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## Variability studies for yield and yield components in Brinjal (*Solanum melongena* L.)

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**Abstract**

Forty one genotypes including one check were sown in a randomized block design with two replications during *Kharif* 2017 at experimental farm, Department of Agricultural Botany, V.N.M.K.V, Parbhani. The phenotypic coefficient of variations were higher than the genotypic coefficients of variation for all the characters. The genotypic coefficient of variation was observed for fruit borer infestation and lowest for plant height. The high heritability with high genetic advance as per cent of mean was observed for fruit borer infestation, shoot borer infestation, fruit yield per plant, fruit weight per plant, fruit per cluster and fruit length per plant indicating that these characters were least influenced by the environmental effects and these characters were governed by additive genes and selection will be rewarding for improvement of such traits.

**Keywords:** Genetic variability, heritability, genetic advance, PCV, GCV

**Introduction**

Brinjal is one of the most important and popular vegetable crop grown round the year all over the country. It is believed that egg plant may have originated in Indo-Burma and China may be the secondary centre of origin. Brinjal fruits are a fairly good source of calcium, phosphorus, iron and vitamins, particularly 'B' group.

A successful breeding programme for high yield requires information on the nature and magnitude of variability in the available material and role played by environment in the expression of various plant characters. The basic idea in the study of variation is its partitioning into the components attributed to aforesaid causes. The magnitude of heritability and more particularly its genetic component is the most important aspect of genetic constitution of the breeding material which has a close bearing on its response to selection.

Yield is a complex entity which depends upon many contributing characters. Knowledge of the magnitude and type of association between yield and its components greatly helps in evaluating the contribution of different traits. Yield and its components have been of an immense value in selecting suitable plant type.

**Material and Methods**

The present investigation on "variability for fruit yield components in brinjal (*Solanum melongena* L.)" was carried out during *kharif* 2017 at experimental farm, Department of Agril. Botany, VNMKV Parbhani. The experimental material consist of forty one genotypes of (*Solanum melongena* L.) including one checks. The experiment was laid out in a randomized block design with 40 genotypes of brinjal and one check variety with two replications. Thirty days old seedlings raised in the nursery beds were transplanted on the ridges adopting a spacing of 60 × 45 cm. The data was analyzed by the methods outlined by Panse and Sukhatme (1967) [6] using the mean values at random plots in each replication from all genotypes to find out significance of genotypic effect. Genotypic and phenotypic coefficient of variation was calculating using the formulae suggested by Bruton (1952) [3]. Broad sense heritability was calculated as per Lush (1949) and genetic advance was estimated by the method suggested by Johnsons *et al.* (1955) [5].

**Result and Discussion**

The analysis of variance showed significant differences among treatments for all the characters studied (Table 1.).

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The extent of variability as measured by GCV and PCV provides information regarding relative amount of variation in different characters. In the present study, the estimates of PCV for all the characters were little higher than the estimates of GCV, which may be due to the interaction of genotypes with the environments.

Close relationship between GCV and PCV was found in all the characters and PCV values that were slightly greater than GCV and revealed a very little influence of environment for their expression. Kumar *et al.* (2013) [8], Shekhar *et al.* (2014) and Akpan *et al.* (2016) [1].

The characters number of fruits per plant, fruit weight per plant, fruit length per plant, fruits per cluster, fruit yield per plant, shoot borer infestation, fruit borer infestation, number of flowers per plant showed higher estimates of GCV and PCV (Table 2). Similar kind of high estimates of variability was reported for number of fruits per plant, fruit weight per plant, fruit yield per plant, fruit length per plant, shoot and fruit borer infestation. Comparatively high estimates of variability observed in the above characters especially fruit yield per plant and fruit length per plant and number of fruit per plant showed that there is ample scope for selection.

The characters days to 50% flowering, number of branches per plant, number of leaves per plant and plant height showed moderate GCV and PCV values. Among the characters studied, highest heritability estimate was recorded for fruit borer infestation (96.81%), shoot borer infestation (96.70%),

fruit weight per plant (95.35%), fruit length per plant (94.31%), fruit yield per plant (94.29%), plant height (93.60%), number of fruits per plant (93.76%), number of flower per plant (92.80%) and genetic advance expressed as per centage of mean is presented in Table 2. The fruit borer infestation recorded highest genetic advance as percentage of mean (99.43) followed by shoot borer infestation (82.74), fruit weight per plant (73.52), fruit yield per plant (73.00), fruit per cluster (70.19) and fruit length per plant (57.42). Genetic advance in general was high for most of the characters studied. Karak *et al.* (2012) [4]

High heritability with high genetic advance was observed for fruit borer infestation, shoot borer infestation, fruit weight per plant, fruits per cluster, fruit yield per plant, fruit length per plant, number of fruits per plant indicating that most likely the heritability is due to additive gene effects and selection may be effective. Baswana *et al.* (2002) [2]

The genotypic and phenotypic coefficients of variation were high (>20%) for the characters number of fruit per plant, fruit weight per plant, fruit length per plant, fruit per cluster, fruit yield per plant, shoot borer infestation, fruit borer infestation and number of flower per plant. Moderate (10-20%) for days to 50% flowering, number of branches per plant, number of leaves per plant and plant height. The differences between PCV and GCV values were less, indicating that these traits were less influenced by environment and could be improved by following phenotypic selection.

**Table 1:** Analysis of variance for different characters in brinjal genotypes

Sr. No	Character	Mean sum of squares		
		Replications (d.f=1)	Treatment (d.f=40)	Error (d.f=40)
1	Days to50% flowering	62.48	250.02**	25.77
2	No. of fruits per plant	0.46	54.57**	1.75
3	No. of branches per plant	0.06	2.401**	0.16
4	Fruit weight per plant(kg)	0.0088	0.289**	0.0068
5	Fruit length per plant(cm)	0.67	23.3305**	0.68
6	No. of leaves per plant	5.90	1126.78**	45.62
7	Plant height(cm)	18.93	246.45**	8.15
8	Fruit per cluster	0.03	1.53**	0.06
9	Shoot borer infestation (%)	0.37	75.69**	1.26
10	Fruit borer infestation (%)	0.44	80.05**	1.29
11	No. of flowers per plant	1.68	200.90**	7.50
12	Fruit yield per plant	0.19	4.51**	0.13

**Table 2:** Components of genetic variability for different characters in brinjal

Sr. no	Character	Range	General mean	Genotypic variance ( $\sigma^2_g$ )	Phenotypic variance ( $\sigma^2_p$ )	GCV (%)	PCV (%)	Heritability (BS) (%)	Genetic advance	Genetic Advance as % of mean 5%
1	Days to50% flowering	49.90-94.90	73.4054	112.1229	137.8986	14.42	15.99	81.31	19.66	26.79
2	No. of fruits per plant	9.00-34.10	20.5293	26.4067	28.1645	25.03	25.85	93.76	10.25	49.92
3	No. of branches per plant	3.92-8.05	5.8132	1.1167	1.2853	18.17	19.50	86.88	2.02	34.90
4	Fruit weight per plant(kg)	0.28-1.90	1.0277	0.1411	0.1480	36.55	37.43	95.35	0.75	73.52
5	Fruit length per plant(cm)	7.53-19.54	11.7227	11.3237	12.0068	28.70	29.55	94.31	6.73	57.42
6	No. of leaves per plant	98.00-186.0	134.487	540.5799	586.2073	17.28	18.00	92.22	45.99	34.19
7	Plant height(cm)	59.10-108.40	77.8366	119.1493	127.3025	14.02	14.49	93.60	21.75	27.94
8	Fruit per cluster	1.10-4.70	2.4146	0.7352	0.7984	35.50	37.00	92.08	1.69	70.19
9	Fruit yield per plant(kg)	1.05-8.13	4.0582	2.1933	2.3260	36.49	37.58	94.29	2.96	73.00
10	Shoot borer infestation (%)	2.63-26.57	14.9355	37.2142	38.4834	40.84	41.53	96.70	12.35	82.74
11	Fruit borer infestation (%)	1.41-26.87	12.7911	39.3778	40.6758	49.05	49.86	96.81	12.71	99.43
12	No. of flowers per plant	26.91-66.32	46.7781	96.7029	104.2063	21.02	21.82	92.80	19.51	41.71

## Conclusion

The character like shoot borer infestation, fruit borer infestation, fruit weight per plant, fruit per cluster, fruit yield per plant possessing high GCV, heritability and genetic advance as per cent of mean could be effectively used in selection, as it had been suggested that characters with high heritability and low genetic advance. The characters exhibited

high GCV, heritability together with high genetic advance indicated the predominance of additive gene effect in controlling these characters.

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