Frontiers in Crop Improvement, Vol. 8 (1) : 52-55 (2020) *ASTHA FOUNDATION*
Print ISSN : 2393-8234, Online ISSN : 2454-6011 *Meerut (U.P.) INDIA*

VARIABILITY STUDIES IN BRINJAL (*SOLANUM MELONGENA* L.)

V. Chaitanya[1], K. Ravinder Reddy[1], R.V.S.K. Reddy[2], S. Sudheer Kumar[3] and M. Sujatha[3]

[1]*College of Horticulture, Rajendranagar, Hyderabad, Telangana*

[2]*Adminstrative office, Dr.YSRHU, Venkatramannagudem, Tadepallygudem, West Godavari, A.P.*

[3]*College of Agriculture, Rajendranagar, Hyderabad, Telangana*

Email : chaitanya.hortico@gmail.com

ABSTRACT

In brinjal significant variability was available in the parents and hybrids. The present study which consisted of 7 parents, 21 hybrids and 2 commercial checks were evaluated in Randomized Complete Block Design replicated thrice atVegetable Research Station, ARI,Dr YSRHU, Hyderabadduring 2013 to 2014. Marketable fruit yield was kept as a dependent character and the results were analysed. Moderate estimates of phenotypic and genotypic co-efficient of variation was observed for fruit width, marketable yield per plant and fruit and shoot borer infestation on shoots both at genotypic and phenotypic level. The characters *viz.,* marketable fruit yield per plant and fruit and shoot borer infestation on shoots recorded high magnitude of heritability coupled with genetic advance. Therefore, these traits should be kept in mind for better planning of improvement programme in brinjal. Correlation coefficients were estimated at both genotypic and phenotypic level. Total number of fruits per plant, number of marketable fruits per plant, average fruit weight, fruit width, total yield per plant and plant height were positively and significantly correlated with marketable yield per plant at both genotypic and phenotypic level which indicates the importance of these characters during selection for high yielding genotypes in eggplant.

Key words *: Brinjal, variability, correlation coefficient*

Brinjal (*Solanum melongena* L.) is native of India and widely grown during summer and winter seasons to fulfill the market demand. Yield of the brinjal varieties cultivated in India is less and size, shape and skin colour of brinjal varies in different locations. Improvement in fruit yield, colour, pest and disease resistances will certainly enhance the production and consumption of the crop (1). In the face of increasing population, there is a need for increased production and productivity levels of brinjal. In view of very high local preferences for colour, shape, taste, there are specific genotypes suited for specific locality. It is not possible to have one common cultivar to suit different localities and local preferences. It is therefore required to improve the yield potential of available land races through hybridization, may yield good hybrids or varieties (2). The success of any crop improvement programme largely depends upon the nature and magnitude of the genetic variability existing in breeding material with which plant breeder is working (3). Effectiveness of selection directly depends on the amount of heritability and genetic advance as percent of mean for that character (Prabakaran, 2010). Hence, an insight into the magnitude of variability present in available accessions and hybrids of brinjal is of utmost importance to a plant breeder for starting a judicious breeding programme. Therefore, in the present study, an attempt has been made to access the variability in brinjal hybrids and their parents.

MATERIALS AND METHODS

The present investigation was conducted during *rabi* season, 2013-14 at Vegetable Research Station, Dr. Y.S.R. Horticulture University, Hyderabad. The experimental material comprised of seven genotypes and their 21 F_1'sobtained from 7 × 7 half diallel crosses along with two commercial checks Chhayaand Utkarsha. The seeds were sown in the nursery during the last week of June and the seedlings were transplanted on first week of August, 2013 in a randomized block design at 50×50 cm spacing with three replications. Standard cultural practices were followed to raise the normal crop. The data were recorded on five randomly selected plants in each treatment over replications for fourteen characters *viz.,* plant height, number of branches per plant, days to 50% flowering, days to first fruit harvest, days to last fruit harvest, fruit length (cm), fruit width (cm), average fruit weight (g), total number of fruits per plant, number of marketable fruits per plant, total yield per plant (g), marketable yield per plant (g), fruit and shoot borer infestation on shoots (%) and fruit and shoot borer infestation on fruits (%). The analysis of variance and simple correlation and coefficient were worked out according to (4). Phenotypic and genotypic coefficient of variability, heritability and expected genetic advance were determined according to (5).

RESULTS AND DISCUSSION

The extent of variability for the characters in different genotypes measured in terms of range, variance, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) along with the amount of heritability (h^2) expected genetic advance as percent at mean are given in Table-1. The estimates of phenotypic coefficient of variation (PCV) were higher than their

Table-1 : Estimates of variability, heritability and genetic advance as per cent of mean for fourteen characters in brinjal.

Character	Range		Mean	Variance		PCV (%)	GCV (%)	h^2 (%)	Genetic Advance	GA as per cent of mean
	Min.	Max.		Pheno-typic	Geno-typic					
Plant height (cm)	64.60	89.09	79.33	44.33	35.91	8.39	7.55	81.00	11.11	14.01
No. of branches per plant	13.28	17.56	14.89	1.61	1.26	8.52	7.55	78.20	2.05	13.76
Days to 50 per cent flowering	46.56	55.98	50.15	6.66	2.99	5.15	3.45	44.72	2.39	4.76
Days to first fruit harvest	58.71	70.49	62.86	8.84	4.84	4.73	3.50	55.28	3.35	5.34
Days to last fruit harvest	140.62	152.66	145.97	13.71	9.61	2.54	2.12	70.16	5.34	3.66
Fruit length (cm)	6.31	9.95	7.93	0.68	0.57	10.37	9.55	84.90	1.44	18.13
Fruit width (cm)	3.28	5.24	4.48	0.27	0.22	11.55	10.58	84.35	0.89	19.95
Average fruit weight (g)	47.79	67.96	54.04	23.38	19.40	8.95	8.15	83.26	8.26	15.29
Total no. of fruits per plant	29.69	41.63	36.62	8.76	5.65	8.08	6.49	64.12	3.93	10.73
No. of marketable fruits /plant	22.86	37.94	31.08	11.22	8.40	10.78	9.33	75.08	5.17	16.62
Total yield per plant (g)	1754.34	2524.23	1989.41	39054.84	25887.80	9.93	8.09	66.48	269.85	13.56
Marketable yield per plant (g)	1399.91	2272.78	1690.65	45721.19	37980.71	12.65	11.53	83.24	365.91	21.64
Fruit and shoot borer infestation on shoots (%)	10.23	17.11	13.85	3.37	2.69	13.26	11.85	80.12	3.02	21.80
Fruit and shoot borer infestation on fruits (%)	17.28	28.61	22.90	7.36	5.21	11.84	9.97	71.45	3.96	17.29

PCV and GCV : Phenotypic and genotypic coefficient of variation, h^2 : Heritability in broad sense, GA: Genetic Advance

respective genotypic coefficient of variation (GCV) for all the traits which might be due to the interaction of environment to some degree or other denoting environmental factors influencing the expression of these characters. Moderate PCV and GCV estimates were observed for the traits fruit width, marketable yield per plant and fruit and shoot borer infestation on shoots suggesting moderate range of genetic variability and considerable influence of environment in the expression of the trait. (6, 7, 8) reported similar kind of results for these traits. The PCV and GCV values were low for the traits plant height, number of branches per plant, days to 50% flowering, days to first fruit harvest, days to last fruit harvest, fruit length, average fruit weight, total number of fruits per plant and total yield per plant. This indicates narrow genetic variances were presented for these traits. These results are in agreement with the findings of (9, 10). The PCV and GCV values were moderate and low for this traits plant height, number of branches per plant, fruit width, average fruit weight and fruit and shoot borer infestation on fruits suggesting narrow range of genetic variability for these traits. Similar results were reported by (10, 11).

The heritability estimates help breeders in selection based on the phenotypic performance. In the present study, high heritability was observed for the traits plant height, number of branches per plant, days to last fruit harvest, fruit length, fruit width, average fruit weight, total number of fruits per plant, number of marketable fruits per plant, total yield per plant, marketable yield per plant, fruit and shoot borer infestation on shoots and fruit and shoot borer infestation on fruits which indicates that selection is effective. But this selection is misleading because (12) reported that heritability estimate along with genetic advance is more useful than the heritability value alone for improving a particular trait. The high heritability combined with genetic advance as percent of mean was observed for the characters marketable yield per plant and fruit and shoot borer infestation on shoots. This indicates that these characters are under the control of additive gene action (4) and would response very well to continuous selection. These results are in agreement with the findings of (6, 7, 8, 10).

High heritability combined with moderate genetic advance as percent of mean was observed for the traits plant height, number of branches per plant, fruit length, fruit width, average fruit weight, total number of fruits per plant, number of marketable fruits per plant, total yield per plant and fruit and shoot borer infestation on fruits. These results were in accordance with the findings of (6). Moderate heritability coupled with low genetic advance as percent of mean was observed for days to 50% flowering and days to first fruit harvest. These results are comparable with the findings of (13).

The values for correlation coefficient are presented in Table-2. The results on character association indicated significant positive association of yield with total number

Table-2 : Phenotypic (P) and genotypic (G) correlation coefficients among yield and yield attributes in 30 genotypes of brinjal.

Characters		Plant height	No. of branches/ plant	Days to 50% flowering	Days to first fruit harvest	Days to last fruit harvest	Fruit length	Fruit width	Avg. fruit weight	Total no. of fruits/ plant	No. of marketable fruits/ plant	Total yield/plant	Marketable yield/plant	Fruit and shoot borer infestation on shoots	Fruit and shoot borer infestation on fruits
Plant height	P	1.0000	0.2113*	0.0610	0.0287	0.3481**	0.0703	0.0403	0.0855	0.2581*	0.3386**	0.3158**	0.3402**	-0.2572*	-0.4018**
	G	1.0000	0.3039*	0.1852	0.1169	0.4892**	0.0794	0.0391	0.0982	0.3551*	0.4035**	0.3911**	0.3976**	-0.2961*	-0.4419**
Number of branches per plant	P	0.2113*	1.0000	0.1594	0.0974	0.3603**	-0.0699	0.0244	-0.2788**	0.3646**	0.3456**	0.0278	0.0778	-0.2987**	-0.1930
	G	0.3039*	1.0000	0.0851	0.0471	0.5326**	-0.1152	0.0063	-0.3616**	0.5085**	0.4470**	0.0355	0.0970	-0.3289**	-0.2585
Days to 50% flowering	P	0.0610	0.1594	1.0000	0.8850**	0.1332	0.0113	0.1113	0.0676	-0.0650	-0.0799	-0.0406	-0.0281	0.0468	0.0920
	G	0.1852	0.0851	1.0000	1.0060**	0.2270	0.0830	0.2402	0.0836	-0.0713	-0.1133	-0.0244	-0.0735	0.1371	0.1771
Days to first fruit harvest	P	0.0287	0.0974	0.8850**	1.0000	0.1633	-0.0289	0.1456	-0.0028	-0.1067	-0.1268	-0.1257	-0.1210	0.0624	0.1419
	G	0.1169	0.0471	1.0060**	1.0000	0.2326	0.0159	0.2386	0.0213	-0.2318	-0.2613	-0.2000	-0.2427	0.1303	0.2891
Days to last fruit harvest	P	0.3481**	0.3603**	0.1332	0.1633	1.0000	-0.2353*	-0.0925	-0.1231	0.3183**	0.3457**	0.1376	0.2020	-0.3777**	-0.2863**
	G	0.4892**	0.5326**	0.2270	0.2326	1.0000	-0.2195*	-0.0943	-0.1564	0.4827**	0.4830**	0.1865	0.2749	-0.5018**	-0.4051**
Fruit length	P	0.0703	-0.0699	0.0113	-0.0289	-0.2353*	1.0000	0.1696	0.4993**	-0.1833	-0.1721	0.2802**	0.1979	0.0593	0.0970
	G	0.0794	-0.1152	0.0830	0.0159	-0.2195*	1.0000	0.1621	0.6010**	-0.2504	-0.2062	0.3805**	0.2579	0.1109	0.0966
Fruit width	P	0.0403	0.0244	0.1113	0.1456	-0.0925	0.1696	1.0000	0.4361**	-0.0234	0.0141	0.3304**	0.3187**	-0.2408*	-0.0868
	G	0.0391	0.0063	0.2402	0.2386	-0.0943	0.1621	1.0000	0.4897**	-0.0448	0.0062	0.4083**	0.3528**	-0.3262*	-0.1041
Average fruit weight	P	0.0855	-0.2788**	0.0676	-0.0028	-0.1231	0.4993**	0.4361**	1.0000	-0.2427*	-0.1455	0.6468**	0.5760**	-0.0824	-0.0976
	G	0.0982	-0.3616**	0.0836	0.0213	-0.1564	0.6010**	0.4897**	1.0000	-0.3539*	-0.1936	0.6696**	0.5796**	-0.0911	-0.1440
Total number of fruits per plant	P	0.2581*	0.3646**	-0.0650	-0.1067	0.3183**	-0.1833	-0.0234	-0.2427*	1.0000	0.9560**	0.5638**	0.5845**	-0.3702**	-0.5787**
	G	0.3551*	0.5085**	-0.0713	-0.2318	0.4827**	-0.2504	-0.0448	-0.3539*	1.0000	0.9799**	0.4546**	0.5710**	-0.5607**	-0.8212**
Number of marketable fruits per plant	P	0.3386**	0.3456**	-0.0799	-0.1268	0.3457**	-0.1721	0.0141	-0.1455	0.9560**	1.0000	0.6217**	0.7053**	-0.4608**	-0.7918**
	G	0.4035**	0.4470**	-0.1133	-0.2613	0.4830**	-0.2062	0.0062	-0.1936	0.9799**	1.0000	0.6025**	0.6928**	-0.6266**	-0.9182**
Total yield per plant	P	0.3158**	0.0278	-0.0406	-0.1257	0.1376	0.2802**	0.3304**	0.6468**	0.5638**	0.6217**	1.0000	0.9409**	-0.3695**	-0.5551**
	G	0.3911**	0.0355	-0.0244	-0.2000	0.1865	0.3805**	0.4083**	0.6696**	0.4546**	0.6025**	1.0000	1.0127**	-0.5158**	-0.8231**
Marketable yield per plant	P	0.3402**	0.0778	-0.0281	-0.1210	0.2020	0.1979	0.3187**	0.5760**	0.5845**	0.7053**	0.9409**	1.0000	-0.4323**	-0.7467**
	G	0.3976**	0.0970	-0.0735	-0.2427	0.2749	0.2579	0.3528**	0.5796**	0.5710**	0.6928**	1.0127**	1.0000	-0.5485**	-0.8505**
Fruit and shoot borer infestation on shoots	P	-0.2572*	-0.2987**	0.0468	0.0624	-0.3777**	0.0593	-0.2408*	-0.0824	-0.3702**	-0.4608**	-0.3695**	-0.4323**	1.0000	0.5004**
	G	-0.2961*	-0.3289**	0.1371	0.1303	-0.5018**	0.1109	-0.3262*	-0.0911	-0.5607**	-0.6266**	-0.5158**	-0.5485**	1.0000	0.6613**
Fruit and shoot borer infestation on fruits	P	-0.4018**	-0.1930	0.0920	0.1419	-0.2863**	0.0970	-0.0868	-0.0976	-0.5787**	-0.7918**	-0.5551**	-0.7467**	0.5004**	1.0000
	G	-0.4419**	-0.2585	0.1771	0.2891	-0.4051**	0.0966	-0.1041	-0.1440	-0.8212**	-0.9182**	-0.8231**	-0.8505**	0.6613**	1.0000

*significant at 5% LOS, ** significant at 1 % LOS

of fruits per plant, number of marketable fruits per plant, average fruit weight, fruit width, total yield per plant and plant height were positively and significantly correlated with marketable yield per plant at both genotypic and phenotypic level which indicates that the adequate knowledge of interrelationship between marketable yield per plant and its components themselves is useful for selection and simultaneous improvement in these characters.The findings are in conformity with the reports of (3, 14, 15).

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Received : August-2019 Revised : September-2019 Accepted : September-2019