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GENETIC VARIABILITY STUDIES ON F5 GENERATION OF BRINJAL (*SOLANUM MELONGENA* L.)

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Abstract

A field trial was conducted to assess the magnitude of genetic variability and correlation in segregating generation of brinjal (*Solanum melongena* L.). The analysis of variance revealed significant variation among the genotypes for all the characters under study. In general, phenotypic coefficients of variation were higher in magnitude than genotypic coefficient of variation. The characters number of branches per plant, days to initiation of flowering, days to 50 per cent flowering and fruit length showed comparatively higher estimates of genotypic and phenotypic coefficients of variation indicating high level of variability and scope for effective improvement. The characters days to initiation of flowering and fruit yield per plant showed higher estimates of heritability coupled with high genetic advance as percentage of mean indicated additive gene action for the above characters.

Key words : Brinjal, variabilty, heritability, genetic advance.

Introduction

Brinjal, Eggplant or aubergine is an important vegetable crop in tropical and subtropical countries particularly in India, Japan, Indonesia, Bulgaria, Italy, France, the USA and African countries. It contains chemicals that prevent cancer in animals. It is high in water content and is a very good resource of potassium. It is still being used as a remedy for cancer, hypertension and diabetes.

Though the success of breeding program depend upon quantum of genetic variability present in particular crop for exploitation, study of segregating generation would be of considerable importance. Yield is most important character for improvement of crop. It has a complex inheritance governed by large number of genes and greatly affected by environmental factors. Hence it is necessary to estimate relative amount of genetic and non-genetic variability exhibited by traits under consideration. This can be achieved by partitioning total variability into genotypic variance, phenotypic variance and environmental variance, estimation of genetic variability by suitable parameters of variation, heritability estimates and expected genetic advance for the individual characters.

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Materials and Methods

The material for the present study comprised of fifty genotypes (including six parents) in F_5 generation of brinjal. The field experiment was conducted at Research Farm, Department of Agricultural Botany, College of Agriculture, Dapoli, Dist. Ratnagiri, Maharashtra State during *Rabi*-2008-09 season. The experiment was laid out in randomized block design with three replications. The plot size was 3 m × 1.8 m and 60 cm × 60 cm spacing. Each line had 15 plants per plot in each replication.All other recommended cultural practices and plant protection measures were adopted to raise healthy crop. The plot was irrigated adequately.

The observations were recorded on five randomly selected competitive plants for eleven traits *viz*. plant height (cm), number of branches per plant, days to initiation of flowering, days to 50 per cent flowering, days to first picking, days to last picking, fruit length (cm), fruit breadth (cm), fruit weight (g), number of fruits per plant, fruit yield per plant (g).

The data available for individual characters were subjected to the method of analysis of variance commonly

applicable to the Randomized Block Design (Panse and Sukhatme, 1985). Phenotypic and Genotypic coefficient of variation was calculated by the formulae given by Burton and De Vane (1953). Broad sense heritability estimated for various characters by the formulae suggested by Lush (1949). The genetic advance was calculated in per cent by the formulae suggested by Johnson *et al*. (1955).

Results and Discussion

The analysis of variance revealed significant variation among the genotypes for all the characters under study. The estimates of mean sum of squares showed comparatively wide range of variation for the characters *viz*, plant height, number of branches per plant, days to initiation of flowering, days to 50 per cent flowering, days to first picking, days to last picking, fruit length, fruit weight, number of fruits per plant and fruit yield per plant, while comparatively less variation was recorded for fruit breadth.

The estimates of phenotypic, genotypic and environmental variances revealed that phenotypic variances were higher than genotypic variances for all the characters studied. The magnitude of phenotypic and genotypic variances was closer to each other for fruit yield per plant, fruit weight, days to 50 per cent flowering and days to initiation of flowering, thus indicating lesser role of environment in the expression of these characters.

In general phenotypic coefficient of variation was higher in magnitude over the respective genotypic coefficient of variation for all the characters. Similar observations were reported by Prasad *et al*. (2004), Sunita Kushwah and Bandhyopadhya (2005), Tidke *et al*. (2006), Naliyadhara *et al*. (2007), Prabhu and Natarajan (2008a), Mishra *et al*. (2008) and Jadhao (2009). High genotypic and phenotypic coefficient of variation was observed for the character days to initiation of flowering followed by number of branches per plant, days to 50 per cent flowering, fruit length, number of fruits per plant, fruit weight and fruit yield per plant, while low genotypic and phenotypic coefficient of variation was recorded in character days to last picking followed by days to first picking, fruit breadth and plant height.

High heritability estimates were recorded for fruit yield per plant followed by days to initiation of flowering, fruit weight and days to 50 per cent flowering. Similar results reported by Prasad *et al*. (2004), Sunita Kushwah and Bandhyopadhya (2005). The high heritability estimates for fruit yield per plant and fruit weight was also reported by Negi *et al*. (2000), Sharma and Swaroop

Table 1 : Estimates of genetic parameters for various characters in brinjal.

S. no.	Character	Mean	Range	σ^2_p	σ^2_g	σ^2_e	PCV (%)	GCV (%)	h^2bs (%)	GA	GAM (%)
1	Plant height (cm)	55.00	43.13 to 67.13	59.81	20.62	39.19	14.06	8.25	34.50	5.50	10.00
2	Number of branches per plant	6.59	4.73 to 8.53	1.26	0.54	0.72	17.03	11.17	43.00	0.99	15.02
3	Days to initiation of flowering	36.05	27.00 to 46.66	38.40	25.60	12.80	17.10	14.03	66.70	8.51	23.60
4	Days to 50 % flowering	51.05	41.33 to 62.00	57.03	31.61	25.42	14.64	10.90	55.40	8.61	16.71
5	Days to first picking	65.34	49.66 to 78.00	48.26	15.62	32.64	10.63	6.04	32.40	4.63	7.10
6	Days to last picking	130.92	119.00 to 138.66	41.56	6.22	35.34	4.90	1.90	15.00	1.99	1.52
7	Fruit length (cm)	9.93	7.40 to 12.76	2.07	1.01	1.06	14.48	10.09	48.60	1.44	14.50
8	Fruit breadth (cm)	3.51	2.96 to 4.26	0.19	0.04	0.15	12.32	5.33	18.50	0.16	0.04
9	Fruit weight (g)	64.28	48.53 to 77.36	63.62	41.22	22.40	12.40	9.99	64.80	10.64	16.55
10	Number of fruits per plant	18.45	14.70 to 22.73	6.83	2.81	4.02	14.16	9.08	41.10	2.21	11.97
11	Fruit yield per plant (g)	1180	783 to 1345	16613	13204	3408	10.92	9.73	79.50	211.09	17.88

(2000), Baswana *et al.* (2002), Mohanty and Prusti (2002) and Singh and Kumar (2005). While lower heritability estimates were recorded in plant height, number of branches per plant, days to first picking, days to last picking, fruit breadth and number of fruits per plant. Genetic advance was found to be highest for fruit yield per plant and lowest for fruit breadth. The characters days to initiation of flowering and fruit yield per plant showed comparatively higher estimates of genetic advances as percentage of mean.

High estimates of heritability coupled with higher genetic advance as percent of mean was observed for fruit yield per plant, days to initiation of flowering, fruit weight and days to 50 per cent flowering thus indicating the role of additive gene action in the expression these characters. Hence, simple selection method can be employed for the improvement of these characters.

In conclusion, the experimental studies revealed substantial amount of genetic variability among the genotypes under study. In general, phenotypic coefficients of variation were higher in magnitude than genotypic coefficient of variation. The characters number of branches per plant, days to initiation of flowering, days to 50 per cent flowering and fruit length showed comparatively higher estimates of genotypic and phenotypic coefficients of variation indicating high level of variability and scope for effective improvement. The characters days to initiation of flowering and fruit yield per plant showed higher estimates of heritability coupled with high genetic advance as percentage of mean indicated additive gene action for the above characters.

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