Studies on gene action on seasame (*Sesamum indicum* L.)

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SUMMARY

The variance due to SCA was higher than that of the variance due to GCA for all the seven characters of interest. The variance due to dominance was much pronounced than that of additive genetic variance for all the characters studied. The study revealed the importance of both dominance and epistasis for evolving genotypes with higher seed yield. It may be achieved by resorting to population improvement programme.

Key words : Sesame, Line x tester analysis, Seed yield

The genetic control of characters related to seed yield and seed yield *per se* is important in any systematic crop improvement programme. A plant breeder must possess adequate knowledge on gene action of seed yield and its component characters. The present study was formulated to find out the gene action governing seed yield and its component characters in sesame.

MATERIALS AND METHODS

Fifteen lines *viz.*, IC-20441O (L_1); IC-205256 (L_2); IC-205091 (L_3); IC-204579 (L_4); IC-205165 (L_5); IC-96130 (L_6); IC-204854 (L_7); IC-204628 (L_8); IC-204997 (L_9); IC-205082 (L_{10}); IC-205347 (L_{11}); IC-205492 (L_{12}); IC-204973 (L_{13}); IC-204996 (L_{14}) and IC-204666 (L_{15}) were crossed with three testers *viz.*, TMV 3, CO 1 and VRI 1. The resulting 45 hybrids along with 18 parents were evaluated in a randomized block design with three replications, during 2004-2005. The crop was planted at a spacing of 30 x 15 cm in two rowed plots of 4.5 m length. Recommended agronomic practices and need based plant protection measures were undertaken. Data were recorded on five randomly selected plants for the characters *viz.* days to 50 per cent flowering, plant height at maturity, number of branches per plant, number of capsules per plant, number of seeds per capsule, 1000 seed weight and seed yield per plant. The data were subjected to statistical analysis given by Kempthorne (1957).

RESULTS AND DISCUSSION

The variance due to lines and testers was significant for three out of seven characters studied. The variance due to line x tester was significant for all the seven characters studied. Similarly, the variance due to hybrids were significant for all the traits of interest (Table 1). This indicated that there existed significant differences among lines, testers and hybrids. Therefore, further analysis is appropriate.

The variance due to GCA was less than that of the variance due to SCA for all the seven characters studied (Table 2). It indicated that the characters *viz.*, days to 50

Table 1 : Analysis of variance

Sr. No.	Characters	Hybrid df=44	Lines df=14	Tester df=2	Line x tester df=28	Error df=62
1.	Days to 50% flowering	41.50**	42.60	1.57	43.80**	0.37
2.	Plant height at maturity	352.29**	555.53**	288.91**	255.19**	0.26
3.	Number of branches	6.01**	5.42**	23.39**	5.60**	0.02
4.	Number of capsules per plant	167.42**	51.61	120.38	228.68**	0.18
5.	Number of seeds per capsule	19.12**	8.67	4.08	25.42**	0.27
6.	1000 seed weight	0.34**	0.26	0.39**	0.38**	0.00
7.	Seed yield per plant	4.66**	5.63**	0.25	4.04**	0.01

* and ** indicates significant of values at P=0.05 and 0.01, respectively

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Table 2 : Estimation of combining ability variances

Sr. No.	Characters	σ^2GCA	σ^2SCA	GCA/SCA
1.	Days to 50% flowering	0.0440	21.7158	0.0020
2.	Plant height at maturity	1.8542	127.4690	0.0145
3.	Number of branches	0.0181	2.5234	0.0071
4.	Number of capsules per plant	1.1699	114.2500	0.0102
5.	Number of seeds per capsule	0.1203	12.5713	0.0096
6.	1000 seed weight	0.007	0.1881	0.0037
7.	Seed yield per plant	0.0118	2.0145	0.0058

Table 3 : Proportional percentage contribution by lines, testers and line x tester interaction to the total variance

Sr. No.	Characters	Line	Tester	Line x tester
1.	Days to 50% flowering	32.66	0.17	67.17
2.	Plant height at maturity	50.17	3.73	46.10
3.	Number of branches	28.70	17.67	53.63
4.	Number of capsules per plant	9.81	2.27	86.92
5.	Number of seeds per capsule	14.44	0.97	84.59
6.	1000 seed weight	24.54	5.17	70.28
7.	Seed yield per plant	44.58	0.25	55.17

per cent .flowering, plant height at maturity, number of branches per plant, number of capsules per plant, number of seeds per capsule, 1000 seed weight and seed yield per plant were predominantly controlled by dominance and non-additive gene action. The result is in corroboration with the findings of Thirugnanakumar (1991); Krishnaiah *et al.* (2003); Rajasekar Reddy (2004) and Kubendhiran (2006). These characters could be improved by delaying the selection to later segregating generation, until the dominance and epistasis disappear and resorting to intermating of segregants followed by recurrent selection.

Table 4 : Estimation of additive and dominance variance for seven characters in seasame

Sr. No.	Characters	Additive variance		Dominance variance	
		F=0	F=1	F=0	F=1
1.	Days to 50% flowering	0.1760	0.0880	86.8634	21.7158
2.	Plant height at maturity	7.4169	3.7054	509.8759	127.4690
3.	Number of branches	0.0723	0.0361	10.0938	2.5234
4.	Number of capsules per plant	4.6796	2.3398	456.9999	114.2500
5.	Number of seeds per capsule	0.4811	0.2405	50.2854	12.5713
6.	1000 seed weight	0.0028	0.0014	0.7522	0.1881
7.	Seed yield per plant	0.0474	0.0237	8.0581	2.0145

Delogu *et al.* (1988) suggested recurrent selection as a basic breeding approach in self-pollinated crops. Diallel selective mating design as suggested by Jensen (1970) can also be adopted.

The contribution of lines x tester interaction to the total variance was higher followed by lines (Table 3). This indicated the importance of both lines and lines x tester interaction to the total variance. The result is in agreement with the findings of Thirugnanakumar (1991) and Kubendhiran (2006).

The magnitude of dominance variance was much pronounced for all the seven characters studied, both when F = 0 and F = 1 (Table 4). The result conformed the presence excess of dominance variance for these characters as inferred from the combining ability variance studied. The result is in corroboration with the findings of Rajasekhar Reddy (2004) and Kubendhiran (2006) in sesame.

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