

## Genetic Variability in Brinjal (*Solanum melongena* L.)

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### Abstract

Different parameters were estimated to assess the magnitude of genetic variability in 40 diverse genotypes of brinjal (*Solanum melongena* L.). The analysis of variance indicated the prevalence of sufficient genetic variation among the genotypes from all the characters studied except total chlorophyll content. The high phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were observed for fruit volume, fruit weight, fruit length, leaf area index, number of fruits per plant, fruit borer incidence, fruit diameter, number of fruits per cluster, yield per plot, fruit set percent and fruit yield per hectare. High heritability coupled with high genetic advance were observed for fruit volume, fruit weight, leaf area index, fruit length, fruit diameter and number of fruits per plant indicating these characters are governed by additive gene action. Hence, direct selection may be followed for the improvement of brinjal for these characters.

**Key words :** Brinjal, Heritability, Genetic advance, Phenotypic coefficient of variation, Genotypic coefficient of variation.

Brinjal (*Solanum melongena* L.) is an important vegetable crop belongs to the family Solanaceae. Despite being an economically important one, the crop has received little or any concerted prerequisite for improvement of yield of any crop. The performance of different genotypes and locally available cultivars is poor in India. Hence, there is an urgent need for genetic improvement for development of high yielding cultivars. The present investigation was under taken with a view to ascertain the relative variability present in yield contributing characters to contribute them in the genetic improvement of brinjal.

### Methods

Forty diverse genotypes of brinjal (*Solanum melongena* L.) obtained from Indian Institute Horticulture Research, Vegetable Research Station Kalyanpur and local collection, were grown in a randomized block design with two replication at the vegetable research block of the Department of Horticulture, UAS, GKVK, Bangalore. The five plants were randomly selected in each plot for recording observations on 25 quantitative and qualitative traits. The phenotypic and genotypic coefficient variations were estimated following Burton and Dewane (1).

Heritability estimates were assessed following Hansone (2) and genetic advance following the method of Johnson et al. (3).

### Results and Discussion

Analysis and variance revealed highly significant difference for almost all the characters studied indicating the existence of sufficient variability. The genotypes exhibited large amount of variation for all the 25 characters studied (Table 1). It ranged from 28.90 to 61.75 cm for plant height at 45 DAT (Days after transplanting), 40.60 to 71.90 cm for plant height at 60 DAT, 50.75 to 84.4 cm for plant height at 75 DAT, 66.15 to 101.50 cm for plant height at 90 DAT, 32.05 to 51.90 days for first flowering, 41.40 to 59.30 days for 50% flowering, 2.30 to 4.45 branches at 45 DAT, 3.30 to 6.10 branches at 60 DAT, 3.20 to 7.10 flowers per cluster, 12.30 to 28.4 clusters per plant, 46.86 to 108.3 cm for leaf area, 2.19 to 10.96 for leaf area index, 1.20 to 3.70 fruits per cluster, 21.71 to 68.40 for fruit set %, 3.30 to 33.86 for fruits per plant, 0.85 to 2.35 kg for yield per plant, 9.05 to 32.4 kg yield per plot, 47.82 to 52.0 gm for fruit weight, 7.50 to 32.1 cm for fruit length, 2.60 to 9.71 cm for fruit diameter, 52.45 to 86.7ml for fruit volume, 11.67 to 53.01 ton for yield

**Table 1.** Estimation of genetic parameters in respect of growth, yield and quality traits in brinjal genotypes. PV-Phenotypic variance, PCV-Phenotypic coefficient of variation, GCV-Genotypic coefficient of variation, GV-Genotypic variance, GAM-Genetic advance as per cent of mean,  $h^2_{bs}$  - Broad sense heritability.

Characters	Range	Mean	GV	PV	GCV (%)	PCV (%)	$h^2_{bs}$ (%)	GAM (%)
1 Plant height at 45 DAT (cm)	28.90-61.75	45.32	56.58	57.23	16.12	16.22	98.68	32.99
2 Plant height at 60 DAT (cm)	40.60-71.90	56.20	58.10	59.21	13.21	13.33	98.29	26.99
3 Plant height at 75 DAT (cm)	50.75-84.40	67.57	54.43	55.85	10.79	10.89	98.19	22.04
4 Plant height at 90 DAT (cm)	66.15-101.50	83.82	66.05	67.42	9.87	9.94	98.46	20.17
5 Days to first flowering	32.05-51.90	41.97	19.58	19.96	11.35	11.43	98.59	23.22
6 Days to 50% flowering	41.40-59.30	50.35	10.11	10.63	6.18	6.27	96.99	12.54
7 Number of branches at 45 DAT	2.30-4.45	3.37	0.30	0.34	17.88	18.43	94.06	35.72
8 Number of branches at 60 DAT	3.30-6.10	4.70	0.48	0.54	14.55	14.97	94.51	29.15
9 Number of flowers per cluster	3.20-7.10	5.15	0.65	0.68	17.10	17.34	97.30	34.76
10 Number of clusters per plant	12.30-28.4	20.35	5.49	14.11	15.75	19.93	62.48	25.65
11 Leaf area (cm <sup>2</sup> )	46.86-108.3	77.58	277.55	293.18	22.62	22.93	97.31	45.96
12 Leaf area index	2.19-10.96	6.57	4.28	4.32	44.71	44.85	99.36	91.81
13 Number of fruits per cluster	1.20-3.70	2.45	0.38	0.40	32.53	32.93	97.62	66.22
14 Fruit set (%)	21.71-68.40	45.05	121.73	134.87	27.84	28.57	94.94	55.88
15 Number of fruits per plant	3.30-33.86	18.58	66.73	68.53	42.03	42.31	98.68	86.02
16 Yield per plant (kg)	0.85-2.35	1.60	0.04	0.05	17.11	18.20	88.37	33.13
17 Yield per plot (kg)	9.05-32.4	20.72	17.55	26.27	28.51	31.41	82.36	53.30
18 Fruit weight (g)	47.82-52.00	283.91	5419.64	5436.99	74.56	74.71	99.61	153.30
19 Fruit length (cm)	7.50-32.10	19.80	54.27	54.48	46.29	46.34	98.76	69.33
20 Fruit diameter (cm)	2.60-9.71	6.15	3.49	3.56	33.87	34.08	98.76	69.33
21 Fruit volume (ml)	52.45-86.70	459.72	17093.94	17126.70	79.02	79.10	99.82	162.65
22 Yield per ha. (ton)	11.67-53.01	32.34	49.65	54.43	27.62	28.30	95.26	55.89
23 Wilt incidence (%)	0.0-50.00	25.00	216.19	216.64	27.62	28.30	95.52	55.53
24 Shoot and fruit borer incidence (%)	0.0-62.50	31.25	238.47	238.87	34.32	34.37	99.68	70.53
25 Total chlorophyll content (mg/g)	0.0037-0.0068	0.0052	0.000	0.00	12.84	12.99	97.73	26.16

per hectare. 0 to 50% for wilt incidence, 0 to 62.5% for fruit borer incidence and 0.0037 to 0.0068 mg/g for total chlorophyll content. This wide range of variability for different characters indicated the scope for selection of suitable initial material for breeding, in the improvement of brinjal.

The degree of variability shown by different parameters can be judged by the magnitude of genotypic coefficient variation (GCV) and phenotypic coefficient variation (PCV). The GCV values were low in magnitude compared to PCV values for all the characters studied (Table 1). This indicated that the direct selection is not effective for these characters and heterosis breeding can be resorted for further improvement.

High magnitude of phenotypic and genotypic coefficient variation (>20%) were recorded by fruit volume, fruit length, fruit weight, leaf area index,

number of fruits per plant, fruit borer incidence, fruit diameter, number of fruits per cluster, yield per plant, fruit set %, fruit yield per hectare, wilt incidence and leaf area indicating the maximum variability among the genotypes for these parameters. High magnitude of PCV and GCV were also observed by Prasad and Prakash (4), Lohakare et al. (5) in brinjal for above parameters.

The heritability estimates separates the environmental influence from the total variability and indicates the accuracy with which a genotype can be identified by its phenotypic performance, thus making selection most effective. Heritability estimates in broad sense alone do not act as true indicators of effectiveness of selection for the trait since their scope is restricted by their interaction with the environment (3). Hence heritability values considered along with the predicted genetic gain, increase the reality of this

parameter as a tool in selection program.

In the present study high heritability values were associated with high values of genetic advance as per cent of mean for fruit volume, fruit weight, fruit borer incidence, leaf area index, fruit length, fruit diameter, number of fruit per plant, plant height at 45 DAT and 90 DAT and days to first flowering were observed. Similar results were also observed by Omkar and Kumar (6) and Negi et al. (7) in brinjal. Hence, indicating the possibility of selection for the improvement of genotypes for these characters, according to their economic importance.

#### References

1. Burton G. W. and E. M. Dewane. 1953. Estimating heritability in tall-fescue (*Festua circundiance*) from replicated clonal material. *Agron. J.* 45 : 478—481.
2. Hanson C. S. 1956. Biometrical studies of yield in segregating populations of Korean, Lespedeza. *Agron. J.* 48 : 268—272.
3. Johnson H. W., H. F. Robinson and R. S. Comstock. 1955. Estimation of genetic and environmental variability of soybean. *Agron. J.* 41 : 314—318.
4. Prasad B. and R. Prakash. 1974. Genotypic and phenotypic variability in egg plant (*Solanum melongena* L.). *Curr. Res.* 3 : 29—30.
5. Lohakare A. S., V. N. Dod and P. D. Peshattiwar. 2008. Genetic variability in green fruited brinjal. *Asian J. Hort.* 3 : 114—116.
6. Omkar S. and J. Kumar. 2004. Variability, heritability and genetic advance in brinjal. *Ind. J. Hort. Sci.* 62 : 46—49.
7. Negi A. C., P. K. Singh and K. S. Baswana. 2006. Genetic variability and path coefficient analysis in brinjal (*Solanum melongena* L.). *Ind. J. Agric. Sci.* 62 : 116—118.