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Genetic variability in egg plant (*Solanum melongena* L.)

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ABSTRACT

The experiment was conducted at Olericulture Unit, Kittur Rani Channmma College of Horticulture, Arabhavi, Gokak, Belgaum, Karnataka during *kharif* season of 2004-05 to evaluate 61 genotypes using randomized block design. The observations on 24 characters were recorded. High heritability values and high percentages of genetic advance were recorded fruits length, number of fruits per cluster, number of fruits per plant, total yield per plant, yield per plot, yield per hectare which indicated that there were more number of additive factors for these characters and improvement in yield could be brought about by selection based on phenotypic observations.

Key words : Egg plant, Genetic variability, Brinjal

INTRODUCTION

Egg plant or Auburgine or brinjal (*Solanum melongena* L.) is one of the most common vegetable crops grown in the country. India being one of the primary centres of its origin has accumulated wide range of variability in egg plant. The role of genetic variability in crops is of paramount importance in selecting the best genotype for making rapid improvement in yield and related characters as well as to select the most potential parent for making the hybridisation programme successful. An attempt was, therefore, made in the present investigation to break through variability into its components with the hope that the results might be of practical use to the plant breeders of this crop.

MATERIALS AND METHODS

The present investigation was carried out at the Olericulture Unite, Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak, Karnataka during 2004-05. The experiment was laid out in randomized block design with two replications. Sixty-one genotypes of brinjal collected form the different institutes and freshly developed lines in Kittur Rani Channamma College of Horticulture, Arabhavi. Seeds were sown in the nursery bed during the last week of July. A distance of 75 cm between rows and 60 cm between plants was maintained. All the recommended agronomic practices were followed to grow a successful crop under irrigated condition.

The observations were recorded on randomly selected five plants on per plant basis from each variety/ line in each replication for plant height, number of primary braches, plant spread, stem girth, leaf area of index leaf, days to first flowering, days to 50 per cent flowering, days to first fruit maturity, fruit length, fruit diameter, average fruit weight, number of fruits per cluster, number of fruits per plant, early yield per plant, total yield per plant, yield per plot, yield per hectare, fruit length-diameter ratio, per cent dry matter in fruits, reducing sugar, total sugar and per cent fruits and shoot borer infestation. The data given in Tables 1 and 2 are based on average of five plants for each genotype. The variances (genotypic, phenotypic and error) were calculated using the formulae suggested by Comstock and Robinson (1952), heritability was estimated using the formula suggested by Falconer(1981) and genetic advance was calculated by using the formula suggested by Robinson *et al.* (1949).

RESULTS AND DISCUSSION

The variance due to treatments (genotypes), *viz.*, plants height at 60 and 90 days after transplanting (DAT), plant spread from east to west at 60 DAT, number of primary branches at 60 and 90 DAT, stem girth at 60 and 90 DAT, leaf area of index leaf at 60 and 90 DAT, days to first flowering, days to 50 per cent flowering, days to first fruit maturity, fruit length, fruit diameter, average fruit weight, number of fruits per cluster, number of fruits per plant, total yield per plant, yield per plot, yield per hectare, fruit length-diameter ratio, per cent dry matter in fruit, reducing sugar and total sugar. There was no significant difference among genotypes for plant spread from east to west at 90 DAT, plant spread from north to south at 60 and 90 DAT, early yield per plant and per cent fruit and shoot borer infestation. The mean value was maximum in average fruit weight (94.40 g), while stem girth at 60 DAT has minimum (0.11 cm). Phenotypes variances were more than genotypic variances for all the character. Maximum genotypic variance was noted for average fruit weight and minimum for stem girth at 60 DAT. Plant height

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at 60 and 90 DAT, plant spread form east to west at 60 DAT, number of primary branches at 90 DAT, leaf area of index leaf at 60 and 90 DAT, days to first flowering, days to 50 per cent flowering, days to first fruit maturity, number of fruits per plant, yield per plot and yield per hectare indicated moderately high degree of genetic variability. The remaining characters exhibited low estimates for this parameter.

The estimates of heritability varied from 36.10 for days to first flowering to 98.33 per cent for total sugar. Expect days to first flowering, plant height at 90 DAT, stem girth at 60 and 90 DAT, leaf area of index leaf at 60 and 90 DAT, days to 50 per cent flowering and fruit diameter, other characters expressed high heritability values, *i.e.,* above 75 per cent. Genetic advance was highest (13.00) for yield per hectare and the lowest (0.08) for stem girth at 60 DAT. Plant height at 60 DAT (10.29). plant height at 90 DAT (7.59), plant spread from east to west at 60 DAT (8.59), leaf area of index leaf at 60 DAT (9.69) and 90 DAT (9.26), number of fruits per plant (9.45), yield per plot (9.30) and fruit length (5.75) with high to moderately low genetic advance, while remaining traits had low values. The genetic advance as percentage of mean was maximum for number of fruits per cluster (104.49) followed by total yield per plant, number of fruits per plant, yield per plot, yield per hectare, fruit length-diameter ratio, fruit length, average fruit weight, number of primary braches at 60 and 90 DAT, per cent dry matter in fruit, total sugar, fruit diameter, plant height at 60 DAT, leaf area of index leaf at 60 DAT, reducing sugar and plant spread form east to west at 60 DAT with high to moderately high values of genetic advance. Other traits showed comparatively low values with the lowest of 3.36 for days to first flowering. Number of fruits per plant, total yield per plant, yield per plot and yield per hectare showed high estimates of genotypic coefficient of variation, heritability and genetic advance. The hypothesis of panes has suggested that the characters exhibiting high heritability and genetic advance are governed by additive genetic effects. Hence, selection for these characters will be most effective. Johnson *et al*. (1955). suggested that low or high heritability values do not necessarily mean a low or high genetic gain and observed that high heritability is no indication of high genetic progress. Further, characters showing high genotypes coefficient of variation but low heritability values, suggested that whatever

Table 1: Range, mean, mean sum of squares, phenotypic and genotypic variances for various characters of brinjal

Sr. No.	Character	Range	Mean	Mean sum of squares	Phenotypic variance	Genotypic variance
1.	Plant height at 60 DAT (cm)	33.90-68.40	46.41	77.061**	6.63	5.75
2.	Plant height at 90 DAT (cm)	49.00-77.45	61.94	91.944**	7.92	5.40
3.	Plant spread from east to west at 60 DAT (cm)	29.95-54.70	42.89	37.330**	4.37	4.27
4.	Number of primary branches at 60 DAT	1.90-5.25	3.78	1.093**	0.79	0.68
5.	Number of primary branches at 90 DAT	4.50-9.55	7.57	2.938**	1.22	1.20
6.	Stem girth at 60 DAT (cm)	0.93-1.25	0.11	0.0136**	0.09	0.062
7.	Stem girth at 90 DAT (cm)	1.70-2.08	1.88	0.0156**	0.10	0.068
8.	Leaf area of index leaf at 60 DAT (cm^2)	28.68-65.71	41.06	93.804**	7.61	5.99
9.	Leaf area of index leaf at 90 DAT (cm^2)	39.24-74.85	51.10	73.187**	6.73	5.47
10.	Days to first flowering	39.00-45.50	41.80	4.875**	1.90	1.14
11.	Days to 50 per cent flowering	46.50-54.00	49.61	6.456**	2.02	1.55
12.	Days to first fruit maturity	64.06-71.50	68.90	7.236**	2.00	1.80
13.	Fruit length (cm)	6.25-20.00	13.40	16.305**	2.90	2.83
14.	Fruit diameter (cm)	8.00-19.50	13.45	10.962**	2.90	2.08
15.	Average fruit weight (g)	64.00-139.00	94.40	593.468**	17.53	16.91
16.	Number of fruits per cluster	1.00-3.00	1.43	1.096**	0.74	0.73
17.	Number of fruits per plant	6.57-32.60	16.60	56.692**	5.60	5.06
18.	Total yield per plant (kg)	0.66-2.81	1.54	0.543**	0.54	0.50
19.	Yield per plot (kg)	8.32-30.72	18.10	55.831**	5.55	5.00
20.	Yield per hectare (t)	11.65-43.01	25.34	109.429**	7.77	7.00
21.	Fruit length-diameter ratio	0.32-1.61	1.04	0.147**	0.28	0.25
22.	Per cent dry matter in fruit	8.34-16.76	12.95	6.894**	1.95	1.75
23.	Reducing sugar (%)	2.58-4.28	3.70	0.289**	0.39	0.37
24.	Total sugar (%)	2.61-4.70	3.90	0.347**	0.42	0.41

** indicate of significance of value at P = 0.01

Table 2 : Genotypic and phenotypic coefficient of variation, heritability and genetic advance for different characters in brinjal

Sr. No.	Character	Genotypic coefficient of variation	phenotypic coefficient of variation	Heritability in broad sense (%)	Genetic advance	Genetic advance as percentage of mean
1.	Plant height at 60 DAT (cm)	12.40	14.28	75.37	10.29	22.17
2.	Plant height at 90 DAT (cm)	8.72	12.79	46.53	7.59	12.26
3.	Plant spread from east to west at 60 DAT (cm)	9.30	9.52	95.38	8.59	18.71
4.	Number of primary branches at 60 DAT	17.99	20.98	73.54	1.20	31.78
5.	Number of primary branches at 90 DAT	16.02	16.30	96.59	2.43	32.44
6.	Stem girth at 60 DAT (cm)	5.61	8.90	39.79	0.08	7.29
7.	Stem girth at 90 DAT (cm)	3.63	5.60	42.75	0.09	4.91
8.	Leaf area of index leaf at 60 DAT (cm^2)	14.57	18.54	61.82	9.69	23.61
9.	Leaf area of index leaf at 90 DAT (cm^2)	10.71	13.16	66.27	9.26	18.11
10.	Days to first flowering	2.72	4.53	36.10	1.40	3.36
11.	Days to 50 per cent flowering	3.10	4.08	27.86	2.41	4.86
12.	Days to first fruit maturity	2.64	2.94	80.63	3.32	4.90
13.	Fruit length (cm)	21.14	21.50	96.64	5.75	42.88
14.	Fruit diameter (cm)	15.50	19.13	65.65	3.48	25.87
15.	Average fruit weight (g)	17.91	18.57	93.00	3.60	33.60
16.	Number of fruits per cluster	51.33	31.32	97.64	1.49	104.49
17.	Number of fruits per plant	30.51	33.60	82.31	9.45	56.96
18.	Total yield per plant (kg)	32.40	35.20	85.03	0.95	61.63
19.	Yield per plot (kg)	27.64	30.66	81.26	9.30	51.36
20.	Yield per hectare (t)	27.64	30.66	81.25	13.00	51.32
21.	Fruit length-diameter ratio	24.55	27.60	80.01	0.47	45.37
22.	Per cent dry matter in fruit	13.55	15.08	80.66	3.24	25.06
23.	Reducing sugar (%)	10.07	10.50	88.15	0.70	19.07
24.	Total sugar (%)	10.66	10.76	98.33	0.85	21.80

variation is there can be inherited.

Number of fruits per cluster, number of fruits per plant, total yield per plant, yield per plot and yield per hectare scored moderately high genotypic coefficient of variation, low heritability and high to moderate genetic advance in percentage, which can also be considered for improvement of brinjal, while other characters with low value have little scope for improvement.

Summary :

Genetic variability, heritability and genetic advance were studied in 61 genotypes of egg plant for 24 different characters. High heritability values and high percentages of genetic advance were recorded fruits length, number of fruits per cluster, number of fruits per plant, total yield per plant, yield per plot, yield per hectare which indicated that there were more number of additive factors for these characters and improvement in yield could be brought about by selection based on phenotypic observations.

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