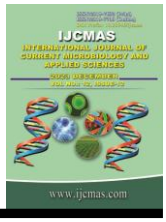
Int.J.Curr.Microbiol.App.Sci (2023) *12*(12): 142-151

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 12 Number 12 (2023)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2023.1212.018

Genetic Variability Studies of Brinjal Genotypes (*Solanum melongena* L.) for Different Quantitative Traits at Satna District of Vindhya Region

Vivek Daheriya*, Ayodhya Prasad Pandey, Rajbeer Singh Gaur, Satyadev Kol and Ankit Kumar Bhagat

Department of Genetics and Plant Breeding, Faculty of Agriculture Science and Technology, AKS University, Satna- 485001, M.P., India

**Corresponding author*

Keywords

Brinjal, Variance, variability, heritability and genetic advance

Article Info

Received:
25 October 2023
Accepted:
22 November 2023
Available Online:
10 December 2023

A B S T R A C T

Twenty diverse cultivars of brinjal (egg plant) planted in a Completely Randomized block design (CRBD) at Research Farm AKS University, Satna, during *Rabi* season on December 2022. Data were collected for twelve quantitative traits and estimated for variance, genetic variability, heritability and genetic advance. The analysis of variance indicated the existence of sufficient amount of variability among genotypes for all the studied characters. The maximum GCV and PCV was observed for the traits viz., fruit length (cm.), harvest index (%), no. of fruits/plant, no of seed/fruits, seed yield/plant (g.), test weight (g.), and plant height (cm.). Higher estimates (h^2b) >80% were observed for fruit length (cm.), test weight (g.), days to 80% fruit maturity, fruit diameter (cm.), days to 50 % flowering, plant height (cm.), harvest index (%), biological yield/plant (g.), no. of fruits/plant, seed yield/plant (g.), and no. of seed/fruits. High estimate of expected genetic advance as percent of mean at 5% were found for fruit length (cm.) followed by harvest index (%), no. of fruits/plant, no. of seed/fruits, seed yield/plant (g.), test weight, plant height (cm.), and biological yield/plant (g.).

Introduction

Brinjal is named as “poor man’s vegetable” because of its low cost of production, ease to cultivation and availability throughout the year. Vegetable improvement programmes have been emphasized for the last two decades. Brinjal or egg plant (*Solanum melongena* L.) is one of the most important solanaceous vegetable crop having diploid chromosome number 2n=2x=24. It has been reported that on an average, the oblong-fruited eggplant cultivars are rich in total soluble sugars, whereas the long-fruited cultivars contain a higher content of free reducing sugars, anthocyanin, phenols, glycoalkaloids (such as solasodine), dry matter, and amide proteins Bajaj *et al.*, (1979). It

also contains 52.0 (mg) chlorine, 47.0 (mg) phosphorus, 44.0 (mg) sulphur and other minerals (Aykroyd, 1963).

De Candolle (1886) regarded brinjal as the native of Asia and the crop is extremely variable in India. Vavilov (1951) suggested China as the centre of origin. Brinjal is a vegetable of Indian origin that has been cultivated for quite a long time Thompson and Kelly, (1957).

Out of 200 species 27 species of belong to genus solanum are found in India. Out of many species ten species closely related in this group like *S. aureitomentosum* (Bitter), *S. campylacanthum* (A. Rich.), *S. cerasiferum* (Dunal), *S. incanum* (L.) *S. insanum* (L.), *S. lichtensteinii* (Willd.), *S. linnaeanum* (Hepper & P.M.L.Jaeger), *S. melongena* (L)., *S. rigidum* (Lam). and *S. umtuma* (Voronts. & S. Knapp) Knapp *et al.,* (2013).

It is grown in the tropics and subtropics of India and other parts of the world. It is widely grown in India, Japan, Indonesia, China, Bulgaria, Turkey, Italy, Syria, France, Egypt, USA, Pakistan, Bangladesh, Iraq, Philippines, and several African countries. In India, it is distributed in Orissa, Bihar, Karnataka, West Bangal, Andhra Pradesh, Maharashtra, Utter Pradesh, Madhya Predesh, Chhattisgarh and many other parts of India (Anonymous, 2022).

The success of brinjal (egg plant) improvement programme largely depends upon the nature and magnitude of the genetic variability existing in the breeding material with which the plant breeder is working. Phenotypic variability changes under different environmental conditions while genetic variability remains unchanged and more useful to a plant breeder for exploitation in selection or hybridization, consequently estimates of heritability and genetic advance are useful for selection. Genetic advance which indicates the improvement in the mean genotypic values of the superior families over the base population helps the breeders to select the progenies in the earlier generation Sidhya *et al.,* (2014).

Materials and Methods

The present investigation was conducted during *Rabi,* 2022-23 at Research farm, Genetics and Plant Breeding, AKS University, Sherganj, Satna, Madhya Pradesh. The material consists 20 varieties/strains of brinjal (*Solanum melongena* L**.**) germplasm comprising indigenous genotypes, evaluated in Completely Randomized Block Design.

The entire experimental field divided in 3 blocks of equal size and each block had 20 plots. The metrological data during the period of experiment pertaining to annual rain fall Temperature (minimum and maximum) and relative humidity during the crop season has been taken.

Twelve observations on yield and yield contributing characters were recorded. In each plot, five competitive plants were randomly selected for recording observations for all the twelve quantitative characters, which were recorded on the plot basis.

The data were recorded for Days to 50 % flowering, Number of primary branches per plants, Plant height (cm.), Days to 80% fruit maturity, Number of fruits per plant, Fruit diameter (cm.), Fruit length (cm.), Number of seed per fruits, Test weight (g.), Harvest index (%), Biological yield per plant (g.), and Seed yield per plant (g.).

The analysis of variance for the design of experiment was done for partitioning the variance into treatments and replications, which was carried out according to the procedure outlined by Panse and Sukhatme (1967).

The genotypic coefficient variation (GCV), phenotypic coefficient of variation (PCV) and environmental coefficient of variation (ECV) was computed following Burton and de Vane (1953). Heritability in broad sense (h^2) was calculated using the formula suggested by Burton and de Vane (1953). Genetic advance was calculated by the method suggested by Johnson *et al.,* (1955).

Results and Discussion

The analysis of variance for the design of the experiment involving 20 strains/varieties of brinjal was evaluated in Completely Randomized Block Design with three replications for the twelve quantitative characters. The design of the experiment indicated highly significant differences for all the characters presented in Table: 1. indicating thereby the presence of sufficient genetic variability in the genotypes. Similar result were found by Khan *et al.,* (2023); Sharma *et al.,* (2022); Balsubramniyam *et al.,* (2021); Devaraju *et al.,* (2020).

The mean, grand means, range, GCV, PCV, and ECV of 20 genotypes of brinjal for 12 quantitative characters are presented in Table.2, Table.3 and Figure 1 and Figure 2. The maximum GCV and PCV was observed in fruit length (cm.) followed by harvest index (%), number of fruits per plant, number of seed per fruits, seed yield per plant (g.), test weight (g.), and plant height (cm.).

The traits observed high genotypic and phenotypic coefficient of variation with environmental coefficient of variation indicated more influence of environmental factors. High degree of GCV, PCV with low degree of ECV were recorded for the traits like fruit length (cm.), test weight (g.), plant height (cm.), biological yield per plant (g.), and fruit diameter (cm.) indicating simple selection for these traits will be useful for the planning of a breeding programme. The similar results were also reported by Sharma *et al.,* (2022); Thomas *et al.,* (2022); Rameshkumar *et al.,* (2022); Durga *et al.,* (2022); Balsubramniyam *et al.,* (2021); Devaraju *et al.,* (2020); Banerjee *et al.,* (2018) and Reshmika *et al.,* (2014) for different traits in their studies.

Burton and De Vane (1953) suggested that the GCV along with heritability estimate could provide better picture of the genetic advance to be expected by phenotypic selection. Johnson *et al.,* (1955) have suggested heritability estimates in association with genetic advance are much useful for selection than heritability alone. Heritability in broad sense includes both additive and non-additive gene effects Hanson *et al.,* (1966). Heritability in broad sense and genetic advancement was estimated for all the characters and has been presented in Table 4. and Figure 3. High heritability estimates were found for fruit length (cm.) (99.30%), test weight (g.) (99.00%), days to 80% fruit maturity (97.60%), fruit diameter (cm.) (97.30%), days to 50 % flowering (96.70%), plant height (cm.) (96.70%), harvest index (%) (96.60%), biological yield per plant (g.) (94.80%), number of fruits per plant (91.60%), seed yield per plant (g.) (89.60%), and number of seed per fruits (86.00%) suggested that the characters are least influenced by the environmental factors and also indicates the dependency of phenotypic expression which reflect the genotypic ability of strains to transmit the gene to their progenies. Similar results were observed by Sharma *et al.,* (2022); Rameshkumar *et al.,* (2022) and Durga *et al.,* (2022) for different traits in their studies.

High heritability coupled with high genetic advance observed for fruit length (cm.), harvest index (%), number of fruits per plant, test weight (g.), plant height (cm.), seed yield per plant (g.), and number of seed per fruits (cm) indicating that these characters could be prominently governed by additive gene action. So the selection of these traits could be more effective for desired genetic improvement in brinjal breeding programme. Similar results were also reported by Rameshkumar *et al.,* (2022); Durga *et al.,* (2022); Thomas *et al.,* (2022); Tirkey *et al.,* (2018); Verma *et al.,* (2021) and Banerjee *et al.,* (2018) for different traits in their studies.

In the light of above findings it may be concluded that wide spectrum of exploitable variability in the brinjal studied with respect to seed yield per plant and its component characters. As per mean performance the maximum yield was recorded by varieties/genotypes viz., NBH 1430, NBH 1322, LOCAL Jhumkiya 1, NBH 972, LOCAL Jhumkiya 2, Satabdi Harsh, and Utkarsh. So these varieties are recommended for growing in Satna district of Vindhya region of Madhya Pradesh.

Table.1 Analysis of variance for 12 quantitative characters in Brinjal (Eggplant).

S. No.	Traits	Replicate (df=2)	Treatments (df=19)	Error (df=38)
1	Days to 50 % flowering	5.050655	319.46816**	10.549401
2	Number of primary branches per plants	0.026972	10.873308**	4.095479
3	Plant height (cm.)	8.709365	642.343654**	21.409053
4	Days to 80% fruit maturity	7.465162	279.497949**	6.640216
5	Number of fruits per plant	13.664746	89.562609**	7.508875
6	Fruit diameter (cm.)	0.293147	3.75011**	0.102729
7	Fruit length (cm.)	3.081132	191.451253**	1.413105
8	Number of seed per fruits	20901.75586	104505.228689**	14592.29312
9	Test weight (g.)	0.002222	3.688537**	0.036823
10	Harvest index (%)	116.56012	601.715033**	20.591127
11	Biological yield per plant (g.)	276.809692	2272.406779**	117.357934
12	Seed yield per plant (g.)	413.939056	611.560011**	63.682138

*Significant at 5% probability level.
**Significant at 1% probability level.

Table.2 Mean performances of 12 characters of twenty Brinjal (Eggplant) genotypes.

S.N.	Genotypes	Days to 50 % flowering	No. of primary branches per plants	Plant height (cm.)	Days to 80% fruit maturity	Number of fruits per plant	Fruit diameter (cm.)	Fruit length (cm.)	Number of seed per fruits	Test weight (g.)	Harvest index (%)	Biological yield per plant (g.)	Seed yield per plant (g.)
1	NBH 1430	60.1067	5.26	57.8667	153.7567	17.6367	7.15	17.81	618.6	5.0167	43.8733	162.1467	71.1533
2	NBH 1322	59.26	6.7567	48.6133	140.9367	14.6	6.0967	17.79	530.6	4.2833	54.5067	122.6233	66.87
3	NBH 1156	62.5967	7.3967	43.8067	147.0933	13.7333	6.5033	15.6867	416.9533	5.62	41.3833	116.8367	48.3067
4	NBH 972	57.3233	7.6567	39.2933	141.7	13.33	7.8367	17.5667	455.41	4.5267	58.7367	102.3233	60.11
5	UTKARSH	52.4833	3.9433	36.8167	133.02	20.8333	6.28	13.31	316.8267	3.0467	46.71	109.2633	51.2533
6	FARM SONA	54.9733	6.5367	55.6933	147.1833	23.76	6.32	13.89	644.96	6.07	37.68	123.5733	46.93
7	SHATABDI 9014	51.2933	7.73	63.38	154.2167	16.4967	5.4633	26.16	653.8933	4.7633	25.0167	133.6233	33.84
8	VARUNA 1454	60.6167	6.2667	56.28	147.49	11.7633	7.0433	19.5233	530.17	5.76	33.5433	113.7367	39.7933
9	VNR 212	83.56	10.78	81.6567	162.9967	8.0633	5.4933	37.3567	841.7733	4.6533	12.1767	180.2533	21.93
10	VNR-UTKAL	75.1	8.6267	68.1533	159.6233	12.2833	6.46	17.5633	714.7667	5.52	28.7833	152.4567	43.87
11	VNR 218	74.3067	9.2933	78.9533	155.7067	8.3233	4.93	26.8833	859.0533	4.34	18.3	172.0133	31.6433
12	BSS 985	70.35	7.49	71.00	153.6933	15.0233	7.4733	15.4767	688.3834	4.18	27.9067	153.9367	43.4567
13	LOCAL NBH 1544	72.6033	8.49	73.5033	152.4333	11.5233	3.3833	26.01	713.34	3.81	16.8133	159.38	27.0567
14	VNR-NAVINA	86.0567	11.6067	80.23	164.7667	7.8	4.17	38.6033	751.5833	2.49	12.3933	178.9633	22.2367
15	LOCAL NBH 1230	53.42	6.4633	44.48	142.23	17.9967	4.75	14.7567	468.33	3.4633	41.0033	95.1867	39.96
16	SATABDI HARSH	58.5533	4.85	41.78	130.2333	22.34	5.63	12.4433	393.4	3.73	45.6633	119.3033	54.82
17	LOCAL JHUMKIYA 1	56.2767	7.6067	47.31	143.37	24.3033	5.4567	11.0667	255.3633	2.4867	43.29	149.48	64.7333
18	BLACK LONG	74.25	7.3467	61.12	152.6567	9.87	5.3167	20.4967	628.9233	4.4067	33.5167	127.4567	42.8967
19	LOCAL JHUMKIYA 2	58.2133	5.2133	42.93	140.2567	20.1667	4.8667	11.2633	292.8867	2.7367	57.3167	104.36	59.6933
20	BLACK BATTY	63.2867	5.8133	45.1733	134.65	23.6567	5.4833	11.59	283.2933	2.7633	43.7833	99.8	43.78

Table.3 Mean, Range, Genotypic, Phenotypic and environmental variances, and coefficient of variation for 12 quantitative characters in Brinjal (Eggplant).

S.N.	Characters	Grand mean	Range		GCV	PCV	ECV	C.D. @ 5%
			Max	Min.				
1	Days to 50 % flowering	64.2315	86.0567	51.2933	15.798	16.066	5.057	5.3686
2	Number of primary branches per plants	7.2563	11.6067	3.9433	20.714	26.236	27.889	3.345
3	Plant height (cm.)	56.902	81.6567	36.8167	25.283	25.716	8.132	7.648
4	Days to 80% fruit maturity	147.9007	164.7667	130.2333	6.448	6.526	1.742	4.2593
5	Number of fruits per plant	15.6752	24.3033	7.8	33.364	34.857	17.481	4.5294
6	Fruit diameter (cm.)	5.8053	7.8367	3.3833	18.993	19.259	5.521	0.5298
7	Fruit length (cm.)	19.2623	38.6033	11.0667	41.319	41.472	6.171	1.9649
8	Number of seed per fruits	552.9255	859.0533	255.3633	31.31	33.755	21.847	199.6693
9	Test weight (g.)	4.1833	6.07	2.4867	26.373	26.506	4.587	0.3172
10	Harvest index (%)	36.1198	58.7367	12.1767	38.533	39.209	12.563	7.5005
11	Biological yield per plant (g.)	133.8358	180.2533	95.1867	20.026	20.564	8.094	17.9063
12	Seed yield per plant (g.)	45.7167	71.1533	21.93	29.56	31.231	17.456	13.1904

Table.4 Heritability (%) in broad sense, Genetic advance and genetic advance as percent of mean for 12 quantitative characters in Brinjal (Eggplant).

S.N.	Traits	GCV	PCV	ECV	h^2 (Broad Sense)%	Genetic Advancement 5%	Genetic Advancement 1%	Gen. Adv as % of Mean 5%	Gen. Adv as % of Mean 1%
1	Days to 50 % flowering	15.798	16.066	5.057	96.7	20.556	26.344	32.003	41.013
2	No. of primary branches/plants	20.714	26.236	27.889	62.3	2.445	3.133	33.69	43.175
3	Plant height (cm.)	25.283	25.716	8.132	96.7	29.139	37.343	51.208	65.626
4	Days to 80% fruit maturity	6.448	6.526	1.742	97.6	19.411	24.877	13.125	16.82
5	Number of fruits per plant	33.364	34.857	17.481	91.6	10.312	13.215	65.785	84.307
6	Fruit diameter (cm.)	18.993	19.259	5.521	97.3	2.24	2.871	38.587	49.451
7	Fruit length (cm.)	41.319	41.472	6.171	99.3	16.335	20.934	84.803	108.679
8	Number of seed per fruits	31.31	33.755	21.847	86	330.796	423.932	59.826	76.671
9	Test weight (g.)	26.373	26.506	4.587	99	2.261	2.898	54.057	69.277
10	Harvest index (%)	38.533	39.209	12.563	96.6	28.176	36.109	78.007	99.97
11	Biological yield per plant (g.)	20.026	20.564	8.094	94.8	53.768	0.948	40.174	51.486
12	Seed yield per plant (g.)	29.56	31.231	17.456	89.6	26.349	0.896	57.636	73.864

Fig.1 Grand mean and Range of Brinjal (Eggplant) for different traits.

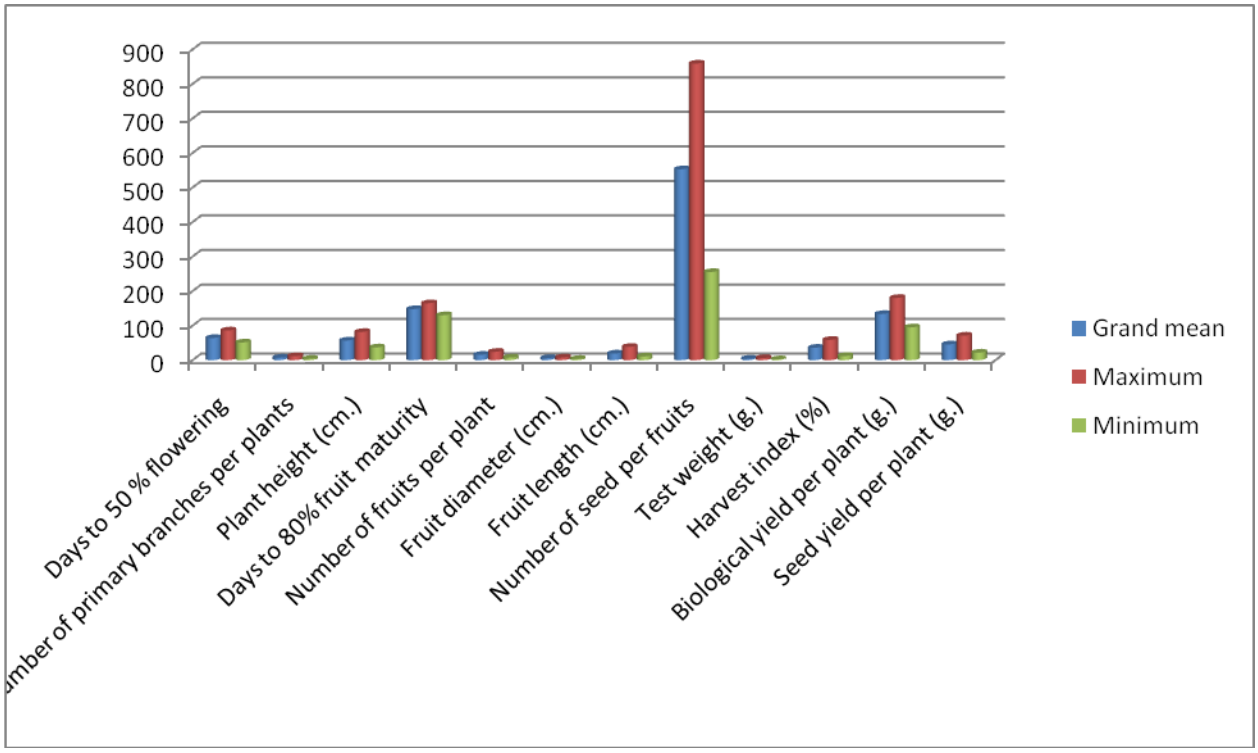


Fig.2 GCV, PCV, ECV and C.D for 12 quantitative characters in Brinjal (Eggplant).

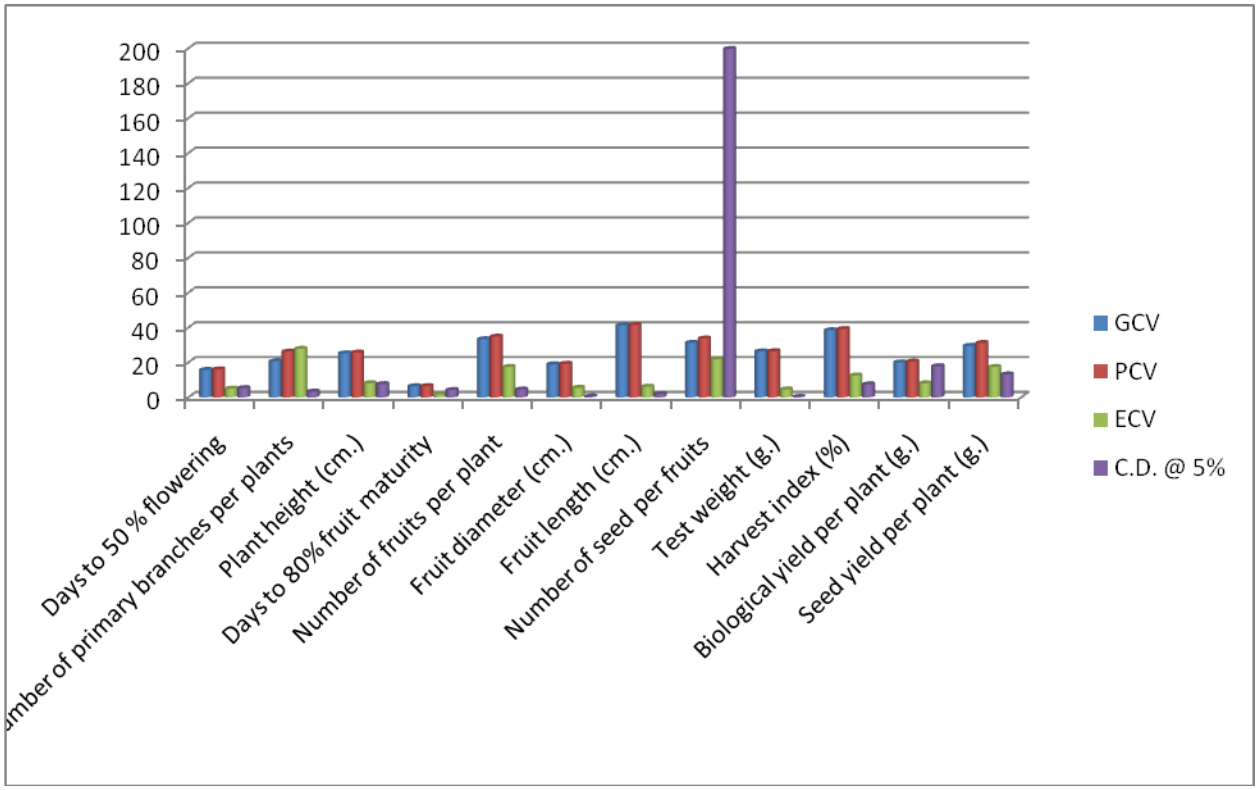
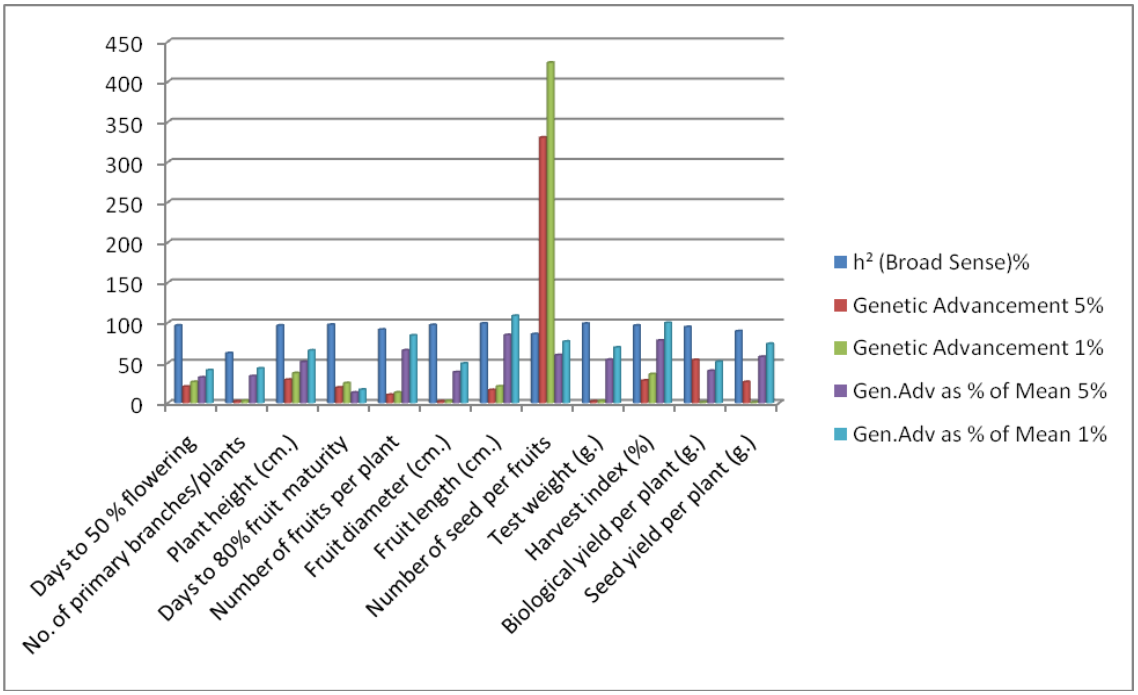


Fig.3 h^2b, GA @5% and 1%, and GA as % of mean 5% and 1%



The characters observed for high GCV, indicative of less amenability of these characters to environmental fluctuations and hence, greater emphasis should be given to these traits.

High heritability coupled with high genetic advance observed for different traits indicating that these characters could be prominently governed by additive gene action. So the selection of these traits could be more effective for desired genetic improvement in brinjal breeding programme.

Acknowledgement

This paper and the research behind it would not have been possible without the exceptional support of my supervisor, Mr. Ayodhya Prasad Pandey. I acknowledge to all the faculty of Department of Genetics and plant breeding and AKS University, Satna (M.P.) for providing the essential facilities during the research.

References

Anonymous, (2022). *Ministry of Agriculture, National Horticulture Board (NHB)*, 2021-22 (First Advance Estimates) of Area and Production of Horticultue Crops.

Aykroyd, W. R. (1963). The nutritive value of Indian foods and planning of satisfactory dttrrriet. *ICMR Special Rep. Series*.; No. 42.

Bajaj, K. L., Kaur, G. and Chadha, M. L. (1979). Glycoalkaloid content and other chemical constituents of the fruits of some egg plant (*Solanum melongena* L.) varieties. *J. Plant Foods*.; 3(3): 163-168. https://doi.org/10.1080/0142968X.1979.11904224

Balsubramaniyam, K., Haripriya, K., Bharathkumar, T. R. and Elangaimannan, R. (2021). Assessment of genetic variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). *Plant Arch*.; 21(1): 1784-1786. https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.285

Banerjee, S., Verma, A., Bisht, Y. S., Maurya, P.K., Jamir, I., Mondal, S., Bhattacharjee, T. and Chattopadhyay, A. (2018). Genetic variability, correlation coefficient and path coefficient analysis in brinjal germplasm. *Int. J. Chem. Stud*.; 6: 3069-3073.

Burton G. W. and De Vane E. M. (1953) Estimating heritability in tall fescue (*Festuca arundinacea*) from replicated clonal material. *Agronomy Journal*; 45, 478-481.

https://doi.org/10.2134/agronj1953.00021962004500100005x

De Candolle, A. (1886). Origin of Cultivated Plants. *2nd edition. Reprinted in* 1959. New York.

Devaraju., Indiresh, K. M., 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. *J. Pharmacogn. Phytochem*.; 9(2): 2200-2203.

Durga, H. K. C. H., Uma, J. K., Usha, K. K., Kranthi, R. G. and Paratpara, R. M. (2022). Studies on variability, heritability and genetic advance in f2 generation of Brinjal (*Solanum melongena* L.) for different yield attributing characters. *The Pharma Innovation Journal*; 11(5): 2121-2123.

Hanson, C. H., Robinson, H. F. and Comstock, R. E. (1956). Biometrical studies or yield in segregating population of Korean Lespedeza. *Agron. J.* 48 : 268-272. https://doi.org/10.2134/AGRONJ1956.00021962004800060008X

Johnson, H. W., Robinson, H. E., Comstock, R.E. (1955) Estimates of genetic and environmental variability in soyabean. *Agronomy Journal*; 47:314-318. https://doi.org/10.2134/agronj1955.00021962004700070009x

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.

Knapp, S., Vorontsova, M. S. and Prohens, J. (2013). Wild Relatives of the Eggplant (*Solanum melongena* L.: Solanaceae): *New Understanding of Species Names in a Complex Group. PLoS ONE;* 8(2): e57039. https://doi.org/10.1371/journal.pone.0057039

Panse V. G. and Sukhatme, P. V., (1967). Statistical methods for Agriculture workers. *Indian council of Agriculture, New Delhi*.

Rameshkumar, D., Swarna, P. R., Savitha, B. K. and Ravikesavan, R. (2022). Genetic variability and correlation analysis in F2 segregating population in brinjal (*Solanum melongena* L.). *J. Appl. & Nat. Sci*.; 14 (SI), 151 - 154. https://doi.org/10.31018/jans.v14iSI.3601

Reshmika, P. K., Gasti, V. D, Evoor, S, Jayyapa, J. and Mulge. R. (2014). Genetic variability studies for growth, earliness, yield and quality parameters in brinjal (*Solanum melongena* L.). *Environment and ecology*; 33 (2): 761-766.

Sharma, P., Nair, R., Kanchan, S. B. and Tiwari, S. (2022). Genetic Variability for Quantitative in Brinjal (*Solanum melongena* L.). *Biological Forum – An International Journal*; 14(1): 01-05.

Sidhya, P, Koundinya, A. V. V. and Pandit, M. K. (2014) Genetic variability, heritability and genetic advances in tomato. *Environment and Ecology* 32(4B): 1737-1740.

Thomas, A., Namboodiri, R. V., Sujatha, R., Sreekumar, K. M., Binitha, N. K. and Varghese, S. (2022). Genetic variability and correlation analysis for yield and yield contributing characters in brinjal (*Solanum melongena* L.). *Electronic Journal of Plant Breeding*; 13(3): 895 - 900. https://doi.org/10.37992/2022.1303.117

Thompson, H. C. and Kelly, W. C. (1957). Vegetable Crops. *McGraw-Hill Book Co. Inc., New York*; pp. 500-503.

Tirkey, M., Saravana, S. and Pushpa, L. (2018). Studies on variability, heritability and genetic advance for yield and its attributes in brinjal (*Solanum melongena* L.). *J. Pharmaco. and Phytochemi*.; 1: 1181-1183.

Vavilov, N. I. (1951). The origin, variation, immunity and breeding of cultivated plants. (Translated from Russian by Chester KS). *Chronical Botany*; 13: 1-364.

Verma, S. R., Mishra, S. K., Roy, S., Singh, R. K. and Singh, M. K. (2021). Genetic studies for parental selection among brinjal (*Solanum melongena* L.) varieties. *J. Pharm. Innov.*; 10(2): 209-213.

How to cite this article:

Vivek Daheriya, Ayodhya Prasad Pandey, Rajbeer Singh Gaur, Satyadev Kol and Ankit Kumar Bhagat. 2023. Genetic Variability Studies of Brinjal Genotypes (*Solanum melongena* L.) for Different Quantitative Traits at Satna District of Vindhya Region. *Int.J.Curr.Microbiol.App.Sci.* 12(12): 142-151.
doi: https://doi.org/10.20546/ijcmas.2023.1212.018