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Hybrid Vigour in Sesame*

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Gene system does not prevail for yield *per se* in the crop plants and the yield is recognised as the end-product of the multiplicative interaction among yield-contributing characters (Whitehouse *et al.*, 1958; Grafius, 1959). Consequently, heterosis for yield should be through heterosis for the individual yield components. The present study was undertaken to determine the degree of hetero sis in sesame (*Sesamum indicum* L.).

Fifteen varieties of sesamum viz., Anand-67, A6B, K-4, S-5, IPS-20, U-2, Anand-13, B-90, UT-43, Kalyanpur-3, DC-4, A 65, Kundla-108, JR-15 and B-14 were crossed to MT 67-52. All the F_1's along with their parents were grown in a randomized-block design with three replication during the rainy season of 1976 at College Farm, Junagadh. Each culture was represented by two rows of two metre length planted at a distance of 45 cm. The thinning was done so as to maintain the distance of 10 cm between plants within a row. At random, 5 plants from each of the F_1's and parents were scored for number of branches per plant (X_1), height of plant (cm) (X_2), yield per plant (g)(X_3), length of capsule (cm) (X_4), 1000-seed weight (g) (X_5), number of capsules per leaf axil (X_6) and oil percentage (X_7). Oil percentage was estimated following the procedure advocated by Motiramani and Wankhade (1964). Heterosis was computed and tested, following standard procedures.

Relative mean performances of the hybrids ($\bar{F}_1$) and mid-parent ($\overline{MP}$) besides relative heterosis (RH) are given in Table 1. Highest degrre of heterotic expression was noteworthy for number

TABLE 1

Mean performance of the hybrids ($\bar{F}_1$), alongwith the values of mid-parent ($\overline{MP}$) and relative heterosis (RH) in per cent over mid-parental value for different characters of sesamum.

Gross	X_1			X_2			X_3		
	$\overline{MP}$	$\bar{F}_1$	*RH*	$\overline{MP}$	$\bar{F}_1$	*RH*	$\overline{MP}$	$\bar{F}_1$	*RH*
S5 x MT 67-52	1.13	1.80	59.29*	79.33	91.40	15.21**	2.28	3.13	37.28**
Kalyanpur-3 x MT 67-52	1.10	1.46	37.72	75.56	93.40	23.61**	2.05	3.33	62.43**
B-90 x MT 67-52	1.26	1.53	21.42	76.13	83.20	9.28	1.95	3.00	53.84**

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	1	2	3	4	5	6	7	8	9
A_6B x MT 67-52	1.10	1.20	0.09	76.06	90.40	14.34**	2.11	2.46	16.85
B-45 x MT 67-52	0.90	1.53	70.00**	80.19	87.46	9.06	1.86	3.40	82.79**
A_6S x MT 67-52	1.10	1.46	32.72	77.73	84.66	8.91	2.06	2.33	13.10
K4 x MT 67-52	1.26	2.14	69.84**	78.84	93.86	19.05**	2.18	3.33	52.75**
DC-4 x MT 67-52	1.43	2.26	58.04**	75.39	95.53	26.71**	1.96	2.603	2.65**
Anand-13 x MT 67-52	1.33	1.73	30.07	79.49	83.13	4.57	2.21	2.56	15.83
Anand-67 x MT 67-52	1.26	1.33	5.55	80.09	83.43	4.17	2.08	2.60	25.00
UT-43 x MT 67-52	1.20	2.00	66.66**	79.49	89.33	12.37*	2.21	2.16	2.26
Kandla 1-8 x MT 67-52	1.23	1.46	18.69	77.69	88.26	13.60*	2.21	2.20	0.45
IPS-20 x MT 67-52	1.16	1.86	60.34**	78.79	101.33	28.44**	1.83	1.96	7.10
U-2 MT 67-52	1.33	2.20	65.41**	78.84	95.70	21.38**	1.98	3.135	8.08**
JR-15 x MT 67-52	1.40	1.33	5.0	79.96	89.80	12.30*	2.01	1.86	—7.46
Average	1.21	1.69	39.67	78.44	90.06	14.81	2.07	2.67	—28.99

Legend: * and ** denote significance at 5 and 1 per cent levels of probability.

X_4			X_5			X_6			X_7		
$\overline{MP}$	$\bar{F}_1$	RH	$\overline{MP}$	$\bar{F}_1$	RH	$\overline{MP}$	$\bar{F}_1$	RH	$\overline{MP}$	$\bar{F}_1$	RH
2.86	2.80	—2.09	2.63	2.76	4.94	3.04	1.83	39.80**	49.10	52.00	7.94*
2.91	2.86	—1.71	2.77	2.61	—5.77	2.88	2.20	—23.61*	48.85	52.83	8.14
2.91	3.00	3.09	2.53	2.80	10.67	2.94	1.50	—48.97**	49.06	52.33	6.66**
2.83	2.70	4.59	2.70	2.55	—5.55	2.86	2.96	3.49	49.43	52.66	6.53**
2.83	2.90	2.47	2.68	2.67	—0.37	2.68	1.20	—55.22**	48.96	53.30	8.86**
2.84	2.96	4.22	2.68	2.84	5.97	2.85	3.33	16.84	49.53	52.13	5.24**
2.91	2.70	—7.21*	2.66	2.80	5.26	2.96	2.43	—17.90	49.83	51.93	4.21*
2.86	2.83	—1.04	2.65	2.86	7.92	2.91	1.06	—63.57**	49.35	51.60	4.55*
2.83	2.90	2.47	2.75	2.69	—2.18	2.74	3.06	11.67	49.38	52.76	6.84**
2.86	2.93	2.44	2.61	2.81	7.66	2.89	2.70	—6.57	49.78	51.66	3.77*
2.83	2.46	—13.07	2.59	2.77	6.94	2.97	1.40	—52.86**	49.23	52.16	5.95**
2.87	2.93	2.09	2.64	2.58	—2.27	2.81	1.63	—41.99**	48.58	51.93	6.89**
2.89	2.90	0.34	2.61	2.61	±0	2.86	1.80	—37.06**	50.23	51.70	2.92
2.86	2.93	2.44	2.61	3.66	40.22	2.69	1.73	—35.68**	49.43	50.30	1.76
2.86	2.76	—3.49	2.69	3.37	25.27	2.88	2.38	—17.36	49.43	50.66	2.48
2.86	2.84	—0.70	2.65	2.83	6.79	2.86	2.08	—21.27	49.34	52.06	5.51

of branches per plant (X_1) followed by seed yield (X_3). Srivastava and Singh (1969) have also reported similar findings. Of all hybrids, seven expressed significant positive heterosis over mid-parent for yield. High heterosis might be obtained with parents of different origin in the presence of adequate favourable environment for expression of heterosis and in the absence of mutual cancellation of components of heterosis. The cross B 45 x MT 67-52 produced the highest yielding hybrid which also exhibited highest relative heterosis for yield. Such crosses are likely to give better transgressive segregants and could be used for further crop improvement.

The hybrids were, in general, taller to the extent of average 14.81 per cent over mid-parental value. Considering tallness as desirable attribute, IPS-20 x MT 67-52 was recognised as the tallest hybrid among all with 28.44% heterosis over mid-parent. Average heterosis was in negative direction for length of capsule and capsule number/leaf axil which is at variance from the findings of Srivastava and Prakash (1977). Heterosis in negative direction could be due to overdominance of genes determining the characters under consideration (Hays *et al.*, 1955). Heaviest seed-bearing hybrid, U-2 x MT 67-52 showed 40.22 per cent relative heterosis for 1000-seed weight. With 5.51 per cent average heterotic value for oil content, eleven hybrids exhibited significant positive heterosis over mid-parent. B 45 x MT 67-52, identified as highest yielding cross, also manifested maximum heterotic expression for oil content. The absence of heterosis in some of the crosses for yield and oil content can be attributed either to less genetic variability in the parents or to the presence of unfavourable genotype-environment interaction. The study revealed that heterosis in seed yield was largely on account of increase in number of branches, height of plant and 1000-seed weight. Uzo (1977) also reported hybrid vigour for yield-contributing traits which were significantly correlated with yield. The expression of heterosis arising as a consequence of the favourable combination of yield components in hybrid has been considered as a case of combinational heterosis (Williams, 1959; Ramanujam *et al.*, 1964).

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REFERENCES

Grafius, J. E. 1959. Heterosis in barley. *Agron. J.* **51:** 551-4.

Hays, H. K., F. R. Immer and D. C. Smith. 1955. Methods of plant breeding. Mc Graw Hill Book Co., Inc., New York, p. 432.

Motiramani, D. P. and R. D. Wankhade. 1964. Laboratory manual in Agricultural Chemistry, Asian Pub., Muzaffarnagar.

Ramanujam, S., S. S. Rohewal and S. P. Singh. 1964. Potentialities of heterosis breeding in *Cicer. Indian J. Genet.*, **24:** 122-9.

Srivastava, D. P. and S. N. Singh. 1969. Heterosis in sesame. *J. Indian Bot. Soc.*, **47:** 78-88.

Srivastava, S. C. and R. Prakash. 1977. Heterosis in sesamum. *Current Research*, **6:** 49-51.

Uzo, J. O. 1977. Expression of hybrid vigour in sesame (*Sesamum Indicum* L.). *Dissertation Abstracts International*, B, **7** (8) 3749 B.

Whitehouse, R. N. H., J. B. Thompson and D. V. Riberio. 1958. Studies on the breeding of self-pollinated ecreals. 2. The use of of a diallel cross analysis in yield production. *Euphytica* **7:** 1467-69.

Williams, W. 1959. Heterosis and genetics of complex characters. *Nature*, **184:** 527-30.