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Variability Studies in Sesame (*Sesamum Indicum* L.)

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ABSTRACT

Forty sesame genotypes were evaluated for variability studies with respect to nine quantitative characters. Analysis of variance revealed significant difference among genotypes for all the nine characters studied. High genotypic coefficient of variation (GCV) was recorded for number of capsules per plant, plant height, seed yield per plant and number of branches per plant. High heritability with high genetic advance as per cent of mean was recorded for number of days to flowering, plant height, number of branches per plant, number of capsules per plant and seed yield per plant. This indicates that the characters are governed by additive gene effects and selection for these traits will be effective.

Key words : Genetic advance, GCV, Heritability, PCV, Sesame.

Sesame (*Sesamum indicum* L.) is one of the most ancient oilseed crops of India, cultivated in almost all parts of the country in all seasons of the year. Sesame is called the "Queen of Oilseeds" in view of its high quality oil and protein. Although, India ranks first in area and production, its productivity is very low when compared to other Asian countries. As a crop with high export potential it becomes imperative to augment the productivity of sesame. Systematic breeding to evolve high yielding varieties is thus very crucial for which assessing and creating variability is of great significance. In this context an attempt has been made to assess the variability among forty genotypes of sesame for yield contributing traits.

MATERIAL AND METHODS

The present investigations were conducted in the Department of Plant Breeding and Genetics, College of Horticulture, Vellanikkara, Kerala Agricultural University. All cultural operations were carried out as per the package of practices recommendations of the KAU 2006. The material used in this study comprised of 40 genotypes whose seeds were sown in randomized block design in three replications and a spacing of 45 cm between rows and 20 cm between plants adopting a ridge and furrow method of planting. Ten plants in each row were selected at random and the data on nine characters were analysed. Phenotypic and genotypic co-efficients of variation were calculated using the formula suggested by Burton (1953) Heritability in the broad sense was derived based on the formula given by Hanson *et al.* (1956). Genetic advance (GA) was obtained by the formula prescribed by Johnson *et al*. (1955).

RESULTS AND DISCUSSION

Analysis of variance (Table 1) revealed highly significant differences among genotypes for the characters studied. The mean, range, variance, heritability and GA estimates are presented in Table 2. Among the nine characters under study the genotypes exhibited wide variations for plant height, number of capsules per plant, seed yield and branches per plant. The process of breeding is primarily conditioned by the magnitude and nature of interactions of genotypic and environmental variation in plant characters.

Estimate of variances reveal that phenotypic variances are slightly higher than the genotypic variances for almost all the characters studied, indicating less influence of environment. Therefore, selection on the basis of phenotype can be effective for the improvement of these traits. The phenotypic variance (PV) and genotypic variance (GV) for locule number was the same indicating that there was no environmental influence this character. Values of phenotypic and genotypic variance were very close for number of branches per plant, capsule length and 1000 seed weight. Characters with almost equal value of PV and GV can be considered as very stable.

Table 1. Analysis of variance for variability studies in sesame.

Source of variation	Degrees of freedom	Mean sum of squares								
		Number of days to flowering	Plant height	Number of branches per plant	Number of capsules per plant	Capsule length	Locules per capsule	1000 seed weight	Seed yield per plant	Oil content
Replication	2	1.6591	0.086961	0.1892	20.9630*	0.0014	0.0000	0.0014	0.2922	0.2031
Treatment	39	32.3377**	1153.4615**	12.4678	255.0877**	0.0340	0.3000	0.0026	4.3093	3.2988
Error	78	0.4456	0.9560	0.1150	1.4284	0.0018	0.0000	0.0001	0.0190	0.1715
SE		0.5451	0.7984	0.2769	0.9758	0.0348	0.0000	0.0085	0.1126	0.3382
CV (%)		21.84	16.365	51.83	43.56	18.97	-	2.95	35.56	7.615

* significant at 5% level ** significant at 1% level

Phenotypic coefficients of variation (PCV) were slightly higher than the genotypic coefficients of variation (GCV) for all the traits studied. High GCV and PCV were observed for plant height, number of branches per plant, number of capsules per plant and seed yield per plant. These results are in confirmation with that of Banerjee and Kole (2006); Parameshwarappa *et al*., (2009) Mandal *et al.*, (2010) and Solanki and Gupta (2004) for the traits plant height, number of branches per plant, number of capsules per plant and seed yield per plant, respectively. When coefficient of variation is higher, the population has greater variation and selection can be practiced. Moderate PCV and GCV estimates were noticed for days to flowering which was also reported by Shadakshari *et al.* (1995). Days to flowering, capsule length, 1000 seed weight and oil content showed low values of PCV and GCV. Similar results were also reported by Shadakshari *et al.* (1995).

Genetic coefficient of variability along with heritability gives an idea of expected genetic gain from selection (Burton, 1952). In the present study, high heritability was observed for all the nine characters studied. High heritability in broad sense does not always mean better response to selection since it is inclusive of non-additive genetic variance. The estimation of genetic advance furnishes the nature of gene effects from which response to selection can be predicted.

High heritability with high genetic advance as per cent of mean was recorded for number of days to flowering, plant height, number of branches per plant, number of capsules per plant and seed yield per plant. These results are in confirmation with the findings of Biswas and Akbar (1995) for number of days to flowering and Parameshwarappa *et al.* (2009) for plant height, number of branches per plant and number of capsules per plant, for seed yield per plant. This indicates the lesser influence of environment in expression of these characters and prevalence of additive gene action in their inheritance. Hence these characters are amenable for simple selection.

High heritability coupled with low genetic advance as per cent of mean was registered for capsule length, 1000 seed weight, oil content and for 1000 seed weight. Similar findings were reported by Shadakshari *et al* (1995) for capsule length and oil content suggesting the preponderance of non additive gene action in the inheritance of those traits.

Table 2. Genetic parameters for nine quantitative characters in sesame.

Character	Mean	Range		Genotypic variance	Environmental variance	Phenotypic variuance	Genotypic coefficient of variation (%)	Environmental coefficient of variation (%)	Phenotypic coefficient of variation (%)	Heritability (Braod sense)	Genetic Advance as % mean at 5% Selection intensity
		Minimum	Maximum								
Number of days to flowering	27.35	18.73	34.8	10.6307	0.4456	11.0763	11.9234	2.4412	12.1707	0.9598	24.0630
Plant height	53.44	31.40	107.97	384.1685	0.9561	385.1245	36.6755	1.8296	36.7211	0.9975	75.4576
Number of branches per plant	5.85	4.27	12.13	4.1176	0.1150	4.2326	34.6707	5.7930	35.1515	0.9728	70.4450
Number of capsules per plant	24.54	4.27	50.93	84.5531	1.4284	85.9815	37.4695	4.8701	37.7847	0.9834	76.5434
Capsule length	2.01	1.82	2.26	0.0107	0.0018	0.0125	5.1537	2.1223	5.5736	0.8550	9.8169
Locules per capsule	4.05	4.00	8.00	0.1000	0.0000	0.1000	7.8081	0.000	7.8081	1.0000	16.0847
1000 seed weight	3.15	3.11	3.21	0.0008	0.0001	0.0009	0.9113	0.3318	0.9698	0.8830	1.7641
Seed yield per plant	3.47	1.36	7.02	1.4301	0.0190	1.4491	34.4780	3.9742	34.7063	0.9869	70.5574
Oil content	48.65	45.53	50.17	1.0424	0.1715	1.2140	2.0986	0.8513	2.2647	0.8587	4.0060

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