CHAPTER IV

EXPERIMENTAL RESULTS

The salient features of the results obtained from the present investigation on "Heterosis and combining ability analysis for seed yield and its components in sesame (*Sesamum indicum* L.)" are presented under following captions:

4.1 Analysis of variance for experimental design

4.2 Mean performance of parents and hybrids

4.3 Estimation of heterobeltiosis and standard heterosis

4.4 Analysis of variance for combining ability

4.5 General and specific combining ability effects

4.1 ANALYSIS OF VARIANCE FOR EXPERIMENTAL DESIGN

Analysis of variance (Table 4.1) showed highly significant differences among the genotypes for all the characters. Differences amongst hybrids were also found highly significant for all characters under investigation. Differences amongst parents were also found highly significant for all characters. Differences due to parents *vs* hybrids were also found highly significant for all the characters except for length of capsule, width of capsule, 1000-seed weight and oil content.

4.2 MEAN PERFORMANCE OF PARENTS AND HYBRIDS

Mean data of thirteen parents and their 40 hybrids for fourteen characters are presented in Appendix II. The character-wise results are presented as under:

4.2.1 Days to 50 per cent flowering

Among in female parents, TC 66 took minimum number of days to 50 per cent flowering (33.33 days), while in male parents; Guj.Til-10 registered maximum number of days (46 days) to 50 per cent flowering. In case of hybrids, AT 351 x Guj.Til-1 was the earliest in 50 per cent flowering (33.67 days), whereas AT 351 x Guj.Til-1 (42.33 days) took maximum number of days to 50 per cent flowering.

4.2.2 Days to maturity

Among the parents, LIMDI 9 took minimum number of days for maturity (78 days), while Guj.Til-10 registered maximum number of days (94.67 days) for maturity. In male parents, Guj.Til-4 was the earliest in maturity. In case of hybrids, DPI 1484 x Guj.Til-1 was the earliest in maturity (76.33 days), whereas AT 355 x Guj.Til-4 was late in maturity (93.67 days).

Table 4.1. Analysis of variance for experimental design for different characters in sesame

Source	d. f.	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Height to first capsule (cm)	Number of branches per plant	Number of internodes per plant	Length of capsule (cm)
Replications	2	4.157	3.817	25.016	2.785	0.007	0.335	0.015
Genotypes	52	26.008**	54.301**	164.382**	79.388**	2.243**	31.868**	0.299**
Parents	12	43.700**	67.333**	148.348**	34.201**	4.666**	26.307**	0.252**
Hybrids	39	16.656**	48.030**	167.158**	90.432**	1.458**	33.481**	0.321**
P. *vs* H.	1	178.438**	142.460**	248.525**	190.932**	3.744**	35.698**	0.006
Error	104	4.426	19.477	30.963	1.381	0.051	1.702	0.020

Source	d. f.	Width of capsule (cm)	Number of capsules per plant	Number of capsules per leaf axil	Number of seeds per capsule	1000-seed weight (g)	Seed yield per plant (g)	Oil content (%)
Replications	2	0.002	1.119	0.001	9.820	0.048	0.519	5.800
Genotypes	52	0.012**	683.185**	0.210**	62.232**	0.247**	16.791**	15.603**
Parents	12	0.015**	534.827**	0.380**	47.237**	0.117**	20.571**	15.788**
Hybrids	39	0.011**	719.865**	0.142**	65.769**	0.292**	15.927**	15.932**
P. *vs* H.	1	0.003	1032.939**	0.837**	104.215**	0.023	5.104*	0.559
Error	104	0.002	21.687	0.007	8.189	0.025	0.745	2.974

*,** Significant at 5 per cent and 1 per cent levels of significance, respectively.

4.2.3 Plant height (cm)

The tallest parent (98.87 cm) was Guj.Til-10 and the shortest one (71.73 cm) was DPI 1484. Among the hybrids, DPI 1484 x Guj.Til-10 registered the highest (99.93 cm) plant height, whereas DPI 1484 x Guj.Til-3 recorded the minimum plant height (73.73 cm).

4.2.4 Height to first capsule (cm)

Among the parents, Guj.Til-2 possessed first capsule at lowest height (11.60 cm), while AT 355 possessed first capsule at maximum height (21.47 cm). In case of hybrids, RSE 3 x Guj.Til-4 showed first capsule at minimum height (10.60 cm), while AT 351 x Guj.Til-4 showed first capsule at maximum height (32.80 cm).

4.2.5 Number of branches per plant

Maximum number of branches per plant was recorded by the parent Guj. Til-10 (6.20), while minimum was recorded in parent Guj.Til-2 (1.60). In case of crosses, TC 66 x Guj.Til-2 produced the highest number of branches per plant (3.93). The lowest number of branches per plant (1.13) was observed in AT 351 x Guj.Til-2.

4.2.6 Number of internodes per plant

Among the parents, Guj.Til-10 possessed maximum number of internodes (22.93), while Guj.Til-1 showed minimum number of internodes per plant (11.80). In case of hybrids, DPI 1484 x Guj.Til-1 showed maximum number of internodes (22.60), while AT 351 x Guj.Til-1 and AT 351 x Guj.Til-2 showed minimum number of internodes per plant (10.47).

4.2.7 Length of capsule (cm)

The longest capsules were found in parent AT 351 (3.22 cm), while the shortest was observed in Guj.Til-10 (2.41 cm). The longest (3.44 cm) and the shortest capsules length (2.18 cm) were found in hybrids RT 33 x Guj.Til-3 and LIMDI 9 x Guj.Til-10, respectively.

4.2.8 Width of capsule (cm)

Parents IC 96128 and Guj.Til-10 recorded the maximum (1.01 cm) and minimum (0.76 cm) capsule width, respectively. Among the hybrids, maximum (0.99 cm) capsule width was observed in hybrid AT 351 x Guj.Til-3, AT 351 x Guj.Til-10, IC 96128 x Guj.Til-3 and IC 96128 x Guj.Til-10, while minimum (0.75 cm) was recorded in RSE 3 x Guj.Til-2.

4.2.9 Number of capsules per plant

Among parental genotypes, the highest number of capsules per plant (95.07) was observed in Guj.Til-10, while the lowest (43.80) in IC 96128. In case of hybrids, the maximum number of capsules (105.60) was produced by RT 33 x Guj.Til-10 and minimum capsules (32.47) was registered by TC 66 x Guj.Til-4. The highest capsules producing hybrid involved one parent with the maximum number of capsules. But the hybrid which gave minimum number of capsules did not involved parents with lowest number of capsules.

4.2.10 Number of capsules per leaf axil

Among parental genotypes, the highest number of capsules per leaf axil (1.93) was observed in Guj.Til-2, while the lowest (1.00) was recorded in five lines *viz.*, TC 66, DPI 1484, RT 33, LIMDI 9 and RSE 3, and two testers *viz.*, Guj.Til-3 and Guj.Til-10. In case of hybrids, the maximum number of capsules per leaf axil (1.67) was produced by cross RSE 3 x Guj.Til-1, while minimum capsule (1.00) was registered by as many as 34 crosses.

4.2.11 Number of seeds per capsule

Among parental genotypes, the maximum number of seeds per capsule (56.73) was observed in RT 33, while the minimum number of seeds per capsule (45.73) was registered in Guj.Til-10. In case of hybrids, the maximum number of seeds per capsule (62.00) was produced by TC 66 x Guj.Til-1 and minimum number of seeds per capsule (40.80) was registered by DPI 1484 x Guj.Til-2.

4.2.12 1000-seed weight (g)

Parents LIMDI 9 and Guj.Til-4 exhibited the highest (3.42 g) and the lowest (2.78 g) test weight, respectively. Among the crosses, TC 66 x Guj.Til-4 registered the highest (3.80 g) test weight, whereas DPI 1484 x Guj.Til-1 manifested the lowest (2.47 g) test weight.

4.2.13 Seed yield per plant (g)

The highest seed yield per plant (18.11 g) was registered by Guj.Til-10, while the lowest seed yield (7.29 g) was recorded in DPI 1484. Hybrid RT 33 x Guj.Til-10 produced the highest seed yield (18.08 g), whereas the hybrid RT 33 x Guj.Til-1 recorded the lowest seed yield per plant (7.53 g).

4.2.14 Oil content (%)

Among the parents, the highest oil content (48.24%) was recorded in Guj.Til-3 and the lowest (41.12%) was observed in AT 355. In case of hybrids, TC 66 x Guj.Til-1

contained the highest oil content (48.05%), while it was the lowest (40.23%) in the cross AT 355 x Guj.Til-10.

4.3 ESTIMATION OF HETEROBELTIOSIS AND STANDARD HETEROSIS

Several investigators have used increase in F_1 over mid-parental value as measure of heterosis. But in practice, increase in F_1 in comparison to poor parents involved in the cross may not be of any significance. Therefore, increase in F_1 over better parent and over standard variety was used in present study. Guj.Til-2, a sesame variety released for general cultivation in Gujarat from Junagadh Agricultural University, Amreli was used as a standard variety. The character wise results on heterosis over better parent and heterosis over standard variety are presented in forthcoming pages:

4.3.1 Days to 50 per cent flowering

Out of 40 crosses, nine crosses exhibited significant and desirable (negative) heterosis over better parent (Table 4.2). The heterosis over better parent ranged from -19.20 per cent (AT 351 x Guj.Til-10) to 20.00 per cent (TC 66 x Guj.Til-1). The highest significant desirable heterosis over better parent was recorded in the cross AT 351 x Guj.Til-10 (-19.20%) followed by RT 33 x Guj.Til-4 (-15.70%), RT 33 x Guj.Til-3 (-13.22%) and AT 351 x Guj.Til-3 (-12.80%).

The standard heterosis values varied from -24.63 per cent (AT 351 x Guj.Til-10) to -5.22 per cent (AT 351 x Guj.Til-1). Out of 40 crosses, 36 hybrids registered significant standard heterosis in desirable (negative) direction. The cross AT 351 x Guj.Til-10 registered the highest (-24.63%) significant standard heterosis in desirable direction followed by TC 66 x Guj.Til-3 (-23.88%), RT 33 x Guj.Til-4 (-23.88%), TC 66 x Guj.Til-4 (-22.39%) and LIMDI 9 x Guj.Til-3 (-22.39%).

4.3.2 Days to maturity

For days to maturity, only 2 crosses exhibited significant and desirable (negative) heterosis over better parent (Table 4.2). The heterosis over better parent ranged from -11.07 per cent (TC 66 x Guj.Til-1) to 14.69 per cent (AT 355 x Guj. Til-4). The highest significant desirable heterosis over better parent was recorded in the cross TC 66 x Guj.Til-1 (-11.07%) followed by AT 355 x Guj.Til-1 (-9.16%).

The standard heterosis varied from -9.84 per cent (DPI 1484 x Guj.Til-1) to 10.63 per cent (AT 355 x Guj.Til-4). Only 3 hybrids registered significant standard heterosis in desirable (negative) direction. The cross DPI 1484 x Guj.Til-1 registered the highest (-9.84%) significant standard heterosis in desirable direction followed by LIMDI 9 x Guj.Til-4 (-9.45%) and TC 66 x Guj.Til-1 (-8.27%).

4.3.3 Plant height

Out of 40 crosses, none of the crosses showed significant and negative heterosis over better parent, as well as heterosis over better parent ranged from -0.75 per cent (LIMDI 9 x Guj.Til-1) to 39.31 per cent (DPI 1484 x Guj.Til-10), while the standard heterosis varied from -10.66 per cent (DPI 1484 x Guj.Til-3) to 21.08 per cent (DPI 1484 x Guj.Til-10).

4.3.4 Height to first capsule

Out of 40 crosses, only 4 crosses showed significant desirable (negative) heterobeltiosis (Table 4.2). The estimates of heterobeltiosis for this trait ranged from -38.61 per cent (RSE 3 x Guj.Til-4) to 179.89 per cent (AT 351 x Guj.Til-2). The hybrid RSE 3 x Guj.Til-4 exhibited the highest negative heterobeltiosis (-38.61%) followed by RT 33 x Guj.Til-4 (-25.95%) and RSE 3 x Guj.Til-10 (-25.87%).

The estimates of standard heterosis for this trait ranged from -17.62 per cent (RSE 3 x Guj.Til-4) to 154.92 per cent (AT 351 x Guj.Til-4). Out of 40 crosses, only one cross RSE 3 x Guj.Til-4 exhibited significant negative standard heterosis.

4.3.5 Number of branches per plant

Out of 40 crosses, 5 crosses showed significant and positive heterosis over better parent, while 27 hybrids showed significant and positive heterosis over standard check (Table 4.2).

The values of heterobeltiosis for number of branches per plant ranged from -73.12 per cent (DPI 1484 x Guj.Til-10) to 60.61 per cent (DPI 1484 x Guj.Til-1). The hybrid DPI 1484 x Guj.Til-1 exhibited the highest positive heterobeltiosis (60.61%) followed by DPI 1484 x Guj.Til-2 (45.45%) and LIMDI 9 x Guj.Til-1 (27.27%).

The estimate of standard heterosis for number of branches per plant ranged from -37.04 per cent (AT 351 x Guj.Til-2) to 118.52 per cent (TC 66 x Guj.Til-2). The hybrid TC 66 x Guj.Til-2 exhibited the highest significant and positive standard heterosis (118.52%) followed by AT 355 x Guj.Til-4 (114.81%), AT 355 x Guj.Til-1 (103.70%) and AT 355 x Guj.Til-3 (100.00%).

4.3.6 Number of internodes per plant

Out of 40 crosses, 2 crosses showed significant and positive heterobeltiosis for this trait (Table 4.3). The estimates of heterobeltiosis for number of internodes per plant ranged from -52.91 per cent (AT 351 x Guj.Til-10) to 50.67 per cent (DPI 1484

Table 4.2. Per cent heterobeltiosis (H_1) and standard heterosis (H_2) for days to 50 per cent flowering, days to maturity, plant height, height to first capsule and number of branches per plant in sesame

Sr. No.	Crosses	Days to 50 per cent flowering		Days to maturity		Plant height (cm)		Height to first capsule (cm)		Number of branches per plant	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
1	AT 351 x Guj.Til-1	1.60	-5.22	-3.47	-1.57	2.40	-0.24	138.50**	131.09**	-56.67**	-3.70
2	AT 351 x Guj.Til-2	-4.80	-11.19**	0.78	1.18	1.05	0.97	179.89**	152.33**	-71.67**	-37.04**
3	AT 351 x Guj.Til-3	-12.80**	-18.66**	0.00	1.97	1.61	-8.00	101.57**	99.48**	-53.33**	3.70
4	AT 351 x Guj.Til-4	-8.80*	-14.93**	8.16	4.33	0.26	-7.51	76.98**	154.92**	-33.33**	48.15**
5	AT 351 x Guj.Til-10	-19.20**	-24.63**	-3.86	-1.97	9.32	9.94	14.55*	63.21**	-61.29**	33.33**
6	AT 355 x Guj.Til-1	-2.54	-14.18**	-9.16*	-6.30	4.20	-3.80	88.77**	82.90**	-3.51	103.70**
7	AT 355 x Guj.Til-2	-9.32*	-20.15**	-1.96	-1.57	5.07	-2.99	42.53**	28.50**	-7.02	96.30**
8	AT 355 x Guj.Til-3	2.54	-9.70*	4.63	6.69	5.26	-4.68	80.10**	78.24**	-5.26	100.00**
9	AT 355 x Guj.Til-4	-9.32*	-20.15**	14.69**	10.63*	5.52	-2.67	-21.22**	13.47	1.75	114.81**
10	AT 355 x Guj.Til-10	0.00	-11.94**	-2.58	3.94	25.37**	15.75**	0.36	43.01**	-51.61**	66.67**
11	TC 66 x Guj.Til-1	20.00**	-10.45*	-11.07**	-8.27*	8.17	-3.80	52.94**	48.19**	-5.88	77.78**
12	TC 66 x Guj.Til-2	13.00*	-15.67**	-4.31	-3.94	10.26	-1.94	76.44**	59.07**	15.69**	118.52**
13	TC 66 x Guj.Til-3	2.00	-23.88**	-2.70	-0.79	1.45	-9.77	36.65**	35.23**	-9.80	70.37**
14	TC 66 x Guj.Til-4	4.00	-22.39**	3.27	-0.39	3.72	-7.75	17.12*	34.72**	-23.53**	44.44**
15	TC 66 x Guj.Til-10	10.00	-17.91**	-1.88	2.76	34.33**	19.47**	84.23**	111.92**	-55.91**	51.85**
16	DPI 1484 x Guj.Til-1	17.76**	-5.97	-6.53	-9.84*	6.97	-7.03	59.36**	54.40**	60.61**	96.30**
17	DPI 1484 x Guj.Til-2	1.87	-18.66**	-3.27	-6.69	7.34	-6.70	62.07**	46.11**	45.45**	77.78**
18	DPI 1484 x Guj.Til-3	0.00	-20.15**	1.22	-2.36	2.79	-10.66	28.80**	27.46**	11.76	40.74**
19	DPI 1484 x Guj.Til-4	9.35	-12.69**	-2.04	-5.51	3.25	-10.26	6.17	24.87**	-37.21**	0.00
20	DPI 1484 x Guj.Til-10	1.87	-18.66**	2.86	-0.79	39.31**	21.08**	51.98**	78.76**	-73.12**	-7.41

(Contd….)

Sr. No.	Crosses	Days to 50 per cent flowering		Days to maturity		Plant height (cm)		Height to first capsule (cm)		Number of branches per plant	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
21	IC 96128 x Guj.Til-1	4.42	-11.94**	-0.38	2.76	4.79	0.73	30.90**	20.73*	-8.33	22.22*
22	IC 96128 x Guj.Til-2	-4.42	-19.40**	2.75	3.15	1.68	-2.26	28.74**	16.06	8.33	44.44**
23	IC 96128 x Guj.Til-3	-5.31	-20.15**	-1.16	0.79	5.80	-4.20	55.62**	43.52**	-25.00**	0.00
24	IC 96128 x Guj.Til-4	10.62*	-6.72	8.98*	5.12	8.58	0.16	40.45**	29.53**	-13.95*	37.04**
25	IC 96128 x Guj.Til-10	3.54	-12.69**	-3.56	6.69	20.17**	15.51**	19.66*	10.36	-58.06**	44.44**
26	RT 33 x Guj.Til-1	-2.48	-11.94**	1.20	0.00	9.29	6.46	22.46**	18.65*	-18.18*	0.00
27	RT 33 x Guj.Til-2	-8.26	-17.16**	-1.59	-2.76	7.03	6.95	9.20	-1.55	0.00	-7.41
28	RT 33 x Guj.Til-3	-13.22**	-21.64**	3.59	2.36	13.83*	3.07	14.14	12.95	-14.71	7.41
29	RT 33 x Guj.Til-4	-15.70**	-23.88**	-1.63	-5.12	12.96*	4.20	-25.95**	0.52	-9.30	44.44**
30	RT 33 x Guj.Til-10	-11.57*	-20.15**	-1.59	-2.76	10.14	15.83**	31.30**	78.24**	-56.99**	48.15**
31	LIMDI 9 x Guj.Til-1	-2.56	-14.93**	7.26	-1.18	-0.75	-3.31	65.24**	60.10**	27.27**	55.56**
32	LIMDI 9 x Guj.Til-2	-8.55	-20.15**	5.56	-2.76	0.50	-1.70	42.53**	28.50**	0.00	22.22*
33	LIMDI 9 x Guj.Til-3	-11.11*	-22.39**	12.39**	3.54	5.08	-4.85	63.35**	61.66**	20.59*	51.85**
34	LIMDI 9 x Guj.Til-4	-1.71	-14.18**	-1.71	-9.45*	1.58	-6.30	8.45	19.69*	-16.28*	33.33**
35	LIMDI 9 x Guj.Til-10	5.98	-7.46	1.71	-6.30	23.04**	20.36**	-8.92	0.52	-67.74**	11.11
36	RSE 3 x Guj.Til-1	12.15*	-10.45*	-3.92	-3.54	3.27	-2.99	-10.16	-12.95	-21.62**	7.41
37	RSE 3 x Guj.Til-2	7.48	-14.18**	5.10	5.51	3.96	-2.34	14.37	3.11	-32.43**	-7.41
38	RSE 3 x Guj.Til-3	4.67	-16.42**	-6.27	-5.91	1.87	-7.75	3.66	2.59	-35.14**	-11.11
39	RSE 3 x Guj.Til-4	12.15*	-10.45*	4.49	0.79	2.10	-5.82	-38.61**	-17.62*	-23.26**	22.22*
40	RSE 3 x Guj.Til-10	11.21*	-11.19**	1.96	2.36	19.09**	11.87*	-25.87**	-0.52	-54.84**	55.56**
	Range	-19.20 To 20.00	-24.63 To -5.22	-11.07 To 14.69	-9.84 To 10.63	-0.75 To 39.31	-10.66 To 21.08	-38.61 To 179.89	-17.62 To 154.92	-73.12 To 60.61	-37.04 To 118.52
	Mean heterosis	0.11	-15.62	0.40	-0.63	8.29	0.58	37.96	43.55	-20.34	39.44
	SEM ±	1.780	1.780	3.477	3.477	4.597	4.597	1.042	1.042	0.189	0.189

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

x Guj.Til-1). The hybrid DPI 1484 x Guj.Til-1 exhibited the highest positive heterobeltiosis (50.67%) followed by DPI 1484 x Guj.Til-2 (28.44%).

Out of 40 crosses, 23 hybrids showed significant and positive heterosis over standard check. The estimates of standard heterosis for this trait ranged from -21.50 per cent (AT 351 x Guj.Til-1 and AT 351 x Guj.Til-2) to 69.50 per cent (DPI 1484 x Guj.Til-1). The hybrid DPI 1484 x Guj.Til-1 exhibited the highest significant and positive standard heterosis (69.50%) followed by IC 96128 x Guj.Til-10 (60.00%) and AT 355 x Guj.Til-10 (59.50%).

4.3.7 Length of capsule

Out of 40 hybrids, 9 hybrids showed significant and positive heterobeltiosis for length of capsule (Table 4.3). The heterobeltiosis for capsule length ranged from -27.74 per cent AT 351 x Guj.Til-10) to 27.79 per cent (DPI 1484 x Guj.Til-10). The cross DPI 1484 x Guj.Til-10 exhibited the highest positive heterobeltiosis (27.79%) followed by RT 33 x Guj.Til-10 (18.66%) and RSE 3 x Guj.Til-4 (16.49%).

Out of 40 hybrids, two hybrids showed significant and positive heterosis over standard check. The values of standard heterosis for this trait ranged from -29.80 per cent (LIMDI 9 x Guj.Til-10) to 10.61 per cent (RT 33 x Guj.Til-3). The hybrid RT 33 x Guj.Til-3 exhibited the highest significant and positive standard heterosis (10.61%) followed by IC 96128 x Guj.Til-3 (9.86%).

4.3.8 Width of capsule

The estimates of heterobeltiosis for width of capsule ranged from -20.46 per cent (IC 96128 x Guj.Til-2) to 8.37 per cent (AT 355 x Guj.Til-4). The highest positive heterobeltosis was observed in the hybrid AT 355 x Guj.Til-4 (8.37%) followed by RT 33 x Guj.Til-4 (6.54%) and LIMDI 9 x Guj.Til-4 (6.37%).

The estimates of standard heterosis for this trait ranged from -17.65 per cent (RSE 3 x Guj.Til-2) to 9.56 per cent (IC 96128 x Guj.Til-3). The hybrid IC 96128 x Guj.Til-3 exhibited the highest significant and positive standard heterosis (9.56%) followed by IC 96128 x Guj.Til-10 (9.19%) and IC 96128 x Guj.Til-1 (8.46%).

4.3.9 Number of capsules per plant

In the present study, out of 40 hybrids, 12 hybrids showed significant and positive heterobeltiosis, while 22 hybrids exhibited significant and positive standard heterosis (Table 4.3).

The magnitude of heterobeltiosis varied from -45.86 per cent (AT 351 x Guj.Til-10) to 64.88 per cent (TC 66 x Guj.Til-2). The highest significant and positive

heterobeltiosis was observed in the hybrid TC 66 x Guj.Til-2 (64.88%) followed by DPI 1484 x Guj.Til-2 (62.17%) and IC 96128 x Guj.Til-2 (49.80%).

The spectrum of variation for standard heterosis ranged from -34.63 per cent (TC 66 x Guj.Til-4) to 112.62 per cent (RT 33 x Guj.Til-10). The hybrid RT 33 x Guj.Til-10 ranked first by expressing the highest (112.62%) standard heterosis followed by DPI 1484 x Guj.Til-2 (78.93%), TC 66 x Guj.Til-2 (69.53%) and DPI 1484 x Guj.Til-1 (63.62%).

4.3.10 Number of capsules per leaf axil

The estimates of heterobeltiosis for this trait ranged from -48.28 per cent (AT 355 x Guj.Til-2, TC 66 x Guj.Til-2, DPI 1484 x Guj.Til-2, IC 96128 x Guj.Til-2 and RSE 3 x Guj.Til-2) to 19.05 per cent (RSE 3 x Guj.Til-1). The highest significant and positive heterobeltiosis was observed in the hybrid RSE 3 x Guj.Til-1 (19.05%) followed by LIMDI 9 x Guj.Til-1 (9.52%) (Table 4.3).

The estimates of standard heterosis for this trait ranged from -48.28 per cent (for most of the hybrids) to -13.79 per cent (RT 33 x Guj.Til-2 and RSE 3 x Guj.Til-1). Out of 40 hybrids, none of the hybrid exhibited significant and positive standard heterosis.

4.3.11 Number of seeds per capsule

The heterobeltiosis ranged from -27.49 per cent (DPI 1484 x Guj.Til-2) to 26.83 per cent (IC 96128 x Guj.Til-4). Out of 40 hybrids, 9 hybrids displayed significant and positive estimates of heterobeltiosis (Table 4.4). The hybrid IC 96128 x Guj.Til-4 exhibited the highest significant and positive heterobeltiosis (26.83%) followed by AT 355 x Guj.Til-2 (17.46%) and AT 355 x Guj.Til-10 (15.23%).

The values for standard heterosis varied from -16.51 per cent (DPI 1484 x Guj.Til-2) to 26.88 per cent (TC 66 x Guj.Til-1). Out of 40 hybrids, 18 hybrids displayed significant and positive estimates of standard heterosis. The hybrid TC 66 x Guj.Til-1 exhibited the highest significant magnitude and positive standard heterosis (26.88%) followed by RSE 3 x Guj.Til-2 (25.78%), IC 96128 x Guj.Til-4 (25.10%) and IC 96128 x Guj.Til-3 (24.15%).

4.3.12 1000-seed weight

The estimates of heterobeltiosis for 1000-seed weight ranged from -26.17 per cent (DPI 1484 x Guj.Til-1) to 25.12 per cent (AT 355 x Guj.Til-4). Out of 40 hybrids, 7 hybrids showed significant and positive heterobeltiosis (Table 4.4). The

Table 4.3. Per cent heterobeltiosis (H_1) and standard heterosis (H_2) for number of internodes per plant, length of capsule, width of capsule, number of capsules per plant and number of capsules per leaf axil in sesame

Sr. No.	Crosses	Number of internodes per plant		Length of capsule (cm)		Width of capsule (cm)		Number of capsules per plant		Number of capsules per leaf axil	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
1	AT 351 x Guj.Til-1	-38.91**	-21.50**	-15.63**	-12.65**	-1.80	0.37	6.80	22.28**	-31.82**	-48.28**
2	AT 351 x Guj.Til-2	-38.91**	-21.50**	-23.91**	-21.22**	-12.41**	-11.76**	14.51	15.44*	-20.69**	-20.69**
3	AT 351 x Guj.Til-3	-20.91	13.50	-6.94	-3.64	-6.57	-5.88	11.44	5.91	-31.82**	-48.28**
4	AT 351 x Guj.Til-4	-34.60**	-14.00	-17.39**	-14.47**	-2.55	-1.84	38.55**	25.91**	-35.71**	-37.93**
5	AT 351 x Guj.Til-10	-52.91**	-19.00*	-27.74**	-25.19**	-10.58**	-9.93*	-45.86**	3.62	-22.73**	-41.38**
6	AT 355 x Guj.Til-1	-14.67**	-4.00	-15.90**	-21.22**	-8.63*	-6.62	-10.32	2.68	-40.00**	-48.28**
7	AT 355 x Guj.Til-2	27.56	43.50**	-19.68**	-19.08**	-5.95	-6.99	28.50**	29.53**	-48.28**	-48.28**
8	AT 355 x Guj.Til-3	-25.78**	6.50	-18.49**	-20.15**	-4.20	-7.72	33.33**	26.71**	-40.00**	-48.28**
9	AT 355 x Guj.Til-4	-4.56	25.50**	-3.85	-14.26**	8.37	0.00	48.48**	38.12**	-46.43**	-48.28**
10	AT 355 x Guj.Til-10	-7.27**	59.50**	-7.81	-17.79**	-1.59	-9.19*	-32.47**	29.26**	-4.00	-17.24**
11	TC 66 x Guj.Til-1	-23.21*	7.50	-3.58	-1.82	-7.09	-3.68	-5.86	7.79	0.00	-27.59**
12	TC 66 x Guj.Til-2	-10.00	26.00**	-0.32	1.50	-0.35	3.31	64.88**	69.53**	-48.28**	-48.28**
13	TC 66 x Guj.Til-3	-14.29	23.00**	-8.11*	-6.43	-6.38	-2.94	26.50**	30.07**	0.00	-48.28**
14	TC 66 x Guj.Til-4	-38.93**	-14.50	-15.79**	-14.26**	-7.80*	-4.41	-36.42**	-34.63**	-46.43**	-48.28**
15	TC 66 x Guj.Til-10	-9.30**	56.00**	-4.42	-2.68	-2.84	0.74	-33.45**	27.38**	0.00	-48.28**
16	DPI 1484 x Guj.Til-1	50.67**	69.50**	13.39**	6.22	-7.59*	-1.47	42.91**	63.62**	-28.57**	-48.28**
17	DPI 1484 x Guj.Til-2	28.44*	44.50**	-12.45**	-11.79**	-4.83	1.47	62.17**	78.93**	-48.28**	-48.28**
18	DPI 1484 x Guj.Til-3	-4.88	36.50**	-16.41**	-18.11**	1.03	7.72	-17.03*	-8.46	0.00	-48.28**
19	DPI 1484 x Guj.Til-4	-11.79	16.00*	0.12	-11.36**	-0.69	5.88	-24.82**	-17.05*	-46.43**	-48.28**
20	DPI 1484 x Guj.Til-10	-11.92**	51.50**	27.79**	2.04	-10.69**	-4.78	-32.19**	29.80**	0.00	-48.28**

(Contd….)

Sr. No	Crosses	Number of internodes per plant		Length of capsule (cm)		Width of capsule (cm)		Number of capsules per plant		Number of capsules per leaf axil	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
21	IC 96128 x Guj.Til-1	0.00	32.00**	6.31	6.54	-2.64	8.46*	0.59	15.17*	-28.57**	-48.28**
22	IC 96128 x Guj.Til-2	-0.76	31.00**	-16.49**	-15.86**	-20.46**	-11.40**	49.80**	51.01**	-48.28**	-48.28**
23	IC 96128 x Guj.Til-3	-17.42**	18.50*	9.63*	9.86**	-1.65	9.56*	36.30**	29.53**	-25.00**	-48.28**
24	IC 96128 x Guj.Til-4	-24.62**	-0.50	-13.69**	-13.50**	-11.88**	-1.84	4.90	-5.10	-46.43**	-48.28**
25	IC 96128 x Guj.Til-10	-6.98	60.00**	-8.66*	-8.47*	-1.98	9.19*	-25.18**	43.22**	-25.00**	-48.28**
26	RT 33 x Guj.Til-1	-28.05**	-11.50	-20.37**	-25.40**	-5.40	-3.31	-42.32**	-33.96**	-28.57**	-48.28**
27	RT 33 x Guj.Til-2	-2.44	20.00*	-24.89**	-24.33**	0.37	-0.74	-0.80	0.00	-13.79**	-13.79**
28	RT 33 x Guj.Til-3	-20.56**	14.00	12.91**	10.61**	-6.49	-9.93*	7.54	3.36	0.00	-48.28**
29	RT 33 x Guj.Til-4	-29.28**	-7.00	2.30	-9.43*	6.54	1.84	-1.54	-5.37	-46.43**	-48.28**
30	RT 33 x Guj.Til-10	-9.01	56.50**	18.66**	-1.18	-1.92	-6.25	11.08**	112.62**	0.00	-48.28**
31	LIMDI 9 x Guj.Til-1	-5.99	25.50**	-5.15	-11.15**	-17.63**	-15.81**	24.62**	42.68**	9.52*	-20.69**
32	LIMDI 9 x Guj.Til-2	-12.73*	16.50*	-8.94*	-8.25*	-6.69	-7.72	14.78	15.70*	-24.14**	-24.14**
33	LIMDI 9 x Guj.Til-3	-14.98**	22.00**	-11.82**	-13.61**	-11.07**	-14.34**	6.90	4.03	0.00	-48.28**
34	LIMDI 9 x Guj.Til-4	-29.59**	-6.00	12.83**	-0.11	6.37	-1.84	-15.59*	-17.85*	-46.43**	-48.28**
35	LIMDI 9 x Guj.Til-10	-19.48**	38.50**	-10.40*	-29.80**	-0.84	-13.24**	-39.06**	16.64*	0.00	-48.28**
36	RSE 3 x Guj.Til-1	-33.79**	-4.00	-6.52	-12.43**	-11.51**	-9.56*	-39.39**	-30.60**	19.05**	-13.79**
37	RSE 3 x Guj.Til-2	-15.86**	22.00**	-10.43**	-9.75*	-16.73**	-17.65**	-1.02	4.16	-48.28**	-48.28**
38	RSE 3 x Guj.Til-3	-27.59**	5.00	8.97*	6.75	2.29	-1.47	-33.29**	-29.80**	0.00	-48.28**
39	RSE 3 x Guj.Til-4	-31.03**	0.00	16.49**	5.25	3.19	-4.78	0.26	5.50	-28.57**	-31.03**
40	RSE 3 x Guj.Til-10	-13.95**	48.00**	9.61*	-0.96	-2.03	-11.40**	-24.82**	43.89**	0.00	-48.28**
	Range	-52.91 To 50.67	-21.50 To 69.50	-27.74 To 27.79	-29.80 To 10.61	-20.46 To 8.37	-17.65 To 9.56	-45.86 To 64.88	-34.63 To 112.62	-48.28 To 19.05	-48.28 To -13.79
	Mean heterosis	-15.01	19.13	-5.42	-9.29	-4.83	-4.00	1.84	17.78	-23.01	-42.42
	SEM ±	1.070	1.070	0.116	0.116	0.036	0.036	3.777	3.777	0.065	0.065

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

Table 4.4. Per cent heterobeltiosis (H_1) and standard heterosis (H_2) for number of seeds per capsule, 1000-seed weight, seed yield per plant and oil content in sesame

Sr. No.	Crosses	Number of seeds per capsule		1000-seed weight (g)		Seed yield per plant (g)		Oil content (%)	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
1	AT 351 x Guj.Til-1	-5.93	1.64	0.74	5.62	-18.87**	-7.87	3.09	2.55
2	AT 351 x Guj.Til-2	-11.24*	-4.09	-4.30	-4.52	-3.61	-3.67	1.75	0.86
3	AT 351 x Guj.Til-3	-3.18	7.91	-1.85	5.40	10.39	9.37	-1.08	1.23
4	AT 351 x Guj.Til-4	-13.13**	-6.14	-7.32	-9.36*	-8.01	-10.39	-1.74	-0.55
5	AT 351 x Guj.Til-10	-4.42	3.27	-3.93	-2.97	-46.82**	-5.28	-6.45*	-6.81*
6	AT 355 x Guj.Til-1	13.17*	12.55*	-15.65**	-11.56**	-11.40	0.62	-10.68**	-11.16**
7	AT 355 x Guj.Til-2	17.46**	18.42**	13.02**	12.78**	7.45	7.37	-11.30**	-12.07**
8	AT 355 x Guj.Til-3	-19.34**	-10.10*	-0.72	6.61	14.75*	13.70*	-16.32**	-14.37**
9	AT 355 x Guj.Til-4	9.88	9.28	25.12**	17.40**	26.51**	23.24**	-10.40**	-9.31**
10	AT 355 x Guj.Til-10	15.23**	14.60**	-2.62	-1.65	-37.85**	10.69	-14.33**	-14.66**
11	TC 66 x Guj.Til-1	14.39**	26.88**	-0.30	10.57*	-19.62**	-8.72	2.47	1.93
12	TC 66 x Guj.Til-2	-2.58	8.05	-15.29**	-6.06	49.75**	49.66**	-1.95	-2.80
13	TC 66 x Guj.Til-3	3.30	15.14**	-1.99	8.70*	12.04	11.01	-0.91	1.40
14	TC 66 x Guj.Til-4	2.71	13.92**	13.11**	25.44**	-15.98*	-18.16**	-2.64	-1.46
15	TC 66 x Guj.Til-10	-1.48	9.28	-23.63**	-15.31**	-36.14**	13.73*	0.47	0.08
16	DPI 1484 x Guj.Til-1	-6.40	7.78	-26.17**	-18.28**	21.39**	37.86**	-11.56**	-12.03**
17	DPI 1484 x Guj.Til-2	-27.49**	-16.51**	-17.51**	-8.70*	55.00**	54.90**	-10.08**	-10.86**
18	DPI 1484 x Guj.Til-3	-17.54**	-5.05	-11.54**	-2.09	-16.14*	-16.91*	-3.65	-1.40
19	DPI 1484 x Guj.Til-4	-9.12*	4.64	-4.98	5.18	-5.62	-8.06	-1.22	-0.02
20	DPI 1484 x Guj.Til-10	2.01	17.46**	-5.27	4.85	-35.92**	14.13*	-7.07*	-7.42*

(Contd….)

Sr. No	Crosses	Number of seeds per capsule		1000-seed weight (g)		Seed yield per plant (g)		Oil content (%)	
		H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)	H_1 (%)	H_2 (%)
21	IC 96128 x Guj.Til-1	13.97**	12.41*	1.84	9.58*	-11.63*	0.36	-4.22	-4.73
22	IC 96128 x Guj.Til-2	12.04*	12.96*	5.83	13.88**	22.17**	22.09**	0.81	-0.07
23	IC 96128 x Guj.Til-3	11.38*	24.15**	-5.53	1.65	-6.05	-6.92	-7.17*	-5.01
24	IC 96128 x Guj.Til-4	26.83**	25.10**	1.43	9.14*	-16.86*	-19.01**	-1.28	-0.08
25	IC 96128 x Guj.Til-10	10.10	8.59	-1.02	6.50	-36.51**	13.08*	-2.39	-2.76
26	RT 33 x Guj.Til-1	-12.81**	1.23	5.54	11.23*	-34.81**	-25.96**	-0.72	0.11
27	RT 33 x Guj.Til-2	-2.47	13.23*	-10.66*	-5.84	-16.86**	-13.04*	-1.83	-1.02
28	RT 33 x Guj.Til-3	-7.52	7.37	-10.36*	-3.74	-10.03	-5.90	-3.75	-1.51
29	RT 33 x Guj.Til-4	0.47	16.64**	1.67	7.16	-23.79**	-20.29**	-0.63	0.57
30	RT 33 x Guj.Til-10	-14.92**	-1.23	11.08**	17.07**	-0.17	77.81**	-5.49	-4.71
31	LIMDI 9 x Guj.Til-1	7.76	11.73*	-2.63	10.13*	13.22*	28.58**	1.01	1.40
32	LIMDI 9 x Guj.Til-2	-0.53	3.14	-6.13	6.17	-8.17	-8.23	-1.54	-1.17
33	LIMDI 9 x Guj.Til-3	0.00	11.46*	7.98*	22.14**	-15.22*	-15.99*	-0.75	1.57
34	LIMDI 9 x Guj.Til-4	11.45*	15.55**	-14.41**	-3.19	-15.95*	-18.13**	-0.96	0.23
35	LIMDI 9 x Guj.Til-10	2.37	6.14	-2.34	10.46*	-41.52**	4.16	-1.99	-1.61
36	RSE 3 x Guj.Til-1	-0.59	15.28**	-10.71*	-6.39	-33.65**	-24.65**	-0.08	1.02
37	RSE 3 x Guj.Til-2	8.47	25.78**	7.68	11.12*	-9.48	-9.54	-2.16	-1.08
38	RSE 3 x Guj.Til-3	-1.41	14.32**	8.72*	16.74**	-13.70*	-14.49*	-2.34	-0.06
39	RSE 3 x Guj.Til-4	-12.71**	1.23	16.97**	20.70**	1.65	-0.98	0.57	1.78
40	RSE 3 x Guj.Til-10	-7.41	7.37	3.42	6.70	-32.63**	19.99**	-2.75	-1.68
	Range	-27.49 To 26.83	-16.51 To 26.88	-26.17 To 25.12	-18.28 To 25.44	-46.82 To 55.00	-25.96 To 77.81	-16.32 To 3.09	-14.66 To 2.55
	Mean heterosis	0.02	9.03	-2.07	4.58	-8.72	3.75	-3.53	-2.89
	SEM±	2.462	2.462	0.131	0.131	0.664	0.664	1.413	1.413

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

hybrid AT 355 x Guj.Til-4 exhibited the highest (25.12%) positive heterobeltiosis followed by RSE 3 x Guj.Til-4 (16.97%) and TC 66 x Guj.Til-4 (13.11%).

The standard heterosis for this trait ranged from -18.28 per cent (DPI 1484 x Guj.Til-1) to 25.44 per cent (TC 66 x Guj.Til-4). Out of 40 hybrids, 16 hybrids showed significant and positive heterosis over standard check. The hybrid TC 66 x Guj.Til-4 exhibited the highest (25.44%) significant and positive standard heterosis followed by LIMDI 9 x Guj.Til-3 (22.14%), RSE 3 x Guj.Til-4 (20.70%) and AT 355 x Guj.Til-4 (17.40%).

4.3.13 Seed yield per plant

In the present study, out of 40 hybrids, 7 hybrids showed significant and positive heterobeltiosis, while 12 hybrids exhibited significant and positive standard heterosis for seed yield per plant (Table 4.4).

The magnitude of heterobeltiosis varied from -46.82 per cent (AT 351 x Guj.Til-10) to 55.00 per cent (DPI 1484 x Guj.Til-2). The highest significant and positive heterobeltiosis was observed in the cross DPI 1484 x Guj.Til-2 (55.00%) followed by TC 66 x Guj.Til-2 (49.75%), AT 355 x Guj.Til-4 (26.51%) and IC 96128 x Guj.Til-2 (22.17%).

The spectrum of variation for standard heterosis ranged from -25.96 per cent (RT 33 x Guj.Til-1) to 77.81 per cent (RT 33 x Guj.Til-10). The hybrid RT 33 x Guj.Til-10 ranked first by expressing the highest (77.81%) standard heterosis followed by DPI 1484 x Guj.Til-2 (54.90%), TC 66 x Guj.Til-2 (49.66%) and DPI 1484 x Guj.Til-1 (37.86%).

4.3.14 Oil content

Estimates of heterosis over better parent for oil content revealed that none of the cross gave significant positive heterosis over their respective better parent as well as standard check (Table 4.4). The estimates of heterobeltiosis ranged from -16.32 per cent (AT 355 x Guj.Til-3) to 3.09 per cent (AT 351 x Guj.Til-1). The estimates of standard heterosis ranged from -14.66 per cent (AT 355 x Guj.Til-10) to 2.55 per cent (AT 351 x Guj.Til-1).

4.4 ANALYSIS OF VARIANCE FOR COMBINING ABILITY

The analysis of variance for combining ability for all the fourteen characters was carried-out according to the method suggested by Kempthorne (1957). The mean squares due to lines, testers and lines x testers were first tested against the error mean squares. If, lines x testers interaction component was significant, the mean squares

due to lines and testers were further tested against their respective interaction mean squares.

The results obtained from the present study in respect to analysis of variance for combining ability (Table 4.5) are presented as under: Partitioning of variances due to the crosses showed under investigation that the mean squares due to lines were significant for all the characters, while for testers were significant for all the characters except number of seeds per capsule and the mean squares for lines x testers interaction were also significant for all the characters except plant height and oil content.

The mean squares due to lines were found significant for five character *i.e.* days to maturity, height to first capsule, number of branches per plant, number of internodes per plant and width of capsule, when tested against mean square due to lines x testers interaction. Similarly the mean squares due to testers were also found significant for two characters *viz*., days to 50 per cent flowering and number of internode per plant, when tested against mean square due to lines x testers interaction.

The estimated variances due to lines (σ^2l) were higher than the corresponding variances due to testers (σ^2t) for all the characters except days to 50 per cent flowering, plant height, number of internode per plant, number of capsules per plant, number of capsules per leaf axil and seed yield per plant.

The estimates of σ^2gca were higher than the corresponding σ^2sca for plant height, number of internodes per plant and oil content. While in case of remaining characters *viz.*, days to 50 per cent flowering, days to maturity, height to first capsule, number of branches per plant, length of capsule, width of capsule, number of capsules per plant, number of capsules per leaf axil, number of seeds per capsule, 1000-seed weight and seed yield per plant, the magnitude of σ^2sca was higher than σ^2gca.

The ratio of σ^2gca/σ^2sca was less than unity for all the characters except plant height, number of internodes per plant and oil conent.

4.5 COMBINING ABILITY EFFECTS

4.5.1 General combining ability effects

The results on general combining ability effects of lines and testers are presented in Table 4.6, 4.7 and 4.8.

Table 4.5. Analysis of variance for combining ability and variance components for different characters in sesame

Source	d.f.	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Height to first capsule (cm)	Number of branches per plant	Number of internodes per plant	Length of capsule (cm)
Replications	2	1.633	7.233	65.320	2.188	0.013	0.140	0.019
Lines	7	12.608*	94.324**+	96.757**	334.508**++	4.517**++	67.749**++	0.491**
Testers	4	46.970**+	51.863*	1310.806**	19.544**	0.174*	112.239**++	0.259**
Lines x Testers	28	13.337**	35.910**	21.381	39.540**	0.878**	13.664**	0.289**
Error	78	4.752	18.131	31.698	1.629	0.054	1.719	0.020
Variance components								
σ^2l	-	0.524	5.079	4.337	22.192	0.298	4.402	0.031
σ^2t	-	1.759	1.405	53.296	0.746	0.005	4.605	0.010
σ^2lt	-	2.861	5.926	-3.439	12.637	0.275	3.982	0.089
σ^2gca	-	1.284	2.819	34.466	8.995	0.117	4.527	0.018
σ^2sca	-	2.861	5.926	-3.439	12.637	0.275	3.982	0.089
σ^2gca / σ^2sca	-	0.449	0.476	-10.022	0.712	0.428	1.137	0.203

Source	d.f.	Width of capsule (cm)	Number of capsules per plant	Number of capsules per leaf axil	Number of seeds per capsule	1000-seed weight (g)	Seed yield per plant (g)	Oil content (%)
Replications	2	0.008	3.490	0.005	12.497	0.053	0.762	2.915
Lines	7	0.029**++	364.389**	0.098**	119.382**	0.323**	9.560**	63.550**
Testers	4	0.009**	1722.636**	0.192**	13.055	0.235**	32.220**	11.033**
Lines x Testers	28	0.008**	665.481**	0.146**	59.896**	0.293**	15.192**	4.728
Error	78	0.002	21.400	0.006	9.094	0.026	0.661	2.994
Variance components								
σ^2l	-	0.0018	22.866	0.006	7.353	0.020	0.593	4.037
σ^2t	-	0.0003	70.885	0.008	0.165	0.009	1.315	0.335
σ^2lt	-	0.0019	214.694	0.047	16.934	0.089	4.844	0.578
σ^2gca	-	0.0009	52.416	0.007	2.929	0.013	1.037	1.759
σ^2sca	-	0.0019	214.694	0.047	16.934	0.089	4.844	0.578
σ^2gca / σ^2sca	-	0.4569	0.244	0.153	0.173	0.145	0.214	3.044

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

+,++ Significant at 5 per cent and 1 per cent levels of significance, respectively against lines x testers interaction.

4.5.1.1 Days to 50 per cent flowering

Early flowering is desirable in sesame. Estimates of gca effects revealed that only one parental line *i.e.* RT 33 (-1.492), and one tester *i.e.* Guj.Til-3 (-1.567) were good general combiners for days to 50 per cent flowering, as they exhibited significant and negative gca effects (Table 4.6). On the other hand, one lines *viz.,* RSE 3 (1.375) and one tester Guj.Til-1 (2.225) showed significant positive gca effects for days to 50 per cent flowering.

4.5.1.2 Days to maturity

Early maturity is desirable in sesame. Estimates of gca effects revealed that only two parental line *i.e.* DPI 1484 (-3.733) and LIMDI 9 (-2.200) and one tester *i.e.* Guj.Til-1 (-2.425) were good general combiners for days to maturity, as they exhibited significant and negative gca effects (Table 4.6). On the other hand, two line IC 96128 (3.667) and AT 355 (2.800) showed significant positive gca effects for days to maturity.

4.5.1.3 Plant height

Two testers Guj.Til-3 (-5.308) and Guj.Til-4 (-4.183) displayed significant and negative gca effects and were identified as the best general combiners for plant height (Table 4.6). On the other hand, none of the tester showed significant and negative gca effect for this character. However, one lines *viz.,* RT 33 (5.552) and one testers, Guj.Til-10 (12.917) showed significant positive gca effects for plant height.

4.5.1.4 Height to first capsule

Minimum height to first capsule is desirable in sesame. Estimates of gca effects revealed that three parental lines *viz.,* RSE 3 (-6.257), RT 33 (-2.803) and IC 96128 (-2.510) and one tester *i.e.* Guj.Til-4 (-1.420) exerted significant and negative gca effects and were considered as good general combiners for height to first capsule (Table 4.6). On the other hand, two lines, AT 351 (9.863) and TC 66 (1.837) and two testers, Guj.Til-1 (0.880) and Guj.Til-10 (0.597) exhibited significant and positive gca effects for height to first capsule.

4.5.1.5 Number of branches per plant

Two parental lines *viz.,* AT 355 (1.023) and TC 66 (0.597) and one tester Guj.Til-1 (0.098) were identified as good general combiners for number of branches per plant, as they displayed significant and positive gca effects (Table 4.6). Four lines *viz.,* AT 351 (-0.550), RSE 3 (-0.470), RT 33 (-0.377) and IC 96128 (-0.177) and one

Table 4.6. General combining ability effects for days to 50 per cent flowering, days to maturity, plant height, height to first capsule and number of branches per plant in sesame

Sr. No.	Parents	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Height to first capsule (cm)	Number of branches per plant
Lines						
1	AT 351	0.308	1.200	-1.275	9.863**	-0.550**
2	AT 355	0.175	2.800*	-0.208	0.730*	1.023**
3	TC 66	-1.092	-1.267	-1.102	1.837**	0.597**
4	DPI 1484	0.175	-3.733**	-2.715	0.357	0.037
5	IC 96128	0.642	3.667**	1.165	-2.510**	-0.177**
6	RT 33	-1.492**	-0.867	5.552**	-2.803**	-0.377**
7	LIMDI 9	-0.092	-2.200*	0.218	-1.217	-0.083
8	RSE 3	1.375*	0.400	-1.635	-6.257**	-0.470**
	SE(g_i)	0.563	1.099	1.454	0.330	0.060
	SE(g_i-g_j)	0.796	1.555	2.056	0.466	0.085
Testers						
1	Guj.Til-1	2.225**	-2.425**	-1.917	0.880**	0.098*
2	Guj.Til-2	-0.650	-0.300	-1.508	-0.262	-0.018
3	Guj.Til-3	-1.567**	1.200	-5.308**	0.205	-0.118*
4	Guj.Til-4	-0.025	0.575	-4.183**	-1.420**	0.065
5	Guj.Til-10	0.017	0.950	12.917**	0.597*	-0.027
	SE(g_j)	0.445	0.869	1.149	0.261	0.047
	SE(g_i-g_j)	0.629	1.229	1.625	0.368	0.067

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

tester *viz.*, Guj.Til-3 (-0.118) showed significant and negative gca effects for number of branches per plant.

4.5.1.6 Number of internodes per plant

Three parental lines *viz.*, DPI 1484 (3.263), IC 96128 (1.210) and AT 355 (0.943) and one tester Guj.Til-10 (3.300) displayed significant and positive gca effects and hence were identified as good general combiners for number of internodes per plant (Table 4.7). In contrast, one line and two testers showed significant and negative gca effects for number of internodes per plant.

4.5.1.7 Length of capsule

Estimates of gca effects revealed that three parental lines *viz.*, RSE 3 (0.220), IC 96128 (0.156) and TC 66 (0.142) as well as one tester, Guj.Til-3 (0.154) were identified as good general combiners for length of capsule (Table 4.7). On the other hand, three parental lines and one tester exhibited significant and negative gca effects for length of capsule.

4.5.1.8 Width of capsule

Estimates of gca effects indicated that three parental lines *i.e.* IC 96128 (0.062), DPI 1484 (0.052) and TC 66 (0.024) and one tester, Guj.Til-4 (0.028) were found to be good general combiners for width of capsule, as they exerted significant and positive gca effects (Table 4.7). On the other hand, two parental line and one tester exhibited significant and negative gca effects which were poor general combiners for width of capsule.

5.1.9 Number of capsules per plant

Three parental lines *viz.*, DPI 1484 (5.755), IC 96128 (4.462) and AT 355 (3.715) and two testers, Guj.Til-10 (10.193) and Guj.Til-2 (7.577) were good general combiners for number of capsules per plant, as they displayed significant and positive gca effects (Table 4.7). On the other hand, two parental lines and three testers exhibited significant and negative gca effects, which were poor general combiners for number of capsules per plant.

4.5.1.10 Number of capsules per leaf axil

Among the lines, three lines *viz.*, LIMDI 9 (0.087), RSE 3 (0.087) and AT 351 (0.060) had significant and positive gca effects were considered as good general combiners for number of capsules per leaf axil (Table 4.7). Two testers Guj.Til-2 (0.095) and Guj.Til-1 (0.087) were also found to be good general combiners for number of capsules per leaf axil, as it displayed significant and positive gca effects for

Table 4.7. General combining ability effects for number of internodes per plant, length of capsule, width of capsule, number of capsules per plant and number of capsules per leaf axil in sesame

Sr. No.	Parents	Number of internodes per plant	Length of capsule (cm)	Width of capsule (cm)	Number of capsules per plant	Number of capsules per leaf axil
Lines						
1	AT 351	-4.217**	-0.191**	-0.016	-1.565	0.060**
2	AT 355	0.943**	-0.286**	-0.019	3.715**	0.007
3	TC 66	0.063	0.142**	0.024*	1.115	-0.033
4	DPI 1484	3.263**	0.084	0.052**	5.755**	-0.113**
5	IC 96128	1.210**	0.156**	0.062**	4.462**	-0.113**
6	RT 33	-0.630	-0.020	0.003	-1.218	0.020
7	LIMDI 9	0.023	-0.102**	-0.060**	-2.752*	0.087**
8	RSE 3	-0.657	0.220**	-0.045**	-9.512**	0.087**
	SE(g_i)	0.339	0.037	0.011	1.194	0.021
	SE(g_i-g_j)	0.479	0.052	0.016	1.689	0.029
Testers						
1	Guj.Til-1	-0.992**	0.009	0.000	-3.265**	0.087**
2	Guj.Til-2	0.483	-0.134**	-0.022**	7.577**	0.095**
3	Guj.Til-3	-0.233	0.154**	0.008	-5.023**	-0.113**
4	Guj.Til-4	-2.558**	0.009	0.028**	-9.482**	-0.047**
5	Guj.Til-10	3.300**	-0.038	-0.015	10.193**	-0.022
	SE(g_j)	0.268	0.029	0.009	0.944	0.016
	SE(g_i-g_j)	0.379	0.041	0.013	1.335	0.023

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

this character. Two lines and two testers showed significant and negative gca effects, which were poor general combiners for number of capsules per leaf axil.

4.5.1.11 Number of seeds per capsule

Estimates of gca effects revealed that three lines *viz.,* IC 96128 (3.718), TC 66 (2.745) and RSE 3 (1.838) exhibited significant and positive gca effects and were considered as good general combiners for number of seeds per capsule (Table 4.8). On the other hand, two lines showed significant and negative gca effects which were poor general combiners for number of seeds per capsule.

4.5.1.12 1000-seed weight

Three lines *i.e.* RSE 3 (0.157), LIMDI 9 (0.138) and IC 96128 (0.108) were considered as good general combiners for 1000-seed weight (Table 4.8). Two testers Guj.Til-4 (0.136) and Guj.Til-3 (0.071) were also found to be good general combiners for 1000-seed weight, as they displayed significant and positive gca effects for this character. On the other hand, two lines and two testers showed significant and negative gca effects, which were poor general combiners for 1000-seed weight.

4.5.1.13 Seed yield per plant

The data presented in Table 4.8 revealed that three parental lines *viz.,* DPI 1484 (1.284), AT 355 (0.750) and TC 66 (0.585) and two testers Guj.Til-10 (1.504) and Guj.Til-2 (0.884) exhibited significant and positive gca effects and hence they were considered as good general combiners for seed yield per plant (Table 4.8).

4.5.1.14 Oil content

Four lines LIMDI 9 (1.403), RSE 3 (1.361), TC 66 (1.283) and AT 351 (1.107) and one tester Guj.Til-4 (0.842) showed significant and positive gca effects (Table 4.8). On the other hand, two lines AT 355 (-4.441) and DPI 1484 (-1.629) and one tester Guj.Til-10 (-0.968) showed significant and negative gca effects for oil content and hence, these parents were considered as poor general combiners.

4.5.2 Specific combining ability effects

The results obtained on the specific combining ability effects of the crosses for different characters have been presented in Table 4.9 and 4.10.

4.5.2.1 Days to 50 per cent flowering

Only one cross AT 351 x Guj.Til-10 (-4.350) showed significant sca effect in desirable direction (Table 4.9). Three crosses *viz.,* AT 355 x Guj.Til-3, LIMDI 9 x Guj.Til-10 and IC 96128 x Guj.Til-4 registered positive and significant sca effects.

Table 4.8. General combining ability effects for number of seeds per capsule, 1000-seed weight, seed yield per plant and oil content in sesame

Sr. No.	Parents	Number of seeds per capsule	1000-seed weight (g)	Seed yield per plant (g)	Oil content (%)
Lines					
1	AT 351	-4.162**	-0.174**	-0.745**	1.107*
2	AT 355	-0.042	0.004	0.750**	-4.441**
3	TC 66	2.745**	0.003	0.585**	1.283**
4	DPI 1484	-3.602**	-0.254**	1.284**	-1.629**
5	IC 96128	3.718**	0.108**	-0.186	0.171
6	RT 33	-0.775	0.018	-0.125	0.745
7	LIMDI 9	0.278	0.138**	-0.577**	1.403**
8	RSE 3	1.838*	0.157**	-0.985**	1.361**
	SE(g_i)	0.779	0.042	0.210	0.447
	SE(g_i-g_j)	1.101	0.059	0.297	0.632
Testers					
1	Guj.Til-1	1.052	-0.097**	-0.379*	0.131
2	Guj.Til-2	-0.690	-0.067*	0.884**	-0.299
3	Guj.Til-3	-0.432	0.071*	-0.714**	0.294
4	Guj.Til-4	0.485	0.136**	-1.294**	0.842*
5	Guj.Til-10	-0.415	-0.042	1.504**	-0.968**
	SE(g_j)	0.616	0.033	0.166	0.353
	SE(g_i-g_j)	0.871	0.046	0.235	0.500

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

4.5.2.2 Days to maturity

Out of 40 crosses, only 3 crosses showed significant sca effects in desirable direction (Table 4.9). The highest negative sca effect was exhibited by the cross RSE 3 x Guj.Til-3 (-6.067) followed by LIMDI 9 x Guj.Til-4 (-5.842), and AT 355 x Guj.Til-1 (-5.175). Two crosses registered significant and positive sca effects for this character. Out of these, the highest positive sca effect was exhibited by the cross AT 355 x Guj.Til-4 (6.158) followed by RSE 3 x Guj.Til-2 (5.100).

4.5.2.3 Plant height

Estimates of sca effects indicated that none of the cross showed significant and negative sca effect for plant height (Table 4.9). Only one hybrid DPI 1484 x Guj. Til-10 (6.723) exhibited significant positive sca effect for plant height.

4.5.2.4 Height to first capsule

Twelve crosses showed significant sca effect in desirable direction (Table 4.9). Out of these, the highest negative effect was exhibited by the cross AT 351 x Guj.Til-10 (-7.930) followed by LIMDI 9 x Guj.Til-10 (-4.917), AT 355 x Guj.Til-4 (-3.180) and TC 66 x Guj.Til-3 (-3.112). Eleven crosses registered significant and positive sca effects for this character.

4.5.2.5 Number of branches per plant

Estimates of sca effects indicated that total thirteen crosses displayed significant and positive sca effects for number of branches per plant (Table 4.9). The maximum sca effect was displayed by the cross DPI 1484 x Guj.Til-1 (0.888) followed by TC 66 x Guj.Til-2 (0.845), RSE 3 x Guj.Til-10 (0.787) and DPI 1484 x Guj.Til-2 (0.672). Thirteen hybrids exhibited significant and negative sca effects for number of branches per plant. The cross DPI 1484 x Guj.Til-10 (-0.853) showed the highest negative significant sca effect for this character followed by DPI 1484 x Guj.Til-4 (-0.812), AT 351 x Guj.Til-2 (-0.808) and TC 66 x Guj.Til-4 (-0.572).

4.5.2.6 Number of internodes per plant

Estimates of sca effects identified eight crosses as good specific combiners as they showed significant and positive sca effects for number of internodes per plant (Table 4.9). The maximum sca effect was displayed by the cross DPI 1484 x Guj.Til-1 (4.445) followed by AT 351 x Guj.Til-3 (3.700), AT 355 x Guj.Til-4 (2.465), AT 351 x Guj.Til-4 (2.358) and RT 33 x Guj.Til-10 (2.313). Seven hybrids exhibited significant and negative sca effects for number of internodes per plant. The cross, AT 351 x Guj.Til-10 (-4.167) showed the highest negative sca effect for this

Table 4.9. Specific combining ability effects for days to 50 per cent flowering, days to maturity, plant height, height to first capsule, number of branches per plant, number of internodes per plant and length of capsule in sesame

Sr. No.	Crosses	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Height to first capsule (cm)	Number of branches per plant	Number of internodes per plant	Length of capsule (cm)
1	AT 351 x Guj.Til-1	2.108	0.425	2.517	0.520	-0.325*	-0.208	0.077
2	AT 351 x Guj.Til-2	2.317	0.633	3.108	4.395**	-0.808**	-1.683*	-0.046
3	AT 351 x Guj.Til-3	-0.100	-0.200	-0.492	-2.872**	0.025	3.700**	0.213*
4	AT 351 x Guj.Til-4	0.025	2.425	-1.217	5.887**	0.642**	2.358**	0.022
5	AT 351 x Guj.Til-10	-4.350**	-3.283	-3.917	-7.930**	0.467**	-4.167**	-0.266**
6	AT 355 x Guj.Til-1	-1.758	-5.175*	-1.483	3.453**	0.035	-3.035**	-0.094
7	AT 355 x Guj.Til-2	-1.550	-3.300	-1.225	-2.405**	0.018	1.823*	0.116
8	AT 355 x Guj.Til-3	4.033**	2.200	1.175	3.528**	0.185	-2.393**	-0.205*
9	AT 355 x Guj.Til-4	-2.175	6.158*	1.717	-3.180**	0.268*	2.465**	0.124
10	AT 355 x Guj.Til-10	1.450	0.117	-0.183	-1.397	-0.507**	1.140	0.060
11	TC 66 x Guj.Til-1	1.175	-2.775	-0.59	-2.120**	-0.005	-0.622	0.081
12	TC 66 x Guj.Til-2	1.717	-1.233	0.535	0.422	0.845**	0.370	0.328**
13	TC 66 x Guj.Til-3	-1.033	-0.067	-2.132	-3.112**	0.078	0.687	-0.207*
14	TC 66 x Guj.Til-4	-1.908	0.892	-1.590	-1.553*	-0.572**	-1.988*	-0.305**
15	TC 66 x Guj.Til-10	0.050	3.183	3.777	6.363**	-0.347*	1.553*	0.102
16	DPI 1484 x Guj.Til-1	1.908	-1.642	-1.643	0.160	0.888**	4.445**	0.389**
17	DPI 1484 x Guj.Til-2	-0.883	-1.100	-1.785	0.235	0.672**	-0.363	-0.027
18	DPI 1484 x Guj.Til-3	-0.633	1.067	-1.252	-2.632**	0.105	-0.713	-0.512**
19	DPI 1484 x Guj.Til-4	1.158	-0.975	-2.043	-1.340	-0.812**	-1.122	-0.157
20	DPI 1484 x Guj.Til-10	-1.550	2.650	6.723*	3.577**	-0.853**	-2.247**	0.306**

(*Contd…*)

Sr. No.	Crosses	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Height to first capsule (cm)	Number of branches per plant	Number of internodes per plant	Length of capsule (cm)
21	IC 96128 x Guj.Til-1	-1.225	1.625	0.877	-1.307	-0.232	1.498	0.327**
22	IC 96128 x Guj.Til-2	-1.683	-0.167	-1.998	-0.765	0.285*	-0.110	-0.226**
23	IC 96128 x Guj.Til-3	-1.100	-3.667	0.202	2.302**	-0.415**	-1.060	0.286**
24	IC 96128 x Guj.Til-4	3.358**	0.625	2.677	2.127**	0.068	-1.268	-0.295**
25	IC 96128 x Guj.Til-10	0.650	1.583	-1.757	-2.357**	0.293*	0.940	-0.092
26	RT 33 x Guj.Til-1	0.908	3.825	1.223	-1.280	-0.432**	-2.462**	-0.490**
27	RT 33 x Guj.Til-2	1.450	-0.633	1.215	-2.738**	-0.448**	0.263	-0.313**
28	RT 33 x Guj.Til-3	0.367	2.200	1.815	-1.338	-0.082	0.180	0.485**
29	RT 33 x Guj.Til-4	-2.175	-3.508	1.623	-1.313	0.402**	-0.295	0.008
30	RT 33 x Guj.Til-10	-0.550	-1.883	-5.877	6.670**	0.560**	2.313**	0.310**
31	LIMDI 9 x Guj.Til-1	-1.825	4.158	-1.51	2.467**	0.275*	1.818*	0.035
32	LIMDI 9 x Guj.Til-2	-1.283	0.700	-0.585	-0.458	-0.208	-0.857	0.269**
33	LIMDI 9 x Guj.Til-3	-1.367	4.533	0.615	3.342**	0.425**	0.593	-0.186*
34	LIMDI 9 x Guj.Til-4	0.758	-5.842*	-1.710	-0.433	-0.092	-0.815	0.380**
35	LIMDI 9 x Guj.Til-10	3.717**	-3.550	3.190	-4.917**	-0.400**	-0.740	-0.498**
36	RSE 3 x Guj.Til-1	-1.292	-0.442	0.610	-1.893*	-0.205	-1.435	-0.327**
37	RSE 3 x Guj.Til-2	-0.083	5.100*	0.735	1.315	-0.355**	0.557	-0.100
38	RSE 3 x Guj.Til-3	-0.167	-6.067*	0.068	0.782	-0.322*	-0.993	0.125
39	RSE 3 x Guj.Til-4	0.958	0.225	0.543	-0.193	0.095	0.665	0.224**
40	RSE 3 x Guj.Til-10	0.583	1.183	-1.957	-0.010	0.787**	1.207	0.077
	SE (S_{ij})	1.259	2.458	3.251	0.737	0.134	0.757	0.082
	SE(S_{ij}-S_{kl})	1.780	3.477	4.597	1.042	0.189	1.070	0.116

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

character followed by RT 33 x Guj.Til-1 (-2.462), AT 355 x Guj.Til-3 (-2.393) and DPI 1484 x Guj.Til-10 (-2.247).

4.5.2.7 Length of capsule

Eleven crosses showed significant and positive sca effects for length of capsule (Table 4.9). The highest significant and positive sca effect was exhibited by the cross RT 33 x Guj.Til-3 (0.485) followed by DPI 1484 x Guj.Til-1 (0.389), LIMDI 9 x Guj.Til-4 (0.380) and TC 66 x Guj.Til-2 (0.328). Twelve crosses registered negative and significant sca effects for this character.

4.5.2.8 Width of capsule

Out of 40 crosses, seven crosses showed significant and positive sca effect for width of capsule (Table 4.10). Out of these, the maximum significant and positive sca effect was exhibited by the cross IC 96128 x Guj.Til-10 (0.073) followed by TC 66 x Guj.Til-2 (0.065) and RSE 3 x Guj.Til-3 (0.060). Five crosses registered negative and significant sca effects for this character.

4.5.2.9 Number of capsules per plant

Thirteen crosses were identified as good specific combiners based on significant and positive sca effects for number of capsules per plant (Table 4.10). The highest significant and positive sca effect was exhibited by the cross RT 33 x Guj. Til-10 (38.127) followed by DPI 1484 x Guj.Til-1 (20.278) and LIMDI 9 x Guj.Til-1 (18.385). On the other hand, eighteen crosses showed significant and negative sca effects for this character.

4.5.2.10 Number of capsules per leaf axil

Estimates of sca effects indicated that total ten crosses showed significant and positive sca effects for number of capsules per leaf axil (Table 4.10). Out of these, maximum sca effect was displayed by the cross AT 355 x Guj.Til-10 (0.502) followed by RT 33 x Guj.Til-2 (0.438), RSE 3 x Guj.Til-1 (0.380), AT 351 x Guj.Til-2 (0.265) and LIMDI 9 x Guj.Til-1 (0.247). On the other hand, twelve crosses showed significant and negative sca effects for this character.

4.5.2.11 Number of seeds per capsule

Out of 40 crosses, nine crosses showed significant and positive sca effects for number of seeds per capsule (Table 4.10). The highest significant and positive sca effect was exhibited by the cross DPI 1484 x Guj.Til-10 (8.135) followed by RSE 3 x

Table 4.10. Specific combining ability effects for number of capsules per plant, number of capsules per leaf axil, number of seeds per capsule, 1000-seed weight, width of capsule, seed yield per plant and oil content in sesame

Sr. No.	Crosses	Width of capsule (cm)	Number of capsules per plant	Number of capsules per leaf axil	Number of seeds per capsule	1000-seed weight (g)	Seed yield per plant (g)	Oil content (%)
1	AT 351 x Guj.Til-1	0.056*	7.065**	-0.260**	-0.505	0.303**	-0.058	1.326
2	AT 351 x Guj.Til-2	-0.032	-7.177**	0.265**	-1.563	-0.034	-0.894	0.962
3	AT 351 x Guj.Til-3	-0.009	0.690	-0.060	4.045*	0.128	2.030**	0.543
4	AT 351 x Guj.Til-4	0.008	15.082**	0.073	-3.738*	-0.384**	0.600	-0.845
5	AT 351 x Guj.Til-10	-0.023	-15.660**	-0.018	1.762	-0.013	-1.678**	-1.985*
6	AT 355 x Guj.Til-1	-0.005	-7.948**	-0.207**	0.708	-0.395**	-0.689	0.414
7	AT 355 x Guj.Til-2	0.014	-5.457*	-0.215**	5.317**	0.311**	-1.265**	0.413
8	AT 355 x Guj.Til-3	-0.023	5.743*	-0.007	-8.875**	-0.014	0.976*	-1.263
9	AT 355 x Guj.Til-4	0.027	15.868**	-0.073	-0.325	0.249**	2.526**	0.573
10	AT 355 x Guj.Til-10	-0.013	-8.207**	0.502**	3.175	-0.151	-1.548**	-0.137
11	TC 66 x Guj.Til-1	-0.021	-2.815	0.233**	4.922**	0.276**	-1.474**	0.859
12	TC 66 x Guj.Til-2	0.065*	17.010**	-0.175**	-2.537	-0.257**	3.200**	-0.941
13	TC 66 x Guj.Til-3	-0.022	10.010**	0.033	0.672	0.051	0.867	0.446
14	TC 66 x Guj.Til-4	-0.056*	-17.665**	-0.033	-0.845	0.493**	-1.519**	-1.452
15	TC 66 x Guj.Til-10	0.034	-6.540*	-0.058	-2.212	-0.563**	-1.074*	1.088
16	DPI 1484 x Guj.Til-1	-0.030	20.278**	-0.087	1.935	-0.341**	2.563**	-2.809**
17	DPI 1484 x Guj.Til-2	0.019	17.037**	-0.095*	-8.190**	-0.081	3.034**	-1.829
18	DPI 1484 x Guj.Til-3	0.046	-13.763**	0.113*	-2.848	-0.019	-2.672**	2.038
19	DPI 1484 x Guj.Til-4	0.009	-13.572**	0.047	0.968	0.137	-1.192*	2.140**
20	DPI 1484 x Guj.Til-10	-0.045	-9.980**	0.022	8.135**	0.304**	-1.733**	0.460

(*Contd…*)

Sr. No.	Crosses	Width of capsule (cm)	Number of capsules per plant	Number of capsules per leaf axil	Number of seeds per capsule	1000-seed weight (g)	Seed yield per plant (g)	Oil content (%)
21	IC 96128 x Guj.Til-1	0.051*	-2.495	-0.087	-3.118	0.141	0.220	-1.168
22	IC 96128 x Guj.Til-2	-0.107**	4.463	-0.095*	-1.110	0.241*	1.168*	1.458
23	IC 96128 x Guj.Til-3	0.053*	6.397*	0.113*	4.098*	-0.268**	-0.185	-1.461
24	IC 96128 x Guj.Til-4	-0.070**	-6.345*	0.047	3.648*	-0.106	-0.834	0.311
25	IC 96128 x Guj.Til-10	0.073**	-2.020	0.022	-3.518*	-0.008	-0.369	0.861
26	RT 33 x Guj.Til-1	0.003	-21.215**	-0.220**	-4.092*	0.281**	-2.518**	0.537
27	RT 33 x Guj.Til-2	0.049	-15.190**	0.438**	3.517*	-0.266**	-2.467**	0.437
28	RT 33 x Guj.Til-3	-0.065*	-0.923	-0.020	0.392	-0.341**	-0.143	-0.386
29	RT 33 x Guj.Til-4	0.022	-0.798	-0.087	4.008*	-0.076	-1.026*	0.046
30	RT 33 x Guj.Til-10	-0.009	38.127**	-0.112*	-3.825*	0.402**	6.153**	-0.634
31	LIMDI 9 x Guj.Til-1	-0.048	18.385**	0.247**	-0.012	0.127	3.481**	0.489
32	LIMDI 9 x Guj.Til-2	0.048	-5.857*	0.172**	-2.470	-0.023	-1.525**	-0.291
33	LIMDI 9 x Guj.Til-3	-0.042	0.943	-0.087	1.338	0.322**	-0.717	0.406
34	LIMDI 9 x Guj.Til-4	0.051*	-5.465*	-0.153**	2.422	-0.509**	-0.354	-0.772
35	LIMDI 9 x Guj.Til-10	-0.009	-8.007**	-0.178**	-1.278	0.082	-0.885	0.168
36	RSE 3 x Guj.Til-1	-0.006	-11.255**	0.380**	0.162	-0.392**	-1.524**	0.351
37	RSE 3 x Guj.Til-2	-0.057*	-4.830	-0.295**	7.037**	0.108	-1.250**	-0.209
38	RSE 3 x Guj.Til-3	0.060*	-9.097**	-0.087	1.178	0.140	-0.156	-0.322
39	RSE 3 x Guj.Til-4	0.010	12.895**	0.180**	-6.138**	0.195*	1.798**	0.000
40	RSE 3 x Guj.Til-10	-0.007	12.287**	-0.178**	-2.238	-0.051	1.133*	0.180
	SE (Sij)	0.025	2.671	0.046	1.741	0.093	0.470	0.999
	SE(Sij-Skl)	0.036	3.777	0.065	2.462	0.131	0.664	1.413

*, ** Significant at 5 per cent and 1 per cent levels of significance, respectively.

Guj.Til-2 (7.037), AT 355 x Guj.Til-2 (5.317) and TC 66 x Guj.Til-1 (4.922). Seven crosses registered significant and negative sca effects for this character.

4.5.2.12 1000-seed weight

Estimates of sca effects indicated that total eleven crosses showed positive and significant sca effect for 1000-seed weight (Table 4.10). The maximum sca effect was displayed by the cross TC 66 x Guj.Til-4 (0.493) followed by RT 33 x Guj.Til-10 (0.402), LIMDI 9 x Guj.Til-3 (0.322), AT 355 x Guj.Til-2 (0.311) and DPI 1484 x Guj.Til-10 (0.304). On the other hand, ten crosses showed significant and negative effects for this crosses.

4.5.2.13 Seed yield per plant

Out of 40 crosses, eleven crosses were identified as good specific combiners, as they showed significant and positive sca effects for seed yield per plant (Table 4.10). The highest significant and positive sca effect was exhibited by the cross RT 33 x Guj.Til-10 (6.153) followed by LIMDI 9 x Guj.Til-1 (3.481), TC 66 x Guj.Til-2 (3.200), DPI 1484 x Guj.Til-2 (3.034), DPI 1484 x Guj.Til-1 (2.563) and AT 355 x Guj.Til-4 (2.526). On the other hand, fifteen crosses showed significant and negative sca effects for seed yield per plant.

4.5.2.14 Oil content

The data on sca effects revealed that out of 40 crosses, only one cross DPI 1484 x Guj.Til-4 (2.140) expressed significant and positive sca effect for oil content (Table 4.10). On the other hand, two crosses showed significant and negative sca effects for this trait.