Current Journal of Applied Science and Technology

31(2): 1-9, 2018; Article no.CJAST.45883
ISSN: 2457-1024
(Past name: British Journal of Applied Science & Technology, Past ISSN: 2231-0843, NLM ID: 101664541)

Genetic Studies for Parental Selection among Brinjal (*Solanum melongena* L.) Varieties

Saurabh Kasera[1*], S. Saravanan[1], Katar Singh Burman[1] and Anita Kerketta[1]

[1]*Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Naini, Allahabad (U.P.), 211007, India.*

Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2018/45883

Original Research Article

Received 05 November 2018
Accepted 27 November 2018
Published 08 December 2018

ABSTRACT

Aims: To evaluate twenty brinjal varieties for suitable parent selection in yield aspects.
Study Design: The experiment was carried out in Randomized Block Design (RBD) with three replications.
Place and Duration of Study: The study was carried out at Horticulture Experiment Station, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, (U.P.) between September 2015 and February 2016.
Methodology: A field experiment was conducted with twenty different brinjal varieties. The observations were recorded on thirteen quantitative and qualitative traits. The mean data were subjected to the various statistical and biometrical analyses.
Results: Analysis of variance indicates that twenty diverse varieties of brinjal differed significantly for the thirteen traits. The highest estimate of phenotypic (PCV) and genotypic (GCV) coefficient of variation were recorded in case of Avg. Fruit Weight (gm) (PCV=35.71) and (GCV=34.80) followed by Avg. Yield/ Plant (kg) (PCV= 28.60) and (GCV=27.53), and Fruit Circumference (cm) (PCV =26.19) and (GCV=24.96) while Days to 50% Flowering exhibited lowest value (11.02 and 7.82). The presences of high heritability with the high genetic advance in per cent of the mean were observed for Avg. Fruit Weight (gm) (94.95 and 69.85), Avg. Yield/ Plant (kg) (92.62 and 54.58), Fruit Circumference (cm) (90.81 and 49.00), No. of Primary Branches/ Plant (90.08 and 45.77) and No. of Fruits/Plant (89.50 and 45.12).
Conclusion: These findings exhibiting additive gene effect and selection for these traits is reliable for a further breeding programme. Selection of suitable parents is an important criteria for the success of crop improvement programme.

**Corresponding author: E-mail: saurabhkaseraag@gmail.com;*
Note: Special issue with selected papers presented in National Conference on Biotechnological Initiatives for Crop Improvement (BICI 2018), December 08-09, 2018, Organized by Bihar Agricultural University, Sabour, Bhagalpur - 813210 (Bihar), India. Conference organizing committee and Guest Editorial Board completed peer-review of this manuscript.

Keywords: Brinjal; GCV; PCV; heritability and genetic advance.

1. INTRODUCTION

Eggplant (*Solanum melongena* L.), as belongs to the family *Solanaceae,* having chromosome number 2n=2x=24, is the native of India [1]. It is popularly known as *brinjal* in India, *aubergine* in France and the United Kingdom. It is popular among people of all social strata and hence, it is rightly called as the vegetable of masses [2]. It is one of the most popular and widely grown crops of commercial and dietary significance in the world. Eggplant [*Solanum melongena* (L.)] is a major vegetable crop grown in temperate (during warm season) and tropical regions. In India, brinjal occupies an area of 0.71 million hectare with an estimated production of 13.59 million tonnes and productivity stands at 19.1 tonnes per hectare [NHB, 2015].

Eggplant is well known for its medicinal properties and has also been recommended as an excellent remedy for liver complaints and diabetic patients [3]. Eggplant contains the alkaloid solanine in roots and leaves, and there are medicinal uses for eggplant. Being rich in fibre, potassium, vitamin B-6 and phytonutrients like flavonoids, this vegetable lowers the risk of heart disease [4]. Consequently, due to the multiple health benefits of eggplant, which include anti-oxidant, anti-diabetic, hypertensive, cardio protective and hepatoprotective effects, the demand for eggplant has been on a rapid and steady rise in the recent years [5].

Due to its sky-scraping production rate all over the world, it is often referred to as a poor man's vegetable [6]. Hence, it is a good source of income to small and marginal farmers. In spite of obvious importance in our daily life, little attention has been given to this crop in the past for the yield improvement. Use of traditional varieties and less variability affected by diseases and pest is the important constraint for low yield potentiality. Collection of germplasm and its genetic studies can help to get a suitable genotype for higher yield or any other desirable character. To meet the demand of ever increasing population, there is a need to enhance the productivity levels of brinjal crop. It is one of the very few self-pollinated crops where exploitation of hybrid vigour has been commercially successful because of a high number of seeds obtained from a cross.

Genetic improvement of any crop mainly depends on the amount of genetic variability present in the population and the germplasm serves as a valuable source of base population and provide scope for wide variability [7]. Phenotypic (PCV) and genotypic (GCV) coefficients of variation are useful in detecting the variability present in the available varieties. Genetic variability for yield and yield components is essential in the base population for successful crop improvement. Heritability and genetic advance help in determining the influence of environment in the expression of the characters and the extent to which the improvement is possible after selection [8].

2. MATERIALS AND METHODS

Materials for the study comprised of twenty varieties of brinjal (Table 1). The experiment was laid out in a Randomized Block Design with three replications at Department of Horticulture, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, during Sep., 2015 to Feb., 2016. The experiment site had sandy loam soil, low in organic carbon and slightly alkaline having pH=7.4. Eighteen plants were raised separately for each accession in $4m^2$ plot at a spacing of 60cm×60cm under three replications. The data were analysed by the methods of Fisher [9] and Panse and Sukhatme [10] using mean values of random plants in each replication from all varieties to determine the significance of genotypic effects.

Table 1. Details of varieties

S. No.	Name of variety	Sources
1.	J.B-6	IIVR, Varanasi
2.	Azad B-4	IIVR, Varanasi
3.	Kashi Sandesh	IIVR, Varanasi
4.	DBR-31	IIVR, Varanasi
5.	Green Long	IIVR, Varanasi
6.	Utkal Madhur	IIVR, Varanasi
7.	Azad B-2	IIVR, Varanasi
8.	Bhagyamati	IIVR, Varanasi
9.	Punjab Shree	IIVR, Varanasi
10.	Utkal Anushri	IIVR, Varanasi
11.	Swarnamani	IIVR, Varanasi
12.	Aruna	IIVR, Varanasi
13.	J.B.Round	IIVR, Varanasi
14.	VR-2	IIVR, Varanasi
15.	Pusa Bindu	IIVR, Varanasi
16.	Punjab Barsati	IIVR, Varanasi
17.	Arka Nidhi	IIVR, Varanasi
18.	DBR-8	IIVR, Varanasi
19.	kashi Prakash	IIVR, Varanasi
20.	Arka Shirish	IIVR, Varanasi

Genotypic and phenotypic coefficients of variation were calculated using the formulae of Burton [11]. Broad sense heritability was calculated as per Lush [12] and genetic advance estimated by the method of Johnson et al. [13]. Categorization of the genotypic coefficient of variation (GCV), the phenotypic coefficient of variation (PCV) and genetic advance (GA) was done as per Sivasubramanian and Menon [14] and heritability categorised as by Johnson et al. [13].

3. RESULTS AND DISCUSSION

In the present investigation, significant differences were observed among all entries for all the characters providing the scope of improvement in brinjal for yield traits (Table 2). Similar findings are reported with Manpreet and Sigh [15]. The suggested existence of wide range variability in the varieties studied. The results pertaining to mean, range, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability in a broad sense (h2) and apparent genetic advance as percent of mean (GAM) for all the 13 characters are depicted in Table 3.

Mean and ranges are the simple measures of variability. The range of mean values also revealed sufficient variation for all thirteen characters of brinjal. The range of variability was recorded maximum for average fruit weight (64.33- 197.58) followed by plant height (52.45-88.36). These findings are in consonance with [16] and [17]. The characters showing a high range of variation have more scope for improvement. The lowest range of mean was observed for TSS (4.15-5.90˚Brix) indicating the availability of low variation for its improvement in the experimental material used. Results from the present study in this context indicated that PCV and GCV were high (>20%) for avg. fruit weight, avg. yield per plant, fruit circumference, number of primary branches per plant, number of flower per cluster, number of fruits per plant and fruit length; whereas, plant height, leaf length, leaf width and dry matter content showed moderate PCV and GCV (10-20%).

3.1 Plant Height (cm)

The plant height ranged from 52.45 to 88.36 cm with a mean of 67.38 cm. (Table 3). In the present study, the genotypic and phenotypic coefficients of variation were moderate for plant height (13.51 and 15.61). The estimates of heritability were high (74.84%) with an expected genetic advance (16.22%) and genetic advance as per cent of the mean (24.07%), respectively. High heritability is effective and less influenced by environment, indicating the relative value of selection based on phenotypic expression of the character. Naz et al. [18] and Patel et al. [19] also reported similar results for plant height. These findings are in close agreement with the findings of Pujer et al. [16] who revealed higher phenotypic coefficient of variation than genotypic coefficient of variation for the character and showed high heritability values similar with the present findings.

3.2 Number of Primary Branches per Plant

The grand mean of a number of primary branches per plant was recorded 4.34 and ranged from 2.66 to 6.35 (Table 3). The PCV value (24.67) was slightly higher than the respective GCV (23.41), denoting little influence of environment for the expression of the character. The estimates of heritability were high (90.08%) with high genetic advance as per cent of mean (45.77%) while low in genetic advance at 5 per cent (1.99%). The results of the present investigation are supported by [15]. Mili et al. [20] also showed the higher phenotypic coefficient of variation for number of primary branches per plant.

3.3 Leaf Length (cm)

The variation in length of leaf among the varieties ranged from 12.88 to 21.13cm with a grand mean of 17.07cm (Table 3). The difference between GCV (11.46) and PCV (13.79) for leaf length was relatively low, which indicates that the character was comparatively stable and highly heritable. The estimate of heritability was (69.08%) with genetic advance (3.35%) and genetic advance as per cent of the mean (19.63%). This indicates that the character controlled by polygenes might be useful for effective selection. The results obtained in this study are in conformity with the findings of [21] and [22].

3.4 Leaf Width (cm)

The grand mean for leaf width was recorded 13.87cm, where it ranged from 9.26 to 19.12cm (Table 3). The PCV and GCV were 16.78 and

14.94%, respectively. Minimum difference between the PCV and GCV revealed that they were less influenced by the environmental condition. On the basis of phenotypic expression, selection for this character would be helpful for the improvement of this crop. The estimates of heritability were high (79.33%) with low genetic advance (3.80%) and genetic advance as per cent of mean (27.42%). These results are supported by [21] and [22], who reported slightly higher PCV than GCV for leaf width.

3.5 Days to 50% Flowering

The grand mean for days to 50% flowering was recorded 74 days. It ranged from 64.13 to 84.37 days (Table 3). The lowest PCV and GCV were 11.02 and 7.82%, respectively recorded with this parameter. The PCV was higher than the respective GCV, denoting environmental factors influencing the expression to some degree or other. The estimates of heritability were moderate (50.37%) with low genetic advance (8.46%) and genetic advance as per cent of mean (11.43%). These results are in conformity with that of [23].

3.6 Number of Flowers per Cluster

The range for number of flowers per cluster was recorded 2.73-5.81 and grand mean was 4.04 (Table 3). The PCV and GCV were 21.61 and 20.19%, respectively. The PCV value was slightly higher than the respective GCV, due to the moderate influence of environment for the expression of the character. The estimates of heritability were high (87.31%) with low genetic advance (1.57%) and genetic advance as per cent of mean (38.87%). Singh et al. [24] also showed that phenotypic coefficient of variation was greater for number of flowers per cluster. Naik et al. [25] also reported similar results for a number of flowers per cluster.

3.7 Number of Fruit per Plant

The grand mean of no. of fruits per plant was recorded as 16.09, ranging from 10.67 to 25.31 (Table 3). The PCV and GCV were 24.47 and 23.15%, respectively. The difference between GCV and PCV was relatively low, which indicates that the character was comparatively stable and highly heritable. The estimate of heritability was high (89.5%) with low genetic advance (7.26%) and genetic advance as per cent of mean (45.12%). Sabeena et al. [26] and Patel et al. [19] reported similar results.

3.8 Fruit Weight (g)

The grand average fruit weight per plant was recorded 114.78g. It ranged from 64.33 to 197.58 g (Table 3). The PCV (35.71%) and GCV (34.80%) were recorded highest. There was least difference between the phenotypic and genotypic coefficient of variation, indicating little environmental influence in the expression of this character. The estimate of heritability was high (94.95%) with high genetic advance (80.17%) and genetic advance as per cent of the mean (69.85%). Similar results with the present findings were exhibited by Ara et al. [27] for average fruit weight per plant.

3.9 Fruit Length (cm)

The fruit length varied among the varieties ranging from 7.97 to 14.79 cm with an average of 10.28 cm (Table 3). The PCV and GCV were 24.14 and 22.76%, respectively. The difference between GCV and PCV was relatively low, which indicates that the character was comparatively stable and highly heritable. The estimate of heritability was high (88.91%) with low genetic advance (4.55%) and high genetic advance as per cent of mean (44.21%). This indicates that the character governed by many genes might be useful for making an effective selection. Similar results were observed by various workers [28,29].

3.10 Fruit Circumference (cm)

The average fruit circumference was recorded 14.16cm, ranging from 8.25 to 21.39cm (Table 3). The PCV and GCV were 26.19 and 24.96%, respectively. The smallest difference observed between PCV and GCV values of fruit circumference exhibited the lesser influence of environmental factors on the expression of the trait. The estimate of heritability was high (90.81%) with low genetic advance (6.94%) and high genetic advance as per cent of mean (49.00%), which indicates the influence of non-additive gene action and considerable influence of environment in the expression of this trait, which could be exploited through manifestation of dominance and epistatic components through heterosis. Similar results were reported by Ullah et al. [21] for average fruit diameter.

Table 2. Analysis of variance for 13 characters in Brinjal (mean squares)

S. No.	Characters	Source of variation		
		Replications	Treatments	Error
	d.f.	**2**	**19**	**38**
1.	Plant Height (cm) at maturity	9.71	276.27**	27.84
2.	No. of Primary Branches/ Plant	0.05	3.22**	0.11
3.	Leaf Length (cm)	0.83	13.19**	1.71
4.	Leaf Width (cm)	0.73	14.01**	1.12
5.	Days to 50% Flowering	10.36	133.47**	32.99
6.	No. of Flowers/Clusters	0.02	2.09**	0.10
7.	No. of Fruits/Plant	0.46	43.27**	1.63
8.	Avg. Fruit Weight (gm)	55.13	4869.95**	84.82
9.	Fruit Length (cm)	0.13	17.11**	0.68
10.	Fruit Circumference (cm)	0.92	38.72**	1.26
11.	Avg. Yield/ Plant (kg)	0.01	0.48**	0.01
12.	Dry Matter Content %	0.20	4.93**	0.52
13	TSS (°Brix)	0.04	0.85**	0.15

*** Significant at 5% levels*

Table 3. Estimates of range, grand mean, phenotypic, genotypic, coefficients of variation, heritability in broad (h^2_{bs}) sense and genetic advance in per cent of mean ($\overline{GA}$) for thirteen characters in brinjal genotypes

	Characters	Mean value range		Grand mean	P.C.V. (%)	G.C.V. (%)	Heritability Broad Sense (%) (h^2_{bs})	Genetic Advancement 5%	Genetic Advance in per cent of mean
		Lowest	Highest						
1.	Plant Height (cm) at maturity	52.45	88.36	67.38	15.61	13.51	74.84	16.22	24.07
2.	No. of Primary Branches/ Plant	2.66	6.35	4.34	24.67	23.41	90.08	1.99	45.77
3.	Leaf Length (cm)	12.88	21.13	17.07	13.79	11.46	69.08	3.35	19.63
4.	Leaf Width (cm)	9.26	19.12	13.87	16.78	14.94	79.33	3.80	27.42
5.	Days to 50% Flowering	64.13	84.37	74.00	11.02	7.82	50.37	8.46	11.43
6.	No. of Flowers/Clusters	2.73	5.81	4.04	21.61	20.19	87.31	1.57	38.87
7.	No. of Fruits/Plant	10.67	25.31	16.09	24.47	23.15	89.50	7.26	45.12
8.	Avg. Fruit Weight (gm)	64.33	197.58	114.78	35.71	34.80	94.95	80.17	69.85
9.	Fruit Length (cm)	7.97	14.79	10.28	24.14	22.76	88.91	4.55	44.21
10.	Fruit Circumference (cm)	8.25	21.39	14.16	26.19	24.96	90.81	6.94	49.00
11.	Avg. Yield/ Plant (kg)	0.88	2.67	1.44	28.60	27.53	92.62	0.78	54.58
12.	Dry Matter Content %	7.55	12.23	9.45	14.95	12.84	73.71	2.14	22.70
13.	TSS (°Brix)	4.15	5.90	5.03	12.34	9.59	60.35	0.77	15.34

3.11 Avg. Yield per Plant (kg)

The grand mean of average fruit yield per plant was recorded as 1.44 kg. It ranged from 0.88 to 2.67kg (Table 3). The PCV and GCV were 28.60 and 27.53%, respectively. There was some difference between the phenotypic and genotypic coefficient of variation, indicating a small environmental influence in the expression of this characteristics. The estimate of heritability was high (92.62%) with low genetic advance (0.78%) and high genetic advance of mean (54.58%). Very high heritability estimates for average yield per plant indicates possibility of improvement through selection. The results obtained in this study are in conformity with the findings of Kumar and Arumugam [30]. They also observed high estimates of heritability for fruit yield per plant, indicating possibility of improvement through selection.

3.12 Dry Matter Content

The dry matter content varied among the varieties ranging from 7.55 to 12.23% with an average of 9.45% (Table 3). The PCV and GCV were 14.95 and 12.84%, respectively. The difference between GCV and PCV was relatively low, which indicates little environmental influence in the expression of this character. The estimate of heritability was high (73.71%) with low genetic advance (2.14%) and moderate genetic advance as per cent of mean (22.70%). Similar results were observed by Ramana et al. [31], Padmaja et al. [32].

3.13 TSS (°Brix)

The grand mean of TSS was recorded as 5.03°Brix and varied among the varieties ranged from 4.15 to 5.90°Brix (Table 3). The PCV and GCV were 12.34 and 9.59%, respectively. The difference between GCV and PCV was relatively low, which indicates little environmental influence in the expression of this character. The estimate of heritability was moderate (60.35%) with lowest genetic advance (0.77%) and moderate genetic advance as per cent of mean (15.34%). Similar results were observed by various workers [28,29].

4. CONCLUSION

The genetic architecture of fruit yield is based on the overall net effect produced by various yield traits interact with each other. Based on the studies on genetic variability, it is concluded that the characters avg. fruit weight (gm) followed by avg. yield per plant (kg), fruit circumference (cm), no. of primary branches per plant, no. of fruits per plant and fruit length (cm) recorded high amount of genetic variability along with heritability and genetic advance. This reveals that there is a large scope for improving these characters by simple phenotypic selection. Days to 50% flowering, which was found to be under the influence of non - additive gene action, suggested that heterosis breeding is more reliable to improve this trait. Therefore, direct selection based on these combinations of traits help in harnessing for selecting good varieties as a parent with high yield per plant in improvement programmes.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hazra P, Chattopadhyay A, Karmakar K, Dutta S. Brinjal in: modern technology in vegetable production. New India Publishing Agency, New Delhi. 2011;103-114.
2. Patel KK, Sarnaik DK. Performance study of long fruited genotypes of brinjal under Raipur conditions. The Orissa J Horticulture. 2003;31:74-77.
3. Tiwari A, Rajesh SJ, Piyush T and Nayak S. Phytochemical investigations of crown of *Solanum melongena* (L.) fruit. Int J Phytomed. 2009;1:9-11.
4. Chauhan A, Chandel KS and Shiv Pratap. Correlation studies in segregating population of brinjal (*Solanum melongena* L.) developed through bi-parental mating using bacterial wilt resistant varieties. Int J Curr Microbiol App Sci. 2017;6(8):1936-1943.
5. Ojiewo CO, Murakami K, Masinde PW, Agong SJ. Mutation breeding of African nightshade (Solanum section Solanum). Fruit Veg Cereal Biotech. 2007;1:39-52.
6. Kumar R, Anjali K, Singh AK, Maurya S. Screening of bacterial wilt resistant accessions of brinjal for Jharkhand region of India. The Ecoscan. 2014;8(1&2):67-70.

7. Gavade RT, Ghadage BA. Genetic variability, heritability and genetic advance in generation of brinjal (*Solanum melongena* L.). Bioinfolet. 2015;12(1C): 325-328.
8. Robinson HF, Comstock RE, Harvey PH. Estimation of heritability and degree of dominance in corn. Agron J. 1949;4:353-359.
9. Fisher RA. Questions and answers, 14. The American Statistician. 1948;2(5):30–31.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers, ICAR, New Delhi. 1967;152-161.
11. Burton GW, deVane EH. Estimating heritability in tall fescue from replicated clonal material. Agronomy Journal. 1953;45:478-81.
12. Lush JL. Heritability of quantitative characters in farm animals. Proceedings of 85th Congress on Genetic Heredity. 1949; (Suppl.):356-375.
13. Johnson HW, Robinson HF, Comstock RE. Estimates of genetic and environmental variability in soybean. Agronomy J. 1955;47:314-318.
14. Sivasubramanian S, Menon PM. Genotypic and phenotypic variability in rice. Madras Agriculture Journal. 1973;60:1093-1096.
15. Manpreet, Dhatt AS, Singh Bikramjit. Variability, Heritability and genetic advance in eggplant (*Solanum melongena* L.) during summer and rainy season. Asian J Bio Sci. 2013;8(2):200-204.
16. Pujer P, Jagadeesha RC and Cholin S. Genetic variability, Heritability and Genetic Advance for Yield, Yield Related Components of Brinjal (*Solanum melongena* L.) Genotypes. Int J Pure App Biosci. 2017;5(5): 872-878.
17. Arunkumar B, Kumar SSV, Prakash JC. Genetic variability and divergence studies in brinjal (*Solanum melongena* L.). Bioinfolet. 2013;10(2B):739-744.
18. Naz S, Zafrullah A, Shahzadhi K, Munir N. Assessment of genetic diversity within germplasm accessions in brinjal using morphological and molecular markers. J Animal Plant Sciences. 2013;23(4):1099-1106.
19. Patel K, Patel NB, Patel AI, Rathod H and Patel D. Study of variability, correlation and path analysis in brinjal (*Solanum melongena* L.). 2015;10(4):2037-2042.
20. Mili C, Bora GC, Das B, Paul S. Studies on variability, heritability and genetic advance in *Solanum melongena* L. Direct Res Agric Food. 2014;2:192-194.
21. Ullah S, Usman I, Tahir I, Najeebullah M, Shahid N. Association and genetic assessment in brinjal. European J Biotech and Bioscience. 2014;2:41-45.
22. Rad MRN, Poodineh M, Ghalandarzehi A and Abkhoo J. Variability, heritability and association analysis in eggplant (*Solanum melongena* L.). ARPN J Agricultural and Biological Sciences. 2015;10(12):464-468.
23. Lokesh B, Reddy SP, Reddy RVSK and Sivaraj N. Variability, heritability and genetic advance studies in Brinjal (*Solanum melongena* L.). Electronic J Plant Breed. 2013;4(1):1097-1100.
24. Singh M, Kalloo G, Banerjee MK, Singh SN. Genetics of yield and its component characters in brinjal (*Solanum melongena* L.). Vegetable Science. 2002;29(I):24-26.
25. Naik BR and Nagre PK. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). M.Sc, Thesis, Department of Horticulture, PDKV Akola, India. 2014;6(1):229-231.
26. Sabeena FA, Mehta N, Ansari S, Gavel JP. Variability studies in brinjal (*Solanum melongena* L.) in Chhattisgarh plains. Electronic J Plant Breeding. 2011;2(2): 275-281.
27. Ara AR, Narayan N, Khan SH. Genetic variability and selection parameters for yield and quality attributes in brinjal. Indian J Horticulture. 2009;66:73-78.
28. Panda B, Singh YV, Ram HH. Studies on heritability, genetic advance and genetic components of variation in round-fruited eggplant (*Solanum melongena* L.). J Horticulture. 2010;18(1):46-50.
29. Tirkey M, Saravanan S, Pushpa Lata. Studies on variability, heritability and genetic advance for yield and its attributes in brinjal (*Solanum melongena* L.). J of Pharmacognosy and Phytochemistry. 2018;SP1:1181-1183.
30. Kumar RS, Arumugam T. Variability, heritability and genetic advance for fruit yield, quality and pest and disease incidence in eggplant. Vegetable Science. 2018;40(1):111-113.

31. Ramana V, Srihari D, Reddy RVSK, Sujatha M, Bhave MHV. Heritability studies in tomato (*Solanum lycopersicum* L.) for growth, yield and quality, Agriculture Update. 12:617-621.
32. Padmaja D, Brahmeswara RMV, Eswari KB, Madhusudhan RS. Genetic variability, heritability for late leaf spot tolerance and productivity traits in a recombinant inbred line population of groundnut (*Arachis hypogaea* L.). Journal of Agriculture and Veterinary Sciences. 2013;*5*(1):36-41.