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RESEARCH ARTICLE

GENETIC VARIABILITY AND RESPONSE TO SELECTION IN BRINJAL (*SOLANUM MELONGENA* L.)

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ABSTRACT

Fifteen F_2's along with 8 parents were used to estimate genetic variability and heritability among 11 developmental, growth, yield and yield related attributes in brinjal (*Solanum melongena* L.) during *rabi* 2012-13. The magnitude of genotypic variance as well as genotypic coefficient of variation were low as compared to both of phenotypic variance as well as phenotypic coefficient of variation indicating thereby, the influence of environment in the expression of these traits. Highest phenotypic coefficient of variation was recorded for number of fruits per cluster followed by, number of fruits per plant, average weight of fruit and fruit yield per plant suggesting that usefulness of phenotypic selection in improving these traits. The estimates of heritability in broad sense were high for number of fruits per cluster, number of fruits per plant, width of fruit, days to initiation of flowering, length of fruit, fruit yield per plant and days to last picking while the moderate estimates of heritability was recorded for average weight of fruit, days to first picking, plant height and number of primary branches per plant. High heritability coupled with genetic advance was recorded for fruit yield per plant revealed that the presence of lesser environmental influence and prevalence of additive gene action in their expression.

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INTRODUCTION

Brinjal or eggplant (*Solanum melongena* L.) is an important solanaceous crop of sub-tropics and tropics. The name eggplant has been derived from the shape of the fruit of some varieties, which are white and resemble in shape to chicken eggs. It is also called aubergine (French word) in Europe. Cytological studies have indicated that basic chromosomal number is 2n = 24. Large genetic variability with regard to size, maturity, fruit shape, culinary characters and spinyness of plants exists in the indigenous material. The low yield levels in India are due to the lack of sufficient crop genetic improvement and development of promising genotypes. Therefore, brinjal needs a constant genetic improvement. Greater the variability present in the initial material better should be the chances for evolving desired types. A clear understanding of variability of various quantitative characters of the breeding materials is an asset to the plant breeder for selecting superior genotypes on the basis of their phenotypic expression. Yield is a complex character influenced by various components that contributes towards the genetic potential of the crop.

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Keeping in all above mentioned points in view, the present investigation was carried out to understand the genetic analysis in F_2 generation of brinjal.

MATERIALS AND METHODS

The experimental material consisted of eight parents and fifteen F_2's of brinjal evaluated in randomized block design with two replications at Research Farm of Department of Agricultural Botany, College of Agriculture, Dapoli, Dist. Ratnagiri, Maharashtra during *rabi* 2012-2013. Five plants from each plot and replication were randomly selected for recording data with respect to eleven developmental, growth, yield and yield contributing components viz., days to initiation of flowering, days to first picking, length of fruit, width of fruit, number of fruits per cluster, plant height, number of primary branches per plant, days to last picking, average weight of fruit, number of fruits per plant and fruit yield per plant.

The mean value for each character and range were calculated. Components of variability were calculated using the method suggested by Burton and De vane (1953). Heritability in broad sense and genetic advance were calculated using the formula by Lush (1949) and Johnson *et al.* (1955) respectively.

Table 1. Mean, Range, genotypic and phenotypic variances, genotypic and phenotypic coefficient of variation, heritability, genetic advance and genetic advance as per cent mean for different characters in Brinjal

S. No.	Characters	Mean		Range		σ^2p	σ^2g	PCV%	GCV %	Heritability %	GA %	GAM
		Parents	F_2's	Parents	F_2's							
1	Days to initiation of flowering	40.85	44.89	35.40-43.10	36.20-59.90	37.76	22.76	14.25	11.06	60.26	7.63	17.69
2	Days to first picking	55.72	60.4	49.40-59.80	51.40-73.20	40.05	20.57	10.77	7.71	51.36	6.69	11.39
3	Length of fruit (cm)	12.77	10.81	9.32-16.68	8.90-12.64	3.71	2.57	16.75	13.94	69.23	2.74	23.90
4	Width of fruit (cm)	4.13	3.72	3.03-6.06	3.12-5.09	0.55	0.41	19.16	16.72	76.18	1.16	30.06
5	Number of fruits per cluster	1.98	2.41	1.3-4.7	1.2-4.3	1.47	1.37	53.07	51.19	93.02	2.32	101.71
6	Plant height (cm)	55.3	58.57	40.60-65.50	51.40-70.50	48.40	22.66	12.12	8.28	46.82	6.71	11.68
7	Number of primary branches per plant	3.6	4.12	2.70-4.40	2.90-5.50	0.85	0.34	23.54	14.93	40.26	0.76	19.52
8	Days to last picking	116.38	119.28	103.80-126.70	108.90-131.10	79.21	51.34	7.53	6.05	64.81	11.88	10.04
9	Average weight of fruit (g)	62.63	61.89	42.00-85.42	41.23-100.17	354.37	185.26	30.27	21.89	52.27	20.27	32.60
10	Number of fruits per plant	11.32	14.56	9.20-17.70	7.80-21.30	17.70	15.52	31.30	29.31	87.68	7.60	56.55
11	Fruit yield per plant (g)	691.76	843.09	464.10-963.80	558.10-1378.27	52497.94	34982.47	28.98	23.66	66.63	314.51	39.78

RESULTS AND DISCUSSION

The analysis of variance exhibited the presence of significant difference among the genotypes in respect of all traits. The estimates of phenotypic and genotypic coefficient of variability, heritability and genetic advance for all the characters are presented in Table 1. In general, phenotypic variances were higher in magnitude than genotypic variances for all characters. The phenotypic variance ranged between 0.55(width of fruit) to 52497.94(fruit yield per plant). The genotypic variance ranged between 0.34(number of primary branches per plant) to 34982.47 (fruit yield per plant). Similar results were reported by Mohanty (1999) and Patel and Sarnaik (2004).

The phenotypic and genotypic coefficient of variation expressed in terms of percent were comparatively high for number of fruits per cluster (53.07%, 51.19%), number of fruits per plant (31.30%, 29.31%), average weight of fruit (30.27%, 21.89%) and fruit yield per plant (28.98%, 23.66%) while number of primary branches per plant (23.54%, 14.93%), width of fruit (19.16%, 13.94%), length of fruit (16.75%, 13.94%), days to initiation of flowering (14.25%, 11.06%), plant height (12.12%, 8.28%), days to first picking (10.77%, 7.71%) and days to last picking (7.53%, 6.05%) indicated comparatively moderate to low estimates of phenotypic coefficient of variation. In all the traits, genotypic coefficient of variation was less than the phenotypic ones, indicating the role of environment, in the expression of the characters under observation but mostly their closer magnitude suggested that greater role was played by genotype rather than environment The characters having high genotypic coefficient of variation (GCV) possessed better potential for improvement through selection. There is very little scope for improvement through selection in case of days to first picking and days to last picking because these characters expressed very low variability. Similar results were obtained by Muniappan *et al.* (2010) and Adesh Kumar *et al.* (2011).

The estimates of heritability acts as a predictive instrument in expressing the reliability of phenotypic value. It, therefore, helps the plant breeder to make selection for a particular character when heritability is high. The characters number of fruits per cluster, number of fruits per plant, width of fruit, days to initiation of flowering, length of fruit, fruit yield per plant and days to last picking exhibited high estimates of heritability. This indicates that environment would play a little role while transmitting these characters to the progenies of selected lines.

The moderate estimates of heritability was observed in characters average weight of fruit, days to first picking, plant height, number of primary branches per plant. The genetic advance is a useful indicator of the progress that can be expected as a result of exercising selection on the relevant population. In the present investigation high heritability estimates along with high genetic advance was noticed in fruit yield per plant (66.63%, 314.51%) and high estimates of heritability coupled with higher genetic advance as per cent mean was observed for character number of fruits per cluster, number of fruits per plant and fruit yield per plant thus indicating role of additive gene action in the expression of these characters.

The minimum magnitude of genetic advance was observed in characters days to initiation of flowering, number of fruits per plant, plant height, days to first picking, length of fruit, number of fruits per cluster, width of fruit and number of primary branches per plant and the moderate estimates of genetic advance recorded by character days to last picking and average weight of fruit. High heritability with low genetic advance for number of fruits per plant (87.68%, 7.59%), width of fruit (76.15%, 1.15%), number of fruits per cluster (93.01%, 2.32%) indicating these characters may be controlled by non additive action of gene and selection would rather be ineffective for improvement of these characters. Similar results were obtained by Mohanty (1999) and Patel and Sarnaik (2004).

Thus, the present study revealed that good amount of variation was observed for various characters under study. The traits recorded obvious breeding value as their heritability and genetic advance as per cent of mean were number of fruits per cluster, number of fruits per plant and fruit yield per plant and improvement by direct selection in brinjal is possible through these characters.

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