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GENETIC VARIABILITY IN SESAMUM

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ABSTRACT

Variability, heritability, genetic advance, phenotypic correlation, genotypic correlation, environmental correlation and coheritability were estimated in 28 varieties of sesame (**Sesamum indicum** L.). High heritability with high genetic advance was observed in yield per plant, high heritability and low genetic advance in 50% flowering, and low heritability and low genetic advance in number of capsules on main stem, number of capsules on branches and total number of capsules per plant. Positive and significant phenotypic, genotypic and environmental correlations were observed between number of capsule on main stem and total number of capsule per plant. Coheritability estimates of positive and high magnitude were observed between yield and 50% flowering and plant height and 50% flowering. High and negative coheritability estimates was observed between 50% flowering and number of branches.

KEY WORDS : Sesame, Variability, Correlation.

Intensive work on evolving high yielding sesame varieties suited to different seasons is in progress at the oilseeds lead centre, Vridhachalam of Tamil Nadu Agricultural University. An attempt was made in the present investigation to assess the interrelationship, heritability and genetic advance of some quantitative characters of a set of selected sesame varieties.

MATERIALS AND METHODS

Twenty eight sesame varieties were studied along with TMV 3 and TMV 4 in a randomised block with three replications at the Regional Research Station, Vridhachalam during *Kharif* of 1984. These varieties were raised in plots of 3.6 x 3.0 m with a spacing of 30 x 15 cm. Five plants in each plot were selected at random and the data on seven characters were recorded.

The data were analysed based on the randomised block design as suggested by Panse and Sukhatme (1967). The significance test was carried out following Snedecor (1961). Phenotypic and genotypic variances were worked out based on the formulae given by Johnson *et al.* (1955). Heritability in the broad sense was derived based on the formula of Lush (1940). Genetic advance for each individual character was obtained by the formula prescribed by Johnson *et al.* (1955). The method adopted by Burton (1952) was used to calculate phenotypic and genotypic coefficients of variation. The genotypic and phenotypic correlation coefficients were worked out by following Al-Jibouri *et al.* (1958).

RESULTS AND DISCUSSION

The analysis of variance indicated significant varietal differences for three attributes *viz.*, 50% flowering, height of plant and yield.

The effect of environment factors appeared to be greater on all the characters studied except 50% flowering and height of plant as indicated by the wide differences between the phenotypic and genotypic coefficients of variability (Table 1). Kandaswami (1985) also reported similar results. The study of heritable portion of variability revealed that yield and 50% flowering and high heritability and height of plant and number of branches had medium heritability and the remaining low heritability.

Table 1: Mean, coefficient of variability, heritability and genetic advance (% of mean)

Character	Mean	'F'value	PV	GV	PCV	GCV	h^2(BS)	GA (% of mean)
Yield / plant	3.87	3.113**	1.249	0.516	28.86	18.55	41.31	11.92
Height of plant	106.68	1.792*	149.676	31.253	11.47	5.24	20.88	2.39
50% flowering	38.86	4.315**	0.748	0.392	2.23	1.61	52.66	1.17
Number of branches per plan	4.85	1.588	1.227	0.201	22.84	9.24	16.38	3.74
Number of capsule on main stem	22.66	1.073	26.062	0.620	22.53	3.47	2.38	0.54
Number of capsule on branches	38.43	1.071	135.151	3.115	30.25	4.59	2.30	0.70
Number of capsule/plant	61.31	1.133	204.326	8.663	23.32	4.80	4.24	0.99

BS = Broad Sense

According to Johnson *et al.* (1955), genetic coefficient of variability together with heritability estimate would give the best indication of the amount of genetic advance to be expected from selection. Yield per plant had high heritability coupled with high genetic advance, whereas number of branches and height of plant had medium heritability and medium genetic advance; 50% flowering had high heritability and low genetic advance; the number of capsule on main stem, branches, as well as total number capsule per plant had low heritability and low genetic advance.

The characters with high heritability estimates coupled with high genetic

Table 2. Correlation coefficients : Phenotypic (P), Genotypic (G) and Environmental (E)

Character		Yield	Ht. of Plant	50% flowering	No. of branches per plant	No. of capsule on main stem	No. of capsule on branches	Total No. of capsules / plant
Yield	(P)		-0.014	-0.203	0.911**	0.041	0.289	0.221
	(G)		-0.107	-0.485**	0.079	0.416*	0.333	0.255
	(E)		0.167	0.458**	0.178	0.068	0.339	0.250
Ht. of plant	(P)			0.118	-0.444*	0.347	0.074	0.625**
	(G)			0.661**	-0.122	-0.676	-0.622**	-0.176
	(E)			-0.163	-0.572	0.401*	0.245	0.998**
50% flowering	(P)				0.528**	-0.127	-0.073	0.127
	(G)				-0.310	-0.395*	-0.310	-0.176
	(E)				-0.070	-0.115	0.067	0.275
No. of branches per plant	(P)					0.050	0.491**	-0.265
	(G)					0.649**	-0.333	-0.512**
	(E)					0.047	0.581**	0.795**
No. of capsule on main stem	(P)						0.388*	0.848**
	(G)						0.584**	0.700**
	(E)						0.314	0.801**
No. of capsule	(P)							0.998**
	(G)							-0.144
	(E)							0.946**

advance indicate the predominance of additive gene action (Johnson *et al.*, 1955 and Panse, 1957). Low heritability and low genetic advance indicate that the scope for improving these characters through selection is very much limitted and this condition may be due to the non additive gene action on these traits (Johnson *et al.*, 1955).

The phenotypic correlation coefficient was positive and significant between yield and number of branches, height of plant and total number of capsule per plant, number of branches and 50% flowering, number of branches and number of capsule per plant, number of capsule on main stem and number of capsule on branches, number of capsule on main stem and total number of capsule per plant and, number of capsule on branches and total number of capsules per plant. Negative and significant phenotypic correlation was obtained between height of plant and number of branches (Table 2).

The genotypic correlation was positive and significant between yield and number of capsule on main stem, height of plant and 50% flowering, number of branches per plant and number of capsule on main stem, number of capsule on main stem and number of capsule on branches, and number of capsule on main stem and total number of capsule per plant. Negative and significant correlation was observed between yield and 50% flowering, height of plant and number of branches, height of plant and number of capsule on branches, 50% flowering and number of capsule on main stem, number of branches per plant and total number of capsule per plant.

Environmental correlation was positive and significant between yield and 50% flowering, height of plant and number of capsule on main stem, height of plant and total number of capsule per plant, number of branches per plant and number of capsule on branches, number of branches and total number of capsules per plant, number of capsule on main stem and total number of capsule per plant and, number of capsule on branches and total number of capsules per plant.

The coheritability estimates are presented in Table 3. The predominance of additive effect was high between yield and 50% flowering, plant height and 50% flowering and number of branches per plant and number of capsules on main stem. Non-additive gene action was high between 50% flowering and number of branches per plant and between plant height and number of branches per plant.

General flowering had negative significant genotypic association with yield. This indirectly indicates that yield increase can be attributed by reducing the 50% flowering period. Since genotypic correlation alone is positive and significant, it is possible to isolate genotypes with similar height and 50% flowering simultaneously.

Table 3. Coheritability estimates

Character	Plant height	50% flowering	Number of branches per plant	No. of capsule on		Total No. of capsules / plant
				Main Stem	Branches	
Yield	-0.381	1.112	0.141	-0.265	0.112	0.152
Plant height	-	1.845	-0.046	-0.015	-1.497	-0.547
50% flowering	-	-	-8.552	-0.345	0.463	-0.529
No. of branches per plant				0.802	-0.069	-0.095
No. of capsule on main stem					0.209	-0.026

The environment which is condusive for height of plant is not favourable for the development of branches but was favourable for the production of more number of capsules per plant as well as total number of capsules per plant. Since both environmental correlations as well as phenotypic correlations were positive and significant for total number of capsule per plant, phenotypic selection for number of capsule on main stem as well as total number of capsules per plant, can be improved simultaneously in plants with similar height and synchrony in flowering period. The environment which is favourable to one is also favourable to the other in the case of number of branches per plant, number of capsule on branches, number of capsule on main stem as well on branches and total number of capsules per plant. Both genotypic and phenotypic correlations were significant for number of capsules on main stem, capsule on branches and total number of capsules per plant. So, these characters can be improved simultaneously through phenotypic selection.

So, it is possible to identify a high yielding genotype to a particular environment through recombination breeding, adopting diallel selective mating as was evidenced by the positive genotypic correlations among yield components of sesamum.

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VARIABILITY, HERITABILITY AND GENETIC ADVANCE IN SESAME (SESAMUM INDICUM L.)

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ABSTRACT

Genotypic coefficient of variation, heritability and genetic advance were assessed in 50 genotypes of Sesame (**Sesamum indicum** L.). The differences between the genotypes were highly significant for all the 15 characters studied. Among the characters, number of capsules per branch had high heritability combined with high genetic advance while seed number per capsule, DMP and first capsule bearing node had high heritability with medium genetic advance. These traits are the most suitable for improvement through selection.

KEY WORDS : Sesame, Variability, Heritability, Genetic advance.