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GENETIC VARIABILITY IN BRINJAL GERMPLASM*

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For any crop improvement programme aimed at achieving maximum productivity a detailed knowledge of genetic variability of various quantitative characters is essential. Studies in this direction are very few in this crop. Therefore, an attempt was made in the present investigation to estimate genetic variability with the aid of genetic parameters such as genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (h^2) and genetic advance (GA).

Materials and Methods

Twentyseven farinjal varieties collected from various sources representing diverse plant types in this crop constituted the material for the present study. These were grown in a 27x3 RBD with 12 plants in each plot of 4x3 meter planted at one meter spacing. Five plants were chosen at random per plot in each of the three replications from all the 27 varieties for taking observations. The mean values of these five plants in respect of 12 characters were estimated and used for statistical analysis. Analysis of variance was carried out according to Panse and Sukatme (1957). GCV and PCV were estimated using the formula suggested by Burton and Devane (1953). GA as per cent of mean at 5 per cent selection intensity was estimated according to formula suggested by Allard (1960).

Results and Discussion

The analysis of variance (Table 1) indicates that there were significant differences among varieties for all the characters under the study. Genetic parameters such as PCV, GCV, h^2 and GA are presented in Table 2. Their values revealed large difference among the characters studied. PCV ranged from 12.5 to 98.85 per cent and GCV from 10.63 to 98.20 per cent. Days to flower recorded the lowest PCV and GCV (12.50 and 10.63 per cent) indicating little scope for improvement of that trait. Peter and Singh (1973) have reported that this character was governed by overdominant gene action. Higher PCV and GCV were observed for weight of single fruit (98.64 and 98.20 per cent) and total fruit yield (98.85 and 92.07 per cent) suggesting better scope of selection for these characters in breeding programmes.

Heritability estimates varied from 38.78 to 99.12 per cent. Among the 12 characters studied percentage of fruit set had the lowest heritability (38.78) followed by number of medium and long styled flowers and number of fruits (64.05 and 69.43 per cent respectively) indicating a high degree of non-heritable variation. High heritability values were observed for diameter of fruits (96.02%), length of

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fruit (96.44%), weight of single fruit (99.12%), plant height (92%), number of leaves (97.36%) and number of branches (96.51 %). This shows that one can attempt selection for these characters directly based on phenotypic performance.

The expected genetic advance ranged from 18,56 per cent (days to flower) to 201.38 per cent (weight of single fruit). When heritability and genetic advance were together considered the diameter of fruits was found to occupy higher position along with number of fruit, number of short styled flowers and number of long and medium styled flowers, Panse (1957) had opined that the association between high heritability and genetic advance indicate additive gene effects. The results of the present study indicate such effects for single fruit weight, total fruit yield, and equatorial diameter or fruit. Peter and Singh (1973) have also observed additive gene action for the expression of equatorial perimeter of fruit in egg plant.

Dharmagowda *et al.* (1979) estimated 63.48 per cent heritability for number of fruits per plant. In the present study this was observed to be 69.43 per cent. Gill *et al.* (1976) have reported that heritability was high for all characters except the number of branches per plant in brinjal whereas Borikar *et al* (1981) have concluded that heritability was high for plant height and number of branches per plant. The results of the present study are in agreement with the latter finding.

Table 1

Analysis of variance for 12 characters in brinjal germplasm

		Mean squares due to		
		Replications	Varieties	Error
	df	2	26	52
1	Height (cm)	102,383	2155.066**	63.639
2	Number of branches	37.642	277.296**	3.296
3	Number of leaves	414.481	17001.085"	151.725
4	Days to flower	3.420	73.750**	8.570
5	Number of short styled flowers	1.037	101.855***	12.063
6	Number of medium and long styled flowers	88.938	282.189**	44.464
7	Number of fruits per plant	68.481	333.701**	42,699
8	Percentage of fruit set	11.706	1164.695**	401.658
9	Diameter of fruit (cm)	0.049	13.936**	0,184
10	Length of fruit (cm)	0.198	36.463**	0.480
11	Weight of single fruit (g)	62.439	42770.945**	126.660
12	Total fruit yield (g)	233945.003	6122645.850**	298135.383

** Significant at 0.01 level of probability

Table 2

Genetic parameters of 12 quantitative characters in brinjal germplasm

	Characters	mean	PCV (%)	GCV (%)	h^2 (%)	GA (expressed as % of mean)
1	Height (cm)	96.58	28.56	27·34	92.00	53.91
2	Number of branches	26.70	36.44	35.81	96.51	72.42
3	Number of leaves	237.30	32.00	31.58	97,36	64.20
4	Days to flower	43.85	12.50	10.63	71.72	18.56
5	Number of short styled flowers	7.69	84.27	71.13	71.28	123,73
6	Number of medium and long styled flowers	13.80	80.60	64.50	64.05	106.37
7	Number of fruits	12,44	95.01	79,18	69.43	135.92
8	Percentage of fruit set	58.12	44.07	27,44	38.78	35.20
9	Diameter of fruit (cm)	5.04	43.32	42.46	96.44	85.87
10	Length of fruit (cm)	11.02	33.30	32.70	96.02	66.17
11	Weight of single fruit (g)	121.41	98.64	98.20	99.12	201.38
12	Total fruit yield (g)	1513.89	93.85	92.07	86.69	176.47

Summary

Genetic variability was worked out for 12 characters in brinjal germplasm of 27 varieties. Days to flower recorded the lowest PCV and GCV indicating little scope for improvement for those characters. Percentage of fruit set showed the lowest heritability indicating a high degree of nonheritability variability. An association of high heritability and genetic advance was shown by single fruit weight, total fruit yield and equatorial diameter of fruit indicating additive gene effects.

സംഗ്രഹം

ഇരുപത്തിയേഴ് വഴുതിനയിനങ്ങളും വളർത്തി അവയിലെ 12 സ്വഭാവങ്ങളുടെ ജനിതക വിചരണം ആകലനം ചെയ്തതിൽ, ഏറ്റവും കുറവ് ബാഹ്യരൂപീയ ഗുണാങ്ക വിചരണവും (PCV) ജീനരൂപീയ ഗുണാങ്കവിചരണവും (GCV) കണ്ടതു പൂക്കാനെടുത്ത സമയത്തിൽ ആയിരുന്നു. നിർധാരണം മുഖേന ഈ സ്വഭാവം അഭിവൃദ്ധിപ്പെടുത്താനാവില്ലെന്നു ഇതു സൂചിപ്പിക്കുന്നു. ഏറ്റവും കുറവ് വംശാഗതത്വം കണ്ടതു കായ്പിടുത്ത ശതമാനത്തിലായിരുന്നു. ഈ സ്വഭാവത്തിന്റെ പ്രകടനത്തിൽ വലിയൊരു പങ്ക് പാരമ്പര്യവിധേയമല്ലാത്ത വിചരണമാണെന്നു സൂചിപ്പിക്കുന്നു. കൂടിയ നിരക്കിൽ വംശാഗതത്വവും ജനിതക മുന്നേറ്റവും പ്രകടിപ്പിച്ച സ്വഭാവങ്ങളായ ഒറ്റക്കായുടെ തൂക്കം, മൊത്തം കായ്കളുടെ തൂക്കം, കായുടെ മധ്യവ്യാസം എന്നിവയ്ക്കാധാരം കൂട്ടുജീൻ പ്രഭാവമാണെന്ന് ഈ പഠനം തെളിയിച്ചു.

References

Allard, R, W. 1960. *Principles of Plant Breeding*. John Wiley and Sons, Inc., New York, 89-98

Borikar, S, T., Makne, V. G. and Kulkarni, U. G. 1981. Note on diallel analysis in brinjal. *Indian J. agric. Sci.* 51 (1): 51-52

Burton, G. W. 1952. Quantitative inheritance in grasses. *Proc. 6th int. Grassl. Congr.* 1953: 227-83

Burton, G. W. and Devane, E. M. 1953. Estimating heritability in tall fescue from replicated clonal material. *Agron. J.* 45: 478-80

Dharmagowda, M. V., Hiremath, K. G, and Goud, J. V. 1979. Genetic analysis of yield and its components in brinjal. *Mysore J. agric. Sci.* 13 (1): 10-14

Gill, H. S., Arora, R. S. and Pachauri, D. C, 1976. Inheritance of quantitative characters in egg plant. *Indian J. agric. Sci.* 46 (10): 484-90

Panse, V. G. 1957. Genetics of quantitative characters in relation to plant breeding *Indian J. Genet.* 17 (2): 318–28

Panse, V. G. and Sukatme, P. V. 1957. *Statistical Methods for Agricultural Workers*. I. C. A. R., New Delhi, 78-81

Peter, K, V. and Singh, R. V. 1973. Diallel analysis of economic traits in brinjal. *Indian J. agric. Sci.* 43 (5): 452-55