

HETEROSIS STUDIES FOR YIELD AND ITS COMPONENTS TRAITS IN SESAME [*Sesamum indicum* L.]

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ABSTRACT

The present investigation on sesame comprised of a half-diallel set of eight parents and their 28 crosses. The experiment was laid out in randomized block design with three replications at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during late kharif 2014-15. The observations were recorded on days to flowering and days to maturity, plant height (cm), number of branches per plant, number of capsules per plant, capsule length (cm), seed yield per plant (g), 1000 seed weight (g), harvest index (%) and oil content (%) on randomly selected five competitive individual plants. The data were subjected to estimation of heterosis. Analysis of variance revealed significant differences among the genotypes, hybrids and parents for all the traits except harvest index for parent studied. Several crosses exhibited significantly desirable heterobeltiosis and economic heterosis for seed yield per plant and other characters. On the basis of per se performance and estimates of heterobeltiosis, the crosses ASRT10 x AT 324 (41.88%) and ASRT10 x Patan 64 (41.88 %) were found to be most promising for seed yield per plant, hence could be evaluated further to exploit the heterosis or utilized in future breeding programme to obtain desirable segregants for the development of superior genotypes.

KEY WORDS: Heterosis, heterobeltiosis, standard heterosis, sesame

INTRODUCTION

Sesame (*Sesamum indicum* L.), commonly known as gingelly, til, benniseed, simsim, is a member of the order *Tubiflorae* and family *Pedaliaceae*. It is probably the most ancient oilseed known and used by man and its domestication is lost in the mists of antiquity. Although originated in sub-saharan Africa, it spread early through West Asia to India, China and Japan, which themselves became secondary distribution centers (Weiss, 1983). In Gujarat sesamum cultivation

is concentrated mostly in Rajkot, Amreli, Bhavnagar, Bhuj, Jamnagar, Junagarh. and Surendranagar districts. Sesame is a short-day plant and is normally self-pollinated, although cross pollination ranging from 5 to 50 per cent occurs through the insect (Flies, butterflies, wasps, honeybee) (Pathirana, 1994), so it can also be kept under often cross pollinated group. It is an erect herbaceous annual plant that has two growth characteristics indeterminate and determinate, with the plants reaching height of up to two

meters. Most of the varieties show an indeterminate growth habit, which is shown as a continuous production of new leaves, flowers and capsules as long as the environment remains suitable for growth (Carlsson *et al.*, 2008). The growth period range from 70 to 150 days depending on the variety and the conditions of cultivation and it thrives best on well-drained soil with a moderate fertility and a pH between 5.5 and 7.0. Sesame is highly drought tolerant, and it can adapt and produce seed well under fairly high temperatures (Ashri, 1998). It is called as the “Queen of oil seeds” because of its excellent qualities of the seed, oil and meal. Sesame is highly nutritive (oil 50%, protein 25%) and its oil contains an antioxidant called sesamol which imparts a high degree of resistance against oxidative rancidity. Sesame cake is nutritious feed for dairy cattle and it can also be used as fertilizer (Ashri, 1989). Brown or black seeded are valued more for oil (for medicinal purpose) extraction, whereas white seeded are rich in iron. Sesame seeds are digestive, rejuvenative, anti-aging and rich in vitamins E, A and B complex and minerals like calcium, phosphorus, iron, copper, magnesium, zinc and potassium. This unique composition coupled with high-unsaturated fatty acids (linolenic and tocopherol) make the sesame nearly perfect food (Lokesha and Theertha, 2006). Possibly for this reason, sesame oil is widely considered to prevent diseases of different kinds. Beside food, sesame also finds its uses in application areas such as pharmaceuticals, industrial and as biofuel. India ranks second in area (18.62 lakh ha) and production (8.13 lakh tones) among the sesame growing countries (FAOSTAT, 2013). Gujarat secured first place in area having 3.55 lakh ha with production of 1.43 lakh

tonnes (Anonymous, 2013). However, the productivity is low in India (413.6 kg/ha) as compared to world's average (464.6 kg/ha) and it is far below as compared to Egypt (1200 kg/ha) being the highest and China (897.7 kg/ha) (FAOSTAT, 2013).

High levels of morphological genetic diversity do exist in sesame (Arriel *et al.*, 2007) but this has not been fully harnessed for genetic improvement of the existing cultivars through heterosis breeding. Heterosis for seed yield is due to simultaneous manifestation of allelic and inter-allelic interactions of innumerable number of genes controlling important morpho-economic component traits under certain environmental conditions. Hybrid vigour of even a small magnitude for individual components may have an additive or synergistic effect on the end product (Sasikumar and Sardana, 1990). Thus, extent of heterotic response of F_1 hybrids largely depends on the breeding value and genetic diversity of the parents involved in the crosses (Young and Virmani, 1990). Heterosis over better parent (heterobeltiosis) is relatively more important than relative heterosis for commercial exploitation of hybrids. Heterobeltiosis for seed yield and yield components in sesame has been reported by many workers (Prajapati *et al.*, 2010, Padmasundari and Kamala, 2012). Besides, heterotic crosses may be amenable for selection of high yielding transgressive segregants in F_2 and follow up selfing generations. Therefore, in the present investigation, an attempt has been taken to identify most desirable heterotic combination(s) in sesame following half diallel mating design.

MATERIALS AND METHODS

The present investigation entitled “Heterosis studies for yield and its components traits in sesame

(*Sesamum indicum* L.)” was carried out at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during late *kharif* 2014-15. The experimental material for present investigation consisted of 8 parents viz., AT- 242, AT-164, AT-324, AT-235, Patan 64, Vijapadi selection, ASRT-9 and ASRT-10 obtained from Main Oilseeds Research Station, Junagadh Agricultural University, Amreli. All the eight sesame genotypes were crossed in every possible combination (excluding reciprocals) and thus obtained total 28 hybrids along with two standard checks viz., AT-324 (SC1) and Patan-64 (SC2) were evaluated. The experiment was laid out in a Randomized Block Design with three replications. Each entry was planted in a single row consisting of 20 plants in each row with a spacing 45 x 15 cm. The standard agronomical practices were followed to raise the good experimental crop. Five competitive plants were randomly selected and tagged excluding border plants to minimize border effects. Observations were recorded for 10 different characters viz., days to 50 per cent flowering, plant height (cm), number of branches per plant, number of capsules per plant, capsule length (cm), days to maturity, 100 seed weight (g), seed yield per plant (g), harvest index (%) and oil content (%). The analysis of variance for randomized block design (RBD) was carried out as per the procedure outlined by Panse and Sukhatme (1985). Heterosis expressed as per cent, increase or decrease in the value of F_1 over better parent (Heterobeltiosis) and standard check (Standard heterosis) was calculated for various characters using standard formula.

RESULTS AND DISCUSSION

Analysis of variance was performed to test the difference among parents and hybrids for all the ten characters studied and are presented in Table 1. The results revealed that the mean squares due to genotypes were highly significant for all the characters. This indicated that sufficient amount of genetic variability was present in the experimental material for all the characters under study. The mean squares due to genotypes were further partitioned into parents, hybrids and parents vs. hybrids for all the traits. The hybrids differed significantly for all the characters. This indicated the existence of considerable genetic variability among the hybrids for all characters. The parents differed significantly for all the characters except harvest index under study, indicated sufficient amount of genetic variability among the parents. Similar results were reported earlier by Kumar *et al.* (2006) and Gawade *et al.* (2007). Mean squares due to parents vs. hybrids were also significant for days to maturity, number of branches per plant, harvest index and oil content suggesting sufficient amount of differences for these traits.

The aim of estimation of heterosis in the present study was to find out the superior combinations of parents giving the high degree of useful heterosis for yield and its contributing characters and for its future use in breeding programme. The magnitude of heterosis was measured as per cent increase or decrease of F_1 value over better parent (heterobeltiosis) and over standard checks, Patan 64 and AT 324 for all 10 characters. The character wise results of heterosis over better parent (BP) and over standard check are presented in Table 2. The results revealed that the majority of hybrids for most of the

traits viz., seed yield per plant, number of branches per plant, number of capsules per plant, harvest index, 1000-seed weight and oil content exhibited positive significant relative heterosis, thereby indicating that for these traits the genes with positive effects were dominant. While for traits such as plant height, days to flowering and days to maturity, majority of the hybrids exhibited negative significant relative heterosis indicating that for these traits the genes with negative effects were dominant. Similar heterotic effects for different traits in sesame have been reported by Das *et al.* (2003), Prajapati *et al.* (2006), Jadhav and Mohrir (2013) and Parimala *et al.* (2013).

An examination of performance of hybrids over better parent revealed that four hybrids manifested significant positive heterobeltiosis for seed yield per plant. The maximum heterobeltiosis for seed yield per plant was exhibited by the hybrids ASRT10 x AT 324 (41.88%) and ASRT10 x Patan 64 (41.88%) followed by AT 235 x Vijapadi selection (18.53 %) and Vijapadi selection x ASRT 9 (14.37%) (Table 2). The hybrid Vijapadi selection x ASRT 9 (17.12%) and AT 164 x AT 235 (13.63%) depicted high heterobeltiosis for 1000-seed weight, while hybrid ASRT10 x AT 324 (32.04%) and ASRT10 x Patan 64 (27.52%) for harvest index. For oil content, hybrid ASRT10 x ASRT 9 (11.76%) depicted high heterobeltiosis. These findings were also supported by Patel *et al.* (2005), Salunke *et al.* (2013) and Subashini *et al.* (2014). In case of standard heterosis, thirteen hybrids manifested significant and desirable heterosis for seed yield per plant over both the checks. The maximum significant and positive heterosis over checks Patan 64 and AT 324 was observed in hybrid ASRT10 x

Patan 64 followed by ASRT10 x AT 324, Vijapadi selection x ASRT 9, AT 164 x Patan 64 and ASRT 10 x AT 242. The heterotic response over the standard check in sesame was also reported by Jadhav and Mohrir (2013), Vavdiya *et al.* (2013) and Subashini *et al.* (2014), which are in accordance with the present findings.

The comparison of top five promising crosses on the basis of *per se* performance for yield per plant and their respective heterobeltiosis, standard heterosis and significant heterotic effects for other characters in sesame is presented in Table 3. As far as economic importance is concerned, seed yield and oil content are the important traits in oilseeds crop, which in turn directly influence the oil yield. Hitherto varietal improvement of sesame was confined to hybridization of promising genotypes and selecting superior segregants for seed yield. The outcome of this breeding strategy did not yield spectacular gains in upgrading yield plateau in sesame. An alternate strategy viz., heterosis breeding has been given importance to increase the productivity. Earlier commercial exploitation of heterosis breeding was confined to cross pollinated group of crop plants. In recent period successful attempts have been made to develop hybrids in autogamous crop plants also. Sesame is the most suitable crop for exploiting heterosis on a commercial scale because of Low seed rate, High seed multiplication ratio (1:50), epipetalous floral structure enabling easy emasculation and natural out crossing to an extent of 5 to 50 per cent.

CONCLUSION

From the above discussion, it can be concluded that three crosses, ASRT10 x Patan 64, ASRT10 x AT 324 and AT 235 x Vijapadi selection found to be most promising crosses for

seed yield and other desirable traits, hence these hybrids could be evaluated further to exploit the heterosis after identifying suitable hybrid seed production technology and in future breeding programme by utilizing biparental mating or recurrent selection breeding approaches to obtain desirable segregants for development of further superior genotypes for seed yield and its component traits.

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Table 1: Analysis of variance (mean squares) for various characters in sesame

Source of Variation	d.f.	Days to 50% Flowering	Plant Height (cm)	Number of Branches Per Plant	Number of Capsules per Plant	Capsules Length (cm)
Replications	2	0.89	86.59	0.36	17.43	0.03
Genotypes (G)	35	18.14**	333.67**	0.92**	2265.26**	0.26**
Parents (P)	7	18.92**	387.54**	1.28**	103.17**	0.40**
Hybrids (H)	27	18.31**	326.94**	0.84**	2908.99**	0.23**
Parent vs.Hybrids	1	8.29	138.18	0.63*	19.32	0.06
Error	70	6.45	35.72	0.10	17.32	0.04
Total	107	10.17	134.13	0.38	752.63	0.11

Source of Variation	d.f.	Days to Maturity	1000 Seed Weight (g)	Seed Yield Per Plant (g)	Harvest Index (%)	Oil Content (%)
Replications	2	218.45	0.05	0.81	7.59	0.62
Genotypes (G)	35	225.95**	0.16**	7.23**	68.25**	16.54**
Parents (P)	7	170.92*	0.06*	5.30**	30.52	27.18**
Hybrids (H)	27	227.84**	0.19**	8.00**	75.52**	12.63**
Parent vs.Hybrids	1	560.09**	0.01	0.07	136.10**	47.86**
Error	70	63.61	0.02	0.75	14.60	5.39
Total	107	119.61	0.07	2.87	32.02	8.95

Table 2: Per cent heterobeltiosis (BP) and standard heterosis (SH) for various traits in sesame

Hybrids	Days to 50% Flowering			Plant Height			Number of Branches Per Plant			Number of Capsules Per Plant		
	BP	SC1	SC2	BP	SC1	SC2	BP	SC1	SC2	BP	SC1	SC2
AT 164 x AT 235	12.90 *	4.48	14.81 *	14.81 *	15.96 *	12.15	-7.77	-3.61	-10.93	-7.04	33.93 **	22.68 **
AT 164 x Vijapadi selection	7.09	1.49	-20.45 **	-20.45 **	4.77	1.32	-15.61 *	8.32	0.09	-14.98 **	16.68 *	6.88
AT 164 x ASRT 10	14.66 **	-0.75	2.59	2.59	14.08 *	10.33	-20.47 **	-5.81	-12.96	13.25 *	55.43 **	42.38 **
AT 164 x AT 242	-9.38	-13.43 **	33.06 **	33.06 **	34.39 **	29.98 **	24.83 **	30.46 **	20.56 **	-15.86 **	15.48 *	5.78
AT 164 x AT 324	-7.03	-11.19 *	0.68	0.68	2.45	-0.92	14.88 *	26.85 **	17.22 *	35.37 **	85.79 **	70.19 **
AT 164 x Patan 64	-16.91 **	-15.67 **	17.70 **	17.70 **	18.88 **	14.97 *	14.05 *	32.57 **	22.50 **	30.32 **	78.86 **	63.84 **
AT 164 x ASRT 9	-6.3	-11.19 *	10.51	10.51	18.04 **	14.16 *	-39.18 **	-5.91	-13.06	35.91 **	86.53 **	70.87 **
AT 235 x Vijapadi selection	-1.57	-6.72	-0.77	-0.77	30.69 **	26.40 **	4.68	34.37 **	24.17 **	15.86 **	66.92 **	52.91 **
AT 235 x ASRT 10	4.03	-3.73	8.38	8.38	20.53 **	16.57 *	28.85 **	52.61 **	41.02 **	-0.3	43.64 **	31.58 **
AT 235 x AT 242	-5.47	-9.70 *	11.37	11.37	-1.16	-4.41	-3.89	-5.91	-13.06	4.1	49.97 **	37.38 **
AT 235 x AT 324	-7.03	-11.19 *	-3.64	-3.64	-1.95	-5.17	1.54	12.12	3.61	5.12	51.46 **	38.74 **
AT 235 x Patan 64	-8.82	-7.46	18.83 *	18.83 *	2.91	-0.47	8.62	26.25 **	16.67 *	20.77 **	73.99 **	59.38 **
AT 235 x ASRT 9	0	-5.22	-7.8	-7.8	-1.52	-4.76	-7.84	42.59 **	31.76 **	8.5	56.32 **	43.19 **
Vijapadi selection x ASRT 10	3.15	-2.24	-30.93 **	-30.93 **	-9.03	-12.02	-14.29 *	10.02	1.67	17.50 **	54.70 **	41.71 **
Vijapadi selection x AT 242	-9.38	-13.43 **	-34.78 **	-34.78 **	-14.11 *	-16.93 *	-15.30 *	8.72	0.46	45.59 **	91.68 **	75.59 **
Vijapadi selection x AT 324	-10.16 *	-14.18 **	-36.83 **	-36.83 **	-16.80 *	-19.53 **	4.68	34.37 **	24.17 **	38.87 **	82.83 **	67.48 **
Vijapadi selection x Patan 64	-12.50 **	-11.19 *	-29.67 **	-29.67 **	-7.37	-10.42	-12.80 *	11.92	3.43	22.76 **	61.62 **	48.05 **
Vijapadi selection x ASRT 9	-13.39 **	-17.91 **	-10.56 *	-10.56 *	17.80 **	13.93 *	-12.05 *	36.07 **	25.74 **	7.42	41.43 **	29.55 **
ASRT 10 x AT 242	-10.16 *	-14.18 **	7.61	7.61	19.67 **	15.74 *	-2.88	15.03	6.30	31.26 **	63.54 **	49.81 **
ASRT10 x AT 324	-2.34	-6.72	1.06	1.06	12.39	8.69	7.53	27.35 **	17.69 *	33.00 **	56.17 **	43.06 **
ASRT10 x Patan 64	-8.82	-7.46	3.77	3.77	15.39 *	11.60	-3.13	14.73	6.02	55.59 **	82.69 **	67.35 **
ASRT10 x ASRT 9	-4.72	-9.70 *	-20.76 **	-20.76 **	-11.88	-14.78 *	-11.98 *	36.17 **	25.83 **	-91.58 **	-89.99 **	-90.83 **
AT 242 x AT 324	-11.72 *	-15.67 **	-17.74 **	-17.74 **	-16.29 *	-19.04 **	12.43	24.15 **	14.72	-92.67 **	-90.87 **	-91.64 **
AT 242 x Patan 64	-2.21	-0.75	1.18	1.18	-10.21	-13.16 *	-3.97	11.62	3.15	-93.41 **	-91.79 **	-92.48 **
AT 242 x ASRT 9	-5.47	-9.70 *	-14.68 *	-14.68 *	-8.87	-11.86	-27.53 **	12.12	3.61	-93.38 **	-91.75 **	-92.45 **
AT 324 x Patan 64	-11.03 *	-9.70 *	-2.71	-2.71	-1.00	-4.26	4.22	21.14 *	11.94	-92.30 **	-91.09 **	-91.84 **
AT 324 x ASRT 9	-3.13	-7.46	-1.71	-1.71	4.99	1.54	-8.1	42.18 **	31.39 **	-91.20 **	-89.54 **	-90.42 **
Patan 64 x ASRT 9	-5.88	-4.48	8.67	8.67	16.07 *	12.26	-13.41 *	33.97 **	23.80 **	-91.71 **	-90.15 **	-90.98 **
Minimum	-16.91	-15.67	-36.83	-36.83	-16.80	-19.53	-39.18	-5.91	-13.06	-93.41	-91.79	-92.48
Maximum	14.66	4.48	33.06	33.06	34.39	29.98	28.85	52.61	41.02	55.59	91.68	75.59
S.E.d	2.07	2.07	4.88	4.88	4.88	4.88	0.26	0.26	0.26	3.39	3.39	3.39

Table 2: Contd.....

Hybrids	Capsules Length (cm)			Days to Maturity			1000 Seed Weight			Seed Yield Per Plant		
	BP	SC1	SC2	BP	SC1	SC2	BP	SC1	SC2	BP	SC1	SC2
AT 164 x AT 235	11.95	10.01	18.51 **	12.34	15.09 *	21.38 **	13.63	17.40 **	4.76	-31.53 **	-1.71	-3.45
AT 164 x Vijapadi selection	2.55	29.17 **	39.15 **	-3.83	-1.48	3.91	-5.94	-2.82	-13.29 **	-21.36 **	12.89	10.90
AT 164 x ASRT 10	7.57	10.63	19.17 **	-16.35 *	-4.69	0.52	-0.49	2.82	-8.26 *	-19.86 **	15.04	13.01
AT 164 x AT 242	16.48 *	14.46 *	23.30 **	9.59	12.27	18.41 *	9.13 *	17.81 **	5.12	-15.61 *	21.14 *	19.00 *
AT 164 x AT 324	-19.63 **	0.74	8.52	3.76	7.30	13.17	-2.21	6.74	-4.76	-2.26	40.31 **	37.83 **
AT 164 x Patan 64	-3.75	-1.61	5.99	-16.39 *	-7.57	-2.52	7.24	16.20 **	3.68	5.71	51.75 **	49.07 **
AT 164 x ASRT 9	-12.96 *	-7.05	0.13	-1.37	1.04	6.57	-3.6	-0.40	-11.13 **	-3.21	38.95 **	36.49 **
AT 235 x Vijapadi selection	-19.33 **	1.61	9.45	22.41 **	19.96 **	26.52 **	-4.22	-4.12	-14.45 **	18.53 *	44.74 **	42.18 **
AT 235 x ASRT 10	-6.13	-3.46	3.99	-7.49	5.40	11.17	-3.38	-2.21	-12.75 **	9.05	33.16 **	30.81 **
AT 235 x AT 242	-6.03	-9.52	-2.53	27.91 **	25.35 **	32.21 **	-11.28	-4.23	-14.54 **	-10.7	27.06 **	24.82 **
AT 235 x AT 324	-13.51 *	8.41	16.78 *	2.56	6.06	11.86	-11.52	-3.42	-13.82 **	-0.18	21.89 *	19.73 *
AT 235 x Patan 64	-8.83	-6.80	0.40	-8.96	0.65	6.15	-7.43	0.30	-10.50 **	-0.61	21.36 *	19.22 *
AT 235 x ASRT 9	2.78	9.77	18.24 *	-8.69	-6.62	-1.52	1.1	1.61	-9.34 *	-18.00 *	11.89	9.91
Vijapadi selection x ASRT 10	-18.45 **	2.72	10.65	-5.55	7.61	13.49	-6.76	-5.63	-15.80 **	-15.18	-4.43	-6.12
Vijapadi selection x AT 242	-20.71 **	-0.12	7.59	26.93 **	17.16 *	23.56 **	-8.76 *	-1.51	-12.12 **	-30.55 **	-1.18	-2.93
Vijapadi selection x AT 324	-28.26 **	-9.64	-2.66	2.95	6.46	12.28	-8.29 *	0.10	-10.68 **	-6.97	3.03	1.21
Vijapadi selection x Patan 64	-25.61 **	-6.30	0.93	-11.62	-2.30	3.04	-6.87	0.91	-9.96 **	-3.95	0.22	-1.55
Vijapadi selection x ASRT 9	-13.35 *	9.15	17.58 *	-0.17	2.08	7.67	17.12	17.71 **	5.03	14.37 *	56.05 **	53.30 **
ASRT 10 x AT 242	-1.8	0.99	8.79	0.29	14.26 *	20.51 **	5.03	13.38 **	1.17	3.64	47.46 **	44.85 **
ASRT10 x AT 324	-0.1	25.22 **	34.89 **	-9.65	2.93	8.56	1.47	10.76 *	-1.17	41.88 **	59.87 **	57.04 **
ASRT10 x Patan 64	14.06 *	17.31 **	26.36 **	8.26	23.34 **	30.09 **	3.81	12.47 **	0.36	41.88 **	59.87 **	57.04 **
ASRT10 x ASRT 9	-14.00 *	-8.16	-1.07	9.79	25.08 **	31.92 **	-3.18	-2.01	-12.57 **	-26.42 **	0.39	-1.38
AT 242 x AT 324	-17.85 **	2.97	10.92	0.69	4.12	9.82	-10.32	-2.11	-12.66 **	-27.96 **	2.50	0.69
AT 242 x Patan 64	-4.59	-2.47	5.06	-4.64	5.42	11.18	-11.79	-4.43	-14.72 **	-26.51 **	4.56	2.71
AT 242 x ASRT 9	-15.86 *	-10.14	-3.20	-5.85	-3.72	1.54	-9.04 *	-1.81	-12.39 **	-32.43 **	-3.86	-5.56
AT 324 x Patan 64	-15.68 **	5.69	13.85 *	7.22	18.53 *	25.01 **	-12.07	-4.02	-14.36 **	-5.74	4.39	2.54
AT 324 x ASRT 9	-21.99 **	-2.22	5.33	8.3	11.99	18.11 *	-9.86 *	-1.61	-12.21 **	-23.95 **	3.77	1.94
Patan 64 x ASRT 9	7.06	14.34 *	23.17 **	-4.03	6.10	11.90	-7.52	0.20	-10.59 **	-24.37 **	3.20	1.38
Minimum	-28.26	-10.14	-3.2	-16.39	-7.57	-1.52	-12.07	-5.63	-15.80	-32.43	-4.43	-6.12
Maximum	16.48	29.17	39.15	27.91	25.35	32.21	17.12	17.81	5.12	41.88	59.87	57.04
SE.d	0.17	0.17	0.17	6.51	6.51	6.51	0.13	0.13	0.13	0.70	0.70	0.70

Table 2: Contd..... Hybrids	Harvest index (%)			Oil content (%)		
	BP	SC1	SC2	BP	SC1	SC2
AT 164 x AT 235	-8.03	4.21	-8.9	-2.73	-0.25	1.82
AT 164 x Vijapadi selection	3.17	16.91	2.2	-3.24	-7.02	-5.09
AT 164 x ASRT 10	5.02	19	4.03	3.73	-0.33	1.75
AT 164 x AT 242	11.96	26.87 *	10.9	-3.45	-5.95	-3.99
AT 164 x AT 324	8.91	23.41 *	7.88	-3.17	3.64	5.8
AT 164 x Patan 64	25.69 *	42.43 **	24.50 *	7.90	4.2	6.37
AT 164 x ASRT 9	10.28	40.10 **	22.47 *	4.14	0.06	2.15
AT 235 x Vijapadi selection	23.02 *	34.25 **	17.36	-8.47 *	-6.14	-4.18
AT 235 x ASRT 10	26.16 *	37.68 **	20.36 *	-1.15	1.37	3.48
AT 235 x AT 242	13.37	23.72 *	8.15	0.83	3.41	5.56
AT 235 x AT 324	-0.62	8.45	-5.2	1.23	8.35 *	10.61 *
AT 235 x Patan 64	-7.01	1.47	-11.29	1.39	3.98	6.14
AT 235 x ASRT 9	-11.32	12.66	-1.52	-6.05	-3.66	-1.65
Vijapadi selection x ASRT 10	-11.45	-3.63	-15.76	10.25 *	2.89	5.03
Vijapadi selection x AT 242	5.13	5.41	-7.85	6.69	3.92	6.09
Vijapadi selection x AT 324	-4.8	-3.25	-15.42	-9.56 *	-3.2	-1.18
Vijapadi selection x Patan 64	11.48	11.78	-2.28	-4.06	-7.34	-5.42
Vijapadi selection x ASRT 9	18.32 *	50.32 **	31.40 **	7.31	-0.34	1.74
ASRT 10 x AT 242	24.97 *	36.01 **	18.9	3.67	0.98	3.08
ASRT10 x AT 324	32.04 **	43.70 **	25.62 *	-13.58 **	-7.5	-5.57
ASRT10 x Patan 64	27.52 *	38.78 **	21.32 *	-3.19	-6.51	-4.56
ASRT10 x ASRT 9	-15.97	6.75	-6.68	11.76 **	4.3	6.47
AT 242 x AT 324	-6.12	-4.58	-16.59	-3.61	3.17	5.32
AT 242 x Patan 64	-7.79	-7.54	-19.18	4.09	1.39	3.5
AT 242 x ASRT 9	-23.75 *	-3.13	-15.32	2.91	0.24	2.32
AT 324 x Patan 64	-12.08	-10.64	-21.88 *	-8.97 *	-2.56	-0.54
AT 324 x ASRT 9	-26.68 **	-6.85	-18.57	-4.60	2.12	4.24
Patan 64 x ASRT 9	-20.71 *	0.73	-11.94	6.46	2.81	4.95
Minimum	-26.68	-10.64	-21.88	-13.58	-7.50	-5.57
Maximum	32.04	50.32	31.40	11.76	8.35	10.61
S.E.d	3.12	3.12	3.12	1.89	1.89	1.89

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

Table 3: Comparison of top five promising crosses on the basis of *per se* performance for seed yield per plant and their respective heterobeltiosis, standard heterosis and significant heterotic effects for other characters in sesame

Hybrids	<i>Per se</i> Performance	Better Parent Heterosis	Standard Heterosis	Significant Heterosis for Other Traits Over Better Parent	Significant Heterosis for Other Traits over Standard Check
ASRT10 x AT 324	12.15	41.88 **	59.87 **	SW, HI, OC,CP,	SW, HI, BP,CP, CL
ASRT10 x Patan 64	12.15	41.88 **	59.87 **	HI, CP, DM, CL	SW, HI, PH, CP, CL, DM, PH
Vijapadi selection x ASRT 9	11.86	14.37 *	56.05 **	SW, DFF, PH, BP, CL, PH	SW, HI, DFF, CP, BP, PH
AT 164 x Patan 64	11.53	5.71	51.75 **	HI, DFF, PH, BP, CP, DM	SW, HI, DFF, PH, BP, CP, DM,
ASRT 10 x AT 242	11.21	3.64	47.46 **	HI, DFF,CP	SW, HI, DF, PH, CP, DM, DFF,

DFF : Days to 50 per cent
flowering

PH : Plant height (cm)

BP : Number of effective
branches per plant

CP : Number of capsules per
plant

CL : Capsule length (cm)

DM : Days to maturity

SC : No. of seeds per capsule

SW: 1000-seed weight

HI : Harvest index (%)

OC : Oil content (%)

[MS received: January 28, 2017]

[MS accepted: February 11, 2017]