



Genetic Variability for Yield and Yield Related Traits in F_2 Generation of Brinjal (*Solanum melongena* L.)

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Genetic variability for yield and yield related traits in fifteen F_2 populations and their six parents of brinjal were studied. The differences among the genotypes were highly significant for all the traits except for the days to last picking. Moderately high to high estimates of genetic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), high estimates of heritability and genetic advance (GA) were observed for fruit yield, number of fruits, average weight of fruit and length of fruit. The low estimates of GCV, PCV and GA were observed for leaf area per plant, days to first fruit picking, plant height and days to last picking. The moderate estimates of GCV, PCV, GA and moderate to high estimates of heritability were exhibited for number of fruits per plant, days to initiation of flowering and number of branches per plant.

(Key words: *Brinjal, Genotypic, Phenotypic, Variability, Heritability*)

Brinjal (*Solanum melongena* L.) is an important vegetable crop grown throughout the tropical region of the world. A broad spectrum of nature and magnitude of variability in a population is a prerequisite for genetic improvement of any crop. Knowledge on the heritability is important to a plant breeder as it indicates the possibility and extent to which improvement is possible through selection. According to Wright (1921), heritability denotes the additive genetic variance in per cent of the total variance. Heritability shows the reliability of phenotypic value as a guide to breeding value and also as a parameter in predicting genetic advance or response to selection. The present investigation was therefore, undertaken to assess the extent of variability and genetic parameters like genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability and expected genetic advance (GA) in F_2 population of brinjal.

MATERIALS AND METHODS

The experimental material consisted of F_2 population of 15 crosses and their 6 parents. The experiment was conducted during Rabi 2005-2006 in a randomized block design with three replications. These F_2 progenies and parents were grown in five rows of 6 m length with 60 × 60 cm spacing. All the recommended cultural practices were followed. Observations were recorded on five randomly selected plants in each replication for eleven quantitative characters. These observations were subjected to statistical analysis to work out different

genetic parameters. The genotypic (GCV) and phenotypic (PCV) coefficient of variation were calculated according to Burton (1952). The broad sense heritability was estimated as suggested by Lush (1949), and genetic advance was calculated according to Johanson *et al.*, (1955).

RESULTS AND DISCUSSION

Analysis of variance revealed significant differences among the F_2 population for all the traits studied except for the days to last picking (Table 1). The maximum mean range values of 0.65 to 1.22 kg were noted for the fruit yield per plant and a minimum of 123.86 to 134.06 were observed days to picking. Maximum mean value of 0.95 kg was observed for the fruit yield per plant. The average fruit weight, days to initiation of flowering, leaf area per plant and plant height showed moderately high mean values.

The phenotypic coefficients of variation (PCV) were more than their respective genotypic coefficients of variation (GCV) for all the traits (Table 2). Fruit yield per plant, breadth of fruit and average weight of fruit showed the high estimates of GCV and PCV. Moderately high estimates of GCV and PCV observed for length of the fruit. The moderate estimates of GCV and PCV were observed for the traits viz, number of fruits per plant, days to initiation of flowering and number of branches per plant. The lowest estimates of GCV and PCV were observed for leaf area per plant, days to first picking, plant height and days to last picking.

Table 1. Mean, range, mean sum of squares, phenotypic and genotypic variances in brinjal

Quantitative traits	Mean	Range	Mean sum of squares	Phenotypic variances	Genotypic variances
Plant height (cm)	56.7	47.1-62.2	36.306**	14.871	10.713
Leaf area per plant (dm ²)	88.0	74.0-104.7	176.94**	65.667	55.313
Number of branches per plant	5.0	4.5-5.9	0.763**	0.339	0.212
Days to initiation of flowering	51.6	41.0-60.0	101.549**	38.781	31.384
Days to first picking	66.3	59.8-75.3	91.467**	37.402	27.033
Days to last picking	128	123-134	43.492	295.335	16.992
Length of fruit (cm)	12.9	9.5-15.7	16.677**	5.871	5.403
Breadth of fruit (cm)	4.2	2.9- 5.7	2.222**	0.815	0.704
Weight of fruit (g)	68.6	49.3-89.0	530.592**	177.996	176.359
Number of fruits per plant	13.9	11.7-17.0	10.769**	4.374	3.198
Fruit yield per plant (g)	950	646-1223	137131.00**	49048.400	43992.800

Table 2. Estimates of genetic parameters in brinjal

Quantitative traits	GCV %	PCV %	h ² b %	GA	GAM (%)
Plant height (cm)	5.81	6.84	72.00	5.72	10.14
Leaf area per plant (dm ²)	8.53	9.30	84.20	14.06	16.14
Number of branches per plant	9.32	11.78	62.70	0.75	15.18
days to initiation of flowering	10.57	11.75	80.90	10.38	19.59
Days to first picking	7.70	9.06	72.30	9.10	14.09
Days to last picking	3.25	13.58	5.80	2.03	1.60
Length of fruit (cm)	18.07	18.84	92.0	4.59	35.69
Breadth of fruit (cm)	20.26	21.80	86.40	1.60	38.64
Weight of fruit (g)	20.20	20.29	99.10	27.23	41.42
Number of fruits per plant	13.49	15.78	73.10	3.14	23.71
Fruit yield per plant (g)	24.05	25.39	89.70	409.20	46.92

The GCV along with heritability estimates provides a better picture of the amount of genetic advance to be expected by phenotypic selection. The broad sense heritability was ranged between 5.80 (days to last picking) and 99.10 per cent (average weight of fruit). The estimates of heritability in broad sense were high for the traits viz., length of fruit, fruit yield per plant, breadth of fruit and leaf area per plant. The remaining six traits exhibited moderate estimate of heritability in broad sense, which ranged between 72.00 (plant height) and 80.90 percent (days to initiation of flowering).

Heritability in conjunction with genetic advance is more effective and reliable in predicting the result and the effect of selection (Johanson *et al.*, 1955). The genetic advance as percentage of mean (GAM) varied from 1.60 (days to last picking) to 46.92 per cent (fruit yield per plant). The high estimates of GA were observed for fruit yield per plant, average weight of fruit, breadth of fruit and length of fruit.

The moderate estimates of GA were exhibited for number of fruits per plant and days to initiation of flowering while the low estimates of GA were recorded for leaf area per plant, number of branches per plant, days to first picking, plant height and days to last picking. Fruit yield per plant, number of fruits per plant, weight of fruit and length of fruit showed high estimates of GCV, heritability and genetic advance indicating effectiveness of simple selection for improvement of these traits. Mohanty and Prusti (2002) and Ingale and Patil (1995) reported similar observation for fruit yield per plant, number of fruits per plant and average weight of fruit in brinjal.

Moderate to high estimates of heritability and low estimates of GA, PCV and GCV were observed for leaf area per plant, days to first fruit picking and plant height. It may be inferred that these traits are governed by non-additive gene actions. Simple selection will not be effective for improvement of these traits. These results were in conformity with

the reports of Mishra and Mishra (1990) and Ingale and Patil (1995) for days to flowering in brinjal.

Moderate estimates of GCV, GA and moderate to high estimates of heritability were recorded for number of fruits per plant, days to initiation of flowering and number of branches per plant. It is suggested that these traits could be improved through rigid selection in the population. Mohanty and Prusti (2002), Mishra and Mishra (1990) and Ingale and Patil (1995) reported similar observations for numbers of branches per plant in brinjal.

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