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ASSESSMENT OF GENETIC VARIABILITY, HERITABILITY AND GENETIC ADVANCE IN BRINJAL (*SOLANUM MELONGENA* L.)

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ABSTRACT

Fifty diverse Brinjal accessions were evaluated to estimate variability, heritability and genetic advance for thirteen biometric characters at Varagoorpettai village near Annamalainagar, Chidambaram during 2018-2020. High PCV and GCV were recorded for fruit yield per plant, number of fruits per cluster, seeds per fruit, individual fruit weight, leaf area, number of fruits per plant, fruit length, number of flowers per cluster and plant height while, low PCV and GCV was found for days to 50% flowering and days to first harvest. High heritability coupled with high genetic advance was recorded for plant height, leaf area, number of flowers per cluster, number of fruits per cluster, individual fruit weight, fruit length, fruit diameter, number of fruits per plant, seeds per fruit and 100 seed weight exhibiting that the traits are controlled by additive gene action. Therefore, direct selection may be followed for improving brinjal yield by examining these characters.

***Keywords*:** Brinjal, PCV, GCV, Heritability, Genetic Advance

Introduction

Brinjal (*Solanum melongena* L.), a member of the Solanaceae family, is one of the popular and principal vegetable crops cultivated in almost all parts of Indian plains for its tender fruits. Except in higher altitudes, this crop is grown all the year round. Tender fruits of brinjal contain protein, minerals, vitamins and iron (Gurbuz *et al.,* 2018). One-hundred-gram edible portion of brinjal fruits possess 5.9 g carbohydrates, 1.4 g protein, 0.3 g fats, 1.3 g fiber, 124 I.U Vitamin A, 11 mg Vitamin C. It also contains minerals like chlorine 52.0 mg, phosphorus 47.0 mg and 44.0 mg sulphur. Fruits are well utilised in Indian System of Medicine. Principal states producing this crop are West Bengal, Orissa, Gujarat, Bihar, Madhya Pradesh, Chattisgarh, Karnataka, Maharashtra, Andhra Pradesh and Tamil Nadu. Brinjal being indigenous to India, variation in plant type, stem color, leaf size, leaf tip, midrib colour, fruit size, fruit shape, fruit colour, fruit yield, cooking quality and tolerance to pest and disease is apparent (Ullah *et al.,* 2014). The main objective is to study the extent of genetic variability with respect to yield, yield components and quality of fruits. Knowledge on the structure of the genetic variability within ecotypes of a region is of great help to draft programs for character improvement (Rathi *et al*., 2011).

Materials and Methods

The experiment was carried out in a farmer's field at Varagoorpattai village near Annamalainagar, Chidambaram during 2018-2020. The experimental field was located at 11º 24'N latitude and 79º 41' E longitude. The study comprised fifty brinjal accessions (Table 1 & 2) raised in two seasons. First was from 05.12.2018 to 21.06.2019 and second was from 12.07.2019 to 26.02.2019. Both experiments were laid out in randomized block design with three replications. Six weeks old healthy seedlings were transplanted along the sides of ridges laid at 60 cm spacing. Plant to plant distance was maintained as 60cm. All the recommended package of practices for raising a healthy crop were followed. Observations were recorded on five randomly selected plants of each accession for thirteen various characters. Thirteen biometric characters viz., plant height, leaf area, days to 50% flowering, number of flowers per cluster, number of fruits per cluster, days to first harvest, individual fruit weight, fruit length, fruit diameter, number of fruits per plant, seeds per fruit, 100 seed weight and fruit yield per plant. Phenotypic and genotypic coefficient of variation (Burton, 1952), heritability (Lush, 1940), and genetic advance as per cent of mean (Robinson *et al*., 1949) were calculated.

Results and Discussion

In the present study, the variation that existed among the accessions were estimated as coefficient of variation. The data on PCV and GCV for different traits presented in Table 3, further confirm the existence of wide variation. In the present investigation, phenotypic coefficient of variation (PCV) for different characters ranged from 5.06 per cent (days to first harvest) to 34.39 per cent (seeds per fruit) and GCV ranged from 4.77 per cent (days to first harvest) to 34.38 per cent (seeds per fruit). The magnitude of PCV was slightly greater than the corresponding GCV for all the traits, which might be due to the interaction of the accessions with the environment to some degree or other denoting environmental factors influencing the expression of these characters. This result is in accordance with the reports of Vaishya *et al*. (2017) and Sujin *et al*. (2017). High estimates for both PCV and GCV were obtained for seeds per fruit, fruit yield per plant, individual fruit weight, number of fruits

per cluster and leaf area in the present study. Moderate estimates of PCV and GCV were recorded for 100 seed weight. Least estimate of PCV and GCV were recorded for days to 50% flowering and days to first harvest. Such findings are in conformity with the reports of Patel *et al*. (2015), Suranjna *et al*. (2017), and Parvati *et al*. (2018).

In the present study, almost all the characters exhibited high heritability, which ranged from 80.87 to 99.98 per cent. The characters included plant height, leaf area, days to 50% flowering, number of flowers per cluster, number of fruits per cluster, days to first harvest, individual fruit weight, fruit length, fruit diameter, number of fruits per plant, seeds per fruit, 100 seed weight and fruit yield per plant. Therefore, it could be understood that these characters were less governed by the environmental factors. Heritability along with genetic advance as per cent of mean would be helpful in assessing the nature of gene action. In the present study, the characters namely number of seeds per fruit, fruit yield per plant, individual fruit weight, number of fruits per cluster, leaf area, number of fruits per plant and fruit diameter showed high estimates of heritability and genetic advance as per cent of mean which may be ascribed to the predominance of additive gene action (Verma *et al*., 2018). Days to 50% flowering and days to first harvest showed high heritability and low genetic advance as per cent of mean, which indicated that the expression of these characters were governed by non-additive genes. Above research is in accordance with the findings of Vaishya *et al*. (2017) and Mangai *et al*. (2017).

Table 1: Salient features of accessions

Accessions	Identity	Source of seeds
Acc 1	IC – 136461	NBPGR, New Delhi
Acc 2	IC – 089876	NBPGR, New Delhi
Acc 3	IC – 136181	NBPGR, New Delhi
Acc 4	IC – 386589	NBPGR, New Delhi
Acc 5	IC – 136300	NBPGR, New Delhi
Acc 6	IC – 136349	NBPGR, New Delhi
Acc 7	IC – 136148	NBPGR, New Delhi
Acc 8	IC – 136249	NBPGR, New Delhi
Acc 9	IC – 136196	NBPGR, New Delhi
Acc10	IC – 136222	NBPGR, New Delhi
Acc 11	IC – 136290	NBPGR, New Delhi
Acc 12	IC – 136006	NBPGR, New Delhi
Acc 13	IC – 136309	NBPGR, New Delhi
Acc 14	IC – 136455	NBPGR, New Delhi
Acc 15	IC – 136266	NBPGR, New Delhi
Acc 16	IC – 136093	NBPGR, New Delhi
Acc 17	IC – 446655	NBPGR, New Delhi
Acc 18	IC – 136268	NBPGR, New Delhi
Acc 19	IC – 111074	NBPGR, New Delhi
Acc 20	IC – 112315	NBPGR, New Delhi
Acc 21	IC – 089875	NBPGR, New Delhi
Acc 22	IC – 136299	NBPGR, New Delhi
Acc 23	IC – 13258	NBPGR, New Delhi
Acc 24	IC – 136182	NBPGR, New Delhi
Acc 25	PLR – 2	Vegetable Research station, Tamil Nadu Agricultural University, Palur

Table 2: Salient features of accessions

Accessions	Identity	Source of seeds
Acc 26	Paramathi local	Namakkal
Acc 27	Namakkal local	Namakkal
Acc 28	PLR – 1	Vegetable Research station, Tamil Nadu Agricultural University, Palur
Acc 29	Kalanjipatti kathiri	Dindigul
Acc 30	Co – 2	TNAU, Coimbatore
Acc 31	Annamalai	Annamalai University, Chidambaram
Acc 32	Thennilai local	Namakkal
Acc 33	Ujala fleshy	Karur
Acc 34	Mallanatham local	Karur
Acc 35	Elavambadi mullu kathiri	Agriculture research station, Virinjipuram, Vellore
Acc 36	Arka Nidhi	IIHR, Bangalore
Acc 37	Paramathy vellore local	Karur
Acc 38	Udumalai samba	Dindigul
Acc 39	Karur local	Karur

Acc 40	Karnataka kathiri	Namakkal
Acc 41	Arka Harshitha	IIHR, Bangalore
Acc 42	Paravai local	Nagapattinam
Acc 43	IC – 089905	NBPGR, New Delhi
Acc 44	IC – 136292	NBPGR, New Delhi
Acc 45	IC – 136296	NBPGR, New Delhi
Acc 46	IC – 136251	NBPGR, New Delhi
Acc 47	IC – 136189	NBPGR, New Delhi
Acc 48	IC – 154517	NBPGR, New Delhi
Acc 49	IC – 136297	NBPGR, New Delhi
Acc 50	Sevathapatti local	Cuddalore

Table 3: PCV, GCV, Heritability and Genetic Advance for various characters in brinjal

S. No	Characters	Range	Mean	GCV (%)	PCV (%)	Heritability (%)	Genetic advance as percent of mean
1	Plant height(cm)	50.04-107.47	75.66	21.14	21.18	99.64	43.47
2	Leaf area (cm^2)	51.33-203.71	112.76	31.25	31.26	99.95	64.36
3	Days to 50% flowering	57.17-70.92	65.44	5.20	5.78	80.87	9.63
4	Number of flower per cluster	2.21-5.70	3.15	22.91	23.34	96.27	46.30
5	Number of fruits per cluster	1.38-4.63	2.11	32.24	32.91	95.98	65.08
6	Days to first harvest	64.89-78.16	73.51	4.77	5.06	88.63	9.25
7	Individual fruit weight (g)	23.12-105.01	58.53	32.43	32.44	99.98	66.81
8	Fruit length (cm)	8–24	13.44	23.55	23.60	99.61	48.43
9	Fruit diameter (cm)	2.51-17.66	4.44	27.07	27.22	98.88	55.45
10	Number of fruits per plant	9.65-43.14	20.48	30.42	30.43	99.97	62.67
11	Seeds per fruit	131.67-670.76	344.10	34.38	34.39	99.97	70.82
12	100 seed weight (g)	0.27-0.41	0.32	10.68	11.52	85.90	20.39
13	Fruit yield per plant (kg)	0.48-2.42	1.15	33.88	34.00	99.28	69.54

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