 7(2):537-540.
23. Dharwad NA, Salimath PM, Patil SA. Association and path co- efficient analysis in elite germplasm lines of brinjal (*Solanum melongena* L.). Kar. J Agri. Sci. 2009; 22(5):965-966.
24. Fisher RA. The correlation between relatives on the supposition of Mendelian inheritance. Trans. Roy. Soc., Edinburgh. 1918; 52:399-433.
25. Fisher RA. The use of multiple measurement in taxonomic problems. Ann. Ecequen., London. 1936; 7:179-188.
26. Goto K. Genetic studies on egg plant. Genetics. 1953; 2b:445-412.
27. Islam MS, Uddin MS. Genetic variation and trait relationship in the exotic and local eggplant germplasm. Bangladesh J Agril. Res. 2009; 34(1):91-96.
28. Jackson ML. Soil chemical analysis. Prentice-hall of India Private Limited, New Delhi, 1967.
29. Jadhav ST, Thawane BL, Rathod DR, Navhale VC. Correlation and path analysis studies in brinjal. Ann. Pl. Physiol. 2009; 23(2):177-179.
30. Johnson HW, Robinson HF, Comstock RE. Genotypic and phenotypic correlation in soybean and their implication in selection. Agron. J. 1955; 47:477-480.
31. Johnson HW, Robinson HF, Comstock RE. Estimated of genetic environmental variability in soybean. Agron. J. 1955; 47:314-318.
32. Jyoti Jirankali P, Nikhila Reddy, Gangaprasad S, Manohara SN. Genetic Variability for Quantitative and Qualitative Characters in Brinjal (*Solanum melongena* L.). Int. J Curr. Microbiol. App. Sci. 2019; 8(3):476-484
33. Kafytullah Indiresh KM, Santhosa HM. Genetic variability in brinjal (*Solanum melongena* L.). Environ. and Eco. 2011; 29(3/B):1686-1688.
34. Kalloo G. Vegetable Breeding, Panima Educational Book Agency, New Delhi, 1994.
35. Kamani JM, Monpara BA. Extent of genetic variation and associations among yield traits in F_2 generation of two brinjal crosses. Natnl. J Pl. Improv. 2006; 8(2):109-114.
36. Karak C, Ray U, Akhtar S, Naik A, Hazra P. Genetic variation and character association in fruit yield components and quality characters in brinjal [*Solanum melongena* L.]. University of Animal Sci. and Fishery Murshidabad, West Bengal. 2012; 8(1):86-89.
37. Katoch Viveka, Katoch R, Pathania NK. Correlation and path analysis for some biometric traits in brinjal (*Solanum melongena* L.). Annals of Biology. 2005; 21(2):193-197.

38. Krusteva L. Correlation in egg plant. Capsicum News Letters. No. 1985; 4:80-81.
39. Kumar A, Dahiya MS, Bhutani RD. Correlation and path analysis in brinjal (*Solanum melongena* L.). Haryana J Hort. Sci., 2002; 31(1-2):71-73.
40. Kumar SR, Arumugam T, Premalakshmi V. Evaluation and variability studies in local types of brinjal for yield and quality (*Solanum melongena* L.). Electronic J of Plant Breed. 2012; 3(4):977-982.
41. Kumar S, Sharma JP, Chopra S. Studies on variability, heritability and genetic advance for morphological and yield traits in brinjal (*Solanum melongena* L.). Mysore J of Agric. Sci. 2011; 45(1):63-66
42. Kumar SR, Arumugam T, Anandakumar CR, Premalakshmi V. Genetic variability for quantitative and qualitative characters in brinjal (*Solanum melongena* L.). Academic J. 2013; 8(39):4956-4959.
43. Kushwah Sunita, Bandhyopadhya BB. Variability and correlation studies in brinjal. Ind. J Hort. 2005; 62(2):210-212
44. Lakshmi RR, Padma SSV, Naidu LM, Umajyothi K. Correlation and path analysis studies of yield and yield components in brinjal. Plant Archives. 2014; 14(1):583-591.
45. Lokesh B, Reddy SP, Reddy RVSK, Sivaraj N. Variability heritability and genetic advance studies in brinjal (*Solanum melongena* L.). Electronic J of Plant Breed. 2013a; 4(1):1097-1100.
46. Lush JL. Intra sire correlation and regression of offspring on dam as a method of estimating heritability of characters. In: Proc. American Animal Pro. 1940; 33:292-301.
47. Madhukar K, Wilson D, Gogineni S. Studies on variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). Ecology, Environment and Conservation. 2015; 21(3):1447-1451.
48. Mili C, Bora GC, Das B, Paul SK. Studies on variability, heritability and genetic advance in (*Solanum melongena* L.) Brinjal genotypes. Direct Res. J Agri. and Food Sci. 2014; 2(11):192-194.
49. Mishra SV, Warade SD, Nayakwadi MB. Correlation and path coefficient analysis in brinjal. J Maharastra Agri. Universities. 2007; 32(1):74-76.
50. Mohammad RNR, Poodineh M, Ghalandarzehi A, Abkhoo J. Variability, heritability and association analysis in eggplant (*Solanum melongena*). ARPN J. Agri. and Bio. Sci. 2015; 10(12).
51. Muniappan S, Saravanan K, Ramya B. Studies on genetic divergence and variability for certain economic character in eggplant (*Solanum melongena* L.). Electronic J of Plant Breeding. 2010; 1(4):462-465.
52. Muniappan S, Saravanan K, Ramya B. Studies on genetic divergence and variability for certain economic characters in Eggplant (*Solanum melongena* L.). Electronic J of Plant Breed. 2010; 1(4):462-465.
53. Naik CKK. Genetic variability and divergence studies in brinjal (*Solanum melongena* L.). Kar. J Agri. Sci. 2006; 19(2):488.
54. Naliyadhara MV, Golani IJ, Mehta DR, Purohit VL. Genetic variability, correlation co-efficient and path analysis in brinjal. Orissa J. Hort. 2007; 35(2):92-96.
55. Nayak BR, Nagre PK. Genetic variability and correlation studies in brinjal. (*Solanum melongena* L). Int. J of Appl. Bio. and Pharmaceutical Tech. 2013; 4(4):211-215.
56. Nayak BR, Nagre PK. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). Int. J Applied Bio. and Pharmaceutical Tech. 2013; 4(1).
57. Negi AC, Baswana KS, Singh A, Sanwal SK, Batra BR. Haryana J Hort. Sci. 2000; 29(3/4):205-206.
58. Olsen SR, Cole CV, Watanable ES, Dean LA. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. United State Department of Agriculture, Circ. 939 and Washington, D.C, 1954.
59. Pandey PK, Yadav GC, Kumar V. Correlation and path coefficient analysis among different characters in genotype of brinjal (*Solanum melongena*). Indian J Ecol. 2016; 43(1):370-372.
60. Patel K, Patel NB. Study of Variability, Correlation and Path analysis in brinjal (*Solanum melongena* L.), 2015.
61. Piper CS. Soil and plant analysis. Bombay/New Delhi Asia Publishign Honse. 1967, 30-38.
62. Prabhu M, Natarajan S. Correlation and path analysis in brinjal (*Solanum melongena* L.). Madras Agri. J. 2008; 95(1-6):184-186.
63. Prasad M. Genetic divergence in brinjal *(Solanum melongena* L.). M.Sc. (Ag.) Thesis, Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2003.
64. Rekha GK, Celine VA. Correlation and path analysis studies in round fruited brinjal. Vegetabe Science. 2013; 40(1):87-89.
65. Robinson HF. Quantitative genetics in relation to breeding on the centennial of Mendalism. Ind. J Genet. 1966; 26**(**A):171-187.
66. Sabeena FA, Mehta N, Ansari S, Gavel JP. Variability studies in brinjal (*Solanum melongena* L) in Chattisgarh plains. Electronic J of Plant Breed. 2011; 2(2):275-281.
67. Sandeep Yadav, Singh VB, Rohit Maurya, Vivek Thapliyal. Correlation and Path Coefficient Analysis in Brinjal (*Solanum melongena* L.). Int. J Curr. Microbiol. App. Sci. 2018; 7(11):3182-3190.
68. Sao A, Mehta N. Genetic studies for fruit yield and its components in brinjal (*Solanum melongena* L.). Flora and Fauna (Jhansi). 2006; 15(2):255-258.
69. Sharma TVRS, Swaroop Kishan. Genetic variability and character association in brinjal (*Solanum melongena* L.). Ind. J Hort., 2000; 57(1):59-65.
70. Sharma TVRS, Kishan S, Swaroop K. Genetic variability and character association in brinjal (*Solanum melongena* L.). Indian. J Hort. 2000; 57(1):59-65.
71. Shekar KC, Ashok P, Shashikala K. Studies on heritability and multivariate analyses in brinjal (*Solanum melongena* L.). Vegetable crops Resbulletin. 2012; 76:79-88.
72. Shekar KC, Ashok P, Sasikala K. Studies on heritability and multivariate analyses in brinjal (*Solanum melongena* L.) Vegetable crops research bulletin. 2014; 76:79-88.
73. Shende RA, Desai SS, Dalvi VV. Character association and path analysis in brinjal (*Solanum melongena* L.). International Journal of agricultural Sciences. 2014; 10(2):631-633.
74. Sherly J, Shanthi A. Variability heritability and genetic advance in brinjal (*Solanum melongena* L.). Orissa J Hort. 2008; 36(2):24-28.
75. Sherly J, Shanthi A. Variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). The Orissa J of Hort. 2008; 36(2):24-28
76. Shivakumar V, Jyothi KU, Ramana CV, Rajalaxmi R. Traits linkage among brinjal genotypes, International J of Farm Sciences. 2016; 6(4):19-23.

77. Singh PP, Verma AK, Singh Dhurendra. Evaluation of brinjal genotype under hot arid agro-climate. Indian J Hort. 2018; 75(3):451-456.
78. Singh HV, Singh SP, Singh Satyendra, Rajput CBS. Heterosis in relation to combining ability in brinjal (*Solanum melongena* L.). Veg. Sci. 2003; 30(1):38-41.
79. Singh O, Kumar J. Variability, heritability and genetic advance in brinjal. Indian J Hort. 2005; 62(3):265-267.
80. Singh PP, Singh D. Genetic variab Shanmugapriya, P, Ramya, K. and Kumar, S.N. Studies on combining ability and heterosis for yield and growth parameters in brinjal (*Solanum melongena* L.). Crop Improvement. 2016; 36(1):66-72.
81. Sujin GS, Karuppaiah P, Saravanan K. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). Indian J Agric. Res. 2017; 51(2):112-119.
82. Tanko UM, Yusuf J. Correlation Studies on the Yield and Yield Characters of eggplant (*Solanum melongena* L.) in Anyigba, Kogi State Nigeria. Developing Country Studies, 2015; 5(19).
83. Tithi Dutta, Tridip Bhattacharjee, Swadesh Banerjee, Praveen Kumar Maurya, Subhramalya Dutta, Arup Chattopadhyay. Studies on genetic variability and identification of selection indices in brinjal (*Solanum melongena* L.). Journal of Pharmacognosy and Phytochemistry. 2018; 7(5):1259-1264.
84. Tripathi MK, Singh AK, Singh BK, Rat VK. Genetic variability, heritability and genetic advance among different quantitative characters of brinjal (*Solanum melongena* L.). Haryana J Hort. Sci. 2009; 38(3/4):334-335.
85. Vandana Yadav, Nandan Mehta, SMITA B, Rangare, Eshu Sahu. Variability and Heritability Estimates in the Germplasm Collection of Egg Plant (*Solanum melongena* L.) Dept. of Horticulture, IGKV, Raipur (C.G.) India. Trends in Bio. Sci. 2014; 7(12)3482:342-369.
86. Vidhya C, Kumar N. Genetic variability studies in Brinjal (*Solanum melongena* L.) for fruit yield and quality. Electronic J. Plant Breeding. 2015; 6(3):668-671.
87. Wright S. Correlation and causation. J Agri. Res. 1921; 20:257-787.
88. Yadav V. Genetic divergence in brinjal (*Solanum melongena* L.). M.Sc. (Ag) Thesis, Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2006.