

Studies on Genetic Variability in Sesamum (*Sesamum indicum* L.)

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Phenotypic and genotypic coefficients of variation, heritability (B. S) and genetic advance were assessed in 40 genotypes of sesamum (*Sesamum Indicum* L.). The differences between the types were highly significant for all the nine characters studied. The heritability estimates for all the characters were high. Branch number, capsule number and seed yield recorded higher values of PCV, GCV, heritability (B. S.) and genetic advance as percent over mean. Selection based on these characters would be more useful in the improvement of this crop.

Estimating variability in a population forms an effective tool for the breeder to design his testing procedures for identifying superior genotypes. It is known that the apparent variability in a population is the result of genetic and environmental factors. To apportion the observed variability to these two factors, parameters such as genotypic and phenotypic coefficient of variability (GCV and PCV) have to be assessed.

Heritability is another index for calculating the influence of environment on the expression of the phenotype. Burton (1952) suggested that GCV together with heritability estimates would give best picture about the extent of advance to be expected by selection. Estimates of genetic advance together with heritability would be helpful in assessing nature of gene actions.

With the above objectives in view, the PCV, GCV, heritability and genetic

advance were estimated in the present study.

MATERIAL AND METHODS

Twenty-five diverse genotypes of sesamum from the College of Agriculture, Bhubaneswar, Orissa State and fifteen other types from the School of Genetics, Tamil Nadu Agricultural University, Coimbatore, constituted the material for this study. The experiment was conducted at Agricultural College and Research Institute, Madurai. The crop was raised in a randomised block design replicated thrice. Each replication consisted of 40 ridges and each ridge was sown with a single type adopting spacing of 45 x 30 cm. Observations were recorded from five randomly selected plants at maturity. The characters chosen for study were plant height, branch number, capsule number per plant, capsule number on main stem, seed number per capsule, thousand seed weight, days to full maturity, oil content of seeds and seed yield per plant. The data on these characters were statistically analysed.

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The phenotypic and genotypic variances were calculated by using the formula suggested by Lush (1940.) The coefficients of variability (PCV and GCV) were derived by applying the formula suggested by Burton (1952). The heritability (h^2) in broad sense^e was estimated based on the formula given by Lush (1940) and the genetic advance (G.A.) was arrived at by following the method outlined by Johnson *et al.* (1955).

RESULTS AND DISCUSSION:

The analysis of variance revealed that the differences between the types were significant at one percent level for all the nine characters studied. The range, mean, variances, PCV, GCV, heritability (B.S.), genetic advance (GA) and genetic advance as percent over mean are given in the table 1. The phenotypic variability estimated for different characters showed wide variation. The PCV was the highest for branch number (45.2%) followed by seed yield (40.5%) and the lowest for days to full maturity (8.4%). Tilak Raj Gupta (1975) and Narasimha Reddy and Reddy (1976) have also reported high estimates of PCV for branch number and seed yield in sesamum.

Genotypic coefficient of variability (GCV) would be more useful for the assessment of inherent or real variability as it exhibits the heritable portion only (Allard, 1970). The estimated GCV for different characters were almost the same, as that of PCV. It is evident therefore that the influence

of environment on the expression of these characters was invariably low in this study. The magnitude of environmental influence (PCV-GCV) was very low and it ranged from 0.0 for capsule and seed number to 0.6 for branch number. Such reduced influence of environment was also observed by Sanjeeviah and Joshi (1974) for capsule number and plant height. It may be assumed therefore that the phenotypic values as such can be utilized in making selection.

Heritability (B. S.) estimate was found to be invariably high for all the characters studied (95.9 to 99.8 per cent) which again shows that the environment has little influence on the expression of these traits. Bhargava and Saxena (1964) reported similar high heritability estimates for capsule number, branch number, plant height and seed weight. Narasimha Reddy and Reddy (1976) observed similar trend for seed number and seed yield.

The genetic advance expressed as per cent of mean was found to be maximum for branch number (90.6%) and minimum for days to full maturity (16.8%). Bhargava and Saxena (1964), Naphade and Kolte (1972), Tilak Raj Gupta (1975), Narasimha Reddy and Reddy (1976), Chaudhary *et al.* (1977) and Murugesan *et al.* (1979) also obtained the highest estimate of genetic advance for branch number. Lowest genetic advance for days to full maturity was reported by Katiyar *et al.* (1974) in mustard. High heritability coupled with high genetic advance as per cent over mean was observed for characters

such as branch number, seed yield and capsule number in the present study. This suggests the action of additive genes for the expression of these traits (Panse, 1957) and hence the selection based on these characters would be more effective in the varietal improvement to this crop. Narasimha Reddy and Reddy (1976) reported the branch number, seed number, seed yield and capsule number recorded high heritability coupled with high genetic advance.

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Table 1. Range, Mean and other Genetic Parameters for nine Characters in sesamum

Character	Range	Mean	Variances		PVC (per cent)	GVC (per cent)	GCV-PCV	Heritability (B. S.) per cent	Genetic advance (G. A.)	G. A. as per cent over mean
			Pheno- typic	Geno- typic						
Plant height (cm)	50.2-115.6	89.11	236.73	234.98	17.3	17.2	0.1	99.26	31.41	35.31
Branch/number	1.0- 9.3	5.35	5.83	5.68	45.2	44.6	0.6	97.27	4.84	90.52
Capsule number	23.9- 99.3	55.91	446.67	445.75	37.8	37.8	0.0	99.79	43.45	77.71
Capsule number on main stem	14.4- 35.9	22.99	24.21	24.09	21.40	21.35	0.15	99.53	10.09	43.88
Seed number	51.1- 78.8	63.4	55.9	55.5	11.8	11.8	0.0	99.3	15.3	24.1
1000 seed weight	2.2- 3.5	2.8	0.1	0.1	11.4	11.1	0.3	95.9	0.6	22.5
Days to full maturity	84.0-115.7	92.9	60.6	58.9	8.4	8.3	0.1	97.2	15.5	16.8
Oil content (per cent)	38.6- 55.0	47.8	21.4	21.2	9.7	9.6	0.1	99.1	9.2	19.2
Seed yield(g)	3.7- 15.8	9.6	15.0	14.9	40.5	40.4	0.1	99.4	7.9	82.9