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Genetic Variability for Yield and its Components in Brinjal (*Solanum melongena* L.)

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ABSTRACT

Information based on 41 genotypes of brinjal (*Solanum melogena* L.) has revealed that the highest genetic coefficient of variation was observed for fruit volume followed by seed to pulp ratio. High heritability was observed for most of the characters studied. Further, characters like fruit weight, fruit volume, plant height and seed to pulp ratio had high heritability coupled with high genetic advance as per cent of mean which suggested that these traits are under the control of additive gene action and would be improved through simple selection method.

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INTRODUCTION

Brinjal (*Solanum melongena* L.) is one of the important crop of India. Improvement in the fruit yield, colour and seed to pulp ratio will certainly enhance the production and consumption of it. However, information on the extent of variability available for fruit yield along with other important economic traits and their heritability will be helpful to the breeders to formulate sound breeding programme. Hence, present attempt was made with these objectives in the brinjal crop.

MATERIALS AND METHODS

The experiment comprised of 41 diverse genotypes of brinjal was grown in Randomized Block Design with four replications at Vegetable Research Farm, Gujarat Agricultural University, Anand during *rabi* 1995-1996. Each plot had two rows and each row consisted of 10 plants. The inter and intra row spacing was 90 and 60 cm, respectively. Five random plants were taken from each plot for recording the observations on days to flowering, days to first mature fruit, pedicel length (cm), plant height (cm), fruit girth (cm), fruit weight (g), fruit volume (cc), fruit shape index, number of fruits per plant and fruit yield per plant (g). While, uniformly ripen fruits were collected at random from each plot to determine the characters like 100 seed weight (mg) and seed to pulp ratio.

The coefficient of variation was estimated according to Burton and Devene (1953). Heritability in broad sense and expected genetic advance were estimated by the methods of Hanson *et al.* (1956).

TABLE 1

Analysis of variance for various characters studied in brinjal.

Sources	d.f.	Mean square											
		Days to flowering	Days to first mature fruit	Pedicel length (cm)	Plant height (cm)	Fruit girth (cm)	Fruit weight (g)	Fruit volume (cc)	Fruit shape index	100 seed weight (mg)	Seed to pulp ratio	Fruit per plant	Fruit yield per plant (g)
Replications	3	0.97	7.71	2.37	61.40	7.78	27.63	203.33	0.11	608.67	0.000	25.09	806.33
Genotypes	40	35.01‡‡	477.75‡‡	5.22‡‡	1246.97‡‡	201.04‡‡	4431.77‡‡	670582.59‡‡	0.37‡‡	35396.53‡‡	0.0059‡‡	594.41‡‡	20055.68‡‡
Error	120	0.83	4.25	0.78	21.42	3.33	40.32	8022.100	0.06	381.89	0.0001	64.11	653.19

TABLE 2

The estimates of genotypic ($\hat{\sigma}^2_g$) and phenotypic ($\hat{\sigma}^2_p$) variances and other genetic parameters for twelve characters in brinjal.

Characters	*Range*	*Mean ± S. Em.*	$\hat{\sigma}^2_g$	$\hat{\sigma}^2_p$	*GCV (%)*	*PCV (%)*	*Heritability (B.S.) %*	*GA (% mean)*
1. Days to flowering	46.10–59.90	51.748 = 0.454	8.55	9.37	5.65	5.92	91.19	11.11
2. Days to first mature fruit	66.25 108.23	85.700 = 1.031	118.37	122.63	12.70	12.92	96.53	25.70
3. Pedicel length (cm)	3.08 9.00	5.12 = 0.442	1.11	1.89	20.57	26.85	58.67	32.45
4. Plant height (cm)	19.92–99.08	66.411 = 2.314	306.39	327.81	26.38	27.26	93.47	52.49
5. Fruit girth (cm)	16.50–52.38	26.433 = 0.913	49.43	52.76	26.60	27.48	93.68	53.03
6. Fruit weight (g)	40.60–198.62	98.438 = 3.175	1097.86	1138.18	37.05	37.72	96.46	74.95
7. Fruit volume (CC)	68.75–2195.00	446.006 = 44.78	165640.12	173662.22	91.25	93.44	95.38	183.59
8. Fruit shape index	0.65–2.08	1.14 = 0.125	0.08	0.14	24.35	32.73	55.36	37.32
9. 100 seed weight (mg)	170.00–567.25	352.579 = 9.770	8753.66	9135.55	26.53	27.11	95.82	53.50
10. Seed to pulp ratio	0.004–0.207	0.036 = 0.005	0.0010	0.0011	87.84	92.13	90.90	172.51
11. Fruits per plant	22.23–83.82	3.115 = 0.333	132.58	196.68	30.79	37.50	67.40	52.07
12. Fruit yield per plant (g)	112.66–386.07	253.14 = 12.77	4850.62	5503.81	27.51	29.31	88.13	53.21

RESULTS AND DISCUSSION

The analysis of variance revealed highly significant differences among the genotypes for all the characters under studied (Table 1). The range of variation was substantially high for all the characters under study and it was particularly pronounced in fruit volume and seed to pulp ratio (Table 2). These traits also showed large genotypic variability.

Among all the characters studied, seed to pulp ratio was least affected by environmental factors followed by pedicel length, fruit shape index and days to flowering. On the other hand, fruit yield per plant, fruit volume, 100 seed weight, fruit weight and number of fruits were comparatively more influenced by external factors as evident by their respective values of estimates of phenotypic and genotypic variances. The GCV was maximum for fruit volume followed by seed to pulp ratio. It was comparatively low for days to flowering, days to first mature fruit, pedicel length, plant height, fruit girth, fruit shape index, 100 seed weight and fruit yield per plant and moderate for number of fruits and fruit weight. Same trend was observed for PCV but comparatively high values. These results are in agreement with Pramanick *et al.* (1994) and Vivekanandan and Subramanian (1991). The heritability estimates help breeder in selection based on the phenotypic performance. In the present study, high heritability was observed for all the characters except fruits per plant, fruit shape index and pedicel length. But some time selection based on heritability gave obscure picture. Johnson *et al.* (1955) reported that heritability estimate alongwith genetic advance is more useful than the heritability value alone for improving the particular trait. The high heritability combined with high genetic advance as per cent of mean was observed for the characters like fruit volume, seed to pulp ratio and fruit weight. Similar findings were found by Ushakumari *et al.* (1991). This suggested that, these characters are under the control of additive gene action and improvement of these characters would respond very well to continuous selection.

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