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Heterosis for yield and its related traits in Okra (*Abelmoschus esculentus* L. Moench)

J. P. Bhatt[1], N. A. Patel[2], R. R. Acharya[3] and K. B. Kathiria[4]

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1 Senior Research Assistant, Regional Cotton Research Station, Anand Agricultural University, Viramgam-382 150 (Gujarat), India
2 Assistant Research Scientist, Main Vegetable Research Station, Anand Agricultural University, Anand-388 110 (Gujarat), India
3 I/C Head and Associate Research Scientist, Main Vegetable Research Station, Anand Agricultural University, Anand-388 110 (Gujarat), India
4 Director of Research and Dean PG Studies, Anand Agricultural University, Anand-388 110 (Gujarat), India

Abstract
Eight parental lines of okra and their 28 F_1 hybrids obtained from half diallel were studied to investigate the extent of heterosis for yield and yield attributing characters. The magnitude of heterosis varied from cross to cross for all the characters studied. Maximum positive heterosis for fruit yild per plant over better parent and standard check (JOH 2) was observed to be 62.12 and 44.11 per cent, respectively. The cause of heterosis may be due to its component traits, mainly, days to first flowering, nodes per plant, length of internode, fruit weight and fruits per plant. The best performing hybrid AOL 09-25 x AOL 09-26 which recorded 44.11 per cent heterosis for yield over standard check may be exploited for commercial cultivation.
Key words: *Abelmoschus esculentus* (L.) Moench, heterosis, diallel analysis, fruit yield

Introduction

Okra [*Abelmoschus esculentus* (L.) Moench] is one of the important vegetable crop grown for its tender green pods in tropics, subtropics and warmer parts of temperate region. It is basically self-pollinated crop in which emasculation and pollination is feasible with higher success rate of fruit setting. The cost of hybrid seed production at a commercial scale may also be lower in okra due to simple floral biology, more number of seeds per cross, higher rate of successful seed setting and higher percentage of successful crosses. These characteristics offer great possibilities of crop improvement through hybridization. The magnitude of heterosis provides a basis for genetical diversity and a guide for the choice of desirable parents for developing superior F_1 hybrids to exploit hybrid vigour and for building gene pools to be employed in future breeding programme. Keeping this in view, the present investigation was carried out to know magnitude of heterosis for fruit yield and its component traits in okra.

Materials and methods

Eight genetically diverse parent lines of okra were crossed in all possible combinations in half diallel fashion for the present study conducted at Main Vegetable Reasearch Farm, Anand Agricultural University, Anand, Gujarat. The eight parents viz., AOL 08-10, AOL 09-24, AOL 08-2, AOL 09-25, AOL 09-26, AOL-09-27, GO-2, AOL-09-28; their 28 F1s and standard check JOH-2 were laid out in randomized block design with three replications during July 2010. The planting distance of 60 cm x 30 cm was maintained. The cultural and plant protection practices were carried out as required to raise a good crop. Observations were recorded on five randomly selected competitive plants for 9 fruit yield and its component characters *viz*., days to first flowering, plant height (cm), nodes per plant, length of internode (cm), primary branches per plant, fruit length (cm), fruit weight (g), fruits per plant and fruit yield per plant (g). Heterobeltiosis and standard heterosis were computed as per the methods given by Fonseca and Peterson (1968) and Meredith and Bridge (1972), respectively.

Results and discussion

The findings of heterosis over better parent and check (JOH-2) are presented in Table 1. Three best *per se* performing parents and three top ranking heterotic crosses alongwith number of crosses showing significant desirable heterosis over better parent and standard check (JOH-2) are presented in Table 2. The results indicated that the degree and direction of heterosis varied enormously for all the characters studied. Overall, the magnitude of heterotic effects were high for fruit yield per plant and primary branches per plant. Whereas, length of internode, fruit weight and fruits per plant displayed moderate heterosis. Nodes per plant, plant height and days to first flowering exhibited the least heterosis.

With respect to days to first flowering, the extent of heterobeltiosis and standard heterosis varied from -9.38 (GO-2 x AOL 09-28) to 20.30 per cent (AOL 09-24 x AOL 09-26) and -19.11 (AOL 09- 27 x GO-2) to 1.91 per cent (AOL 09-26 x AOL 09-28), respectively. Perusal of Table 2 showed that the first three top ranking standard heterotic hybrids possessed at least one good *per se* performing parent for days to first flowering. Significant negative heterosis was also reported by Dhankhar *et al.* (1996), Rawale *et al.* (2003), Amutha *et al.* (2007) and Mehta *et al.* (2007). While, Singh and Sood (1999) reported positive significant heterosis for this trait. This may be due to use of different genetic material.

With respect to plant height, the heterobeltiosis and standard heterosis ranged from -21.80 to 15.92 per cent and -41.08 to 13.77 per cent, respectively. Out of 28 crosses, 9 exhibited significant positive heterobeltiosis of which highest value was observed for the cross AOL 08-2 x AOL 09-27 (15.92%) followed by AOL 09-27 x AOL 09-28 (15.10%) and AOL 08-2 x AOL 09-25 (12.79%). While, only one cross combination GO-2 x AOL 09-28 (13.77%) recorded the significant positive standard heterosis. Positive and significant heterosis for this trait has also been noticed by Dhankhar *et al.* (1996), Rawale *et al.* (2003), Manivannan *et al.* (2007) and Mehta *et al.* (2007).

The extent of heterosis over better parent was -31.36 (AOL 09-24 x AOL 08-2) to 22.38 per cent (AOL 09-25 x AOL 09-26) and over standard check was -33.74 (AOL 08-10 x AOL 09-28) to 17.20 per cent (GO-2 x AOL 09-28) for nodes per plant. The number of significant positive crosses were 7 in better parental and 1 in standard heterosis. Singh and Sood (1999), Rawale *et al.* (2003), Bhalekar *et al.* (2004) and Desai *et al.* (2007) have also reported positive heterosis for this trait. All the three best standard heterotic crosses possessed at least one good *per se* performing parent for nodes per plant. It is interesting to note that all the three top ranking crosses exhibited standard heterosis occupied top rank in the standard heterosis for fruits per plant and fruit yield also, suggesting greater contribution of nodes per plant towards fruit yield per plant.

In case of length of internode, better parental and standard heterosis were -17.68 (AOL 08-10 x AOL 09-26) to 25.08 per cent (AOL 09-24 x AOL 09-25) and -17.38 (AOL 09-24 x GO-2) to 32.20 per cent (AOL 09-24 x AOL 09-25), respectively. Out of a total of 28 cross combinations under study, 9 and 4 crosses showed significant positive heterobeltiosis and standard heterosis, respectively for this trait. It is apparent that all the three top ranking standard heterotic hybrids possessed the best *per se* performing male parents, indicating the greater contribution of male than female for length of internode. Sood and Kalia (2001), Bhalekar *et al.* (2004), Hosamani *et al.* (2008) and Wammanda *et al.* (2010) observed heterosis for this trait which confirmed the present findings.

In respect to primary branches per plant, total 7 cross combinations exhibited positive significant heterobeltiosis of which top ranking was AOL 08-10 x AOL 09-27 (70.91%) followed by AOL 08-2 x GO-2 (53.01%) and AOL 08-10 x AOL 09-25 (52.28%). While most of the cross combinations manifested positive standard heterosis, of which, 20 crosses rendered significant. The cross combination AOL 09-27 x AOL 09-28 exhibited the maximum economical heterosis (119.17%), whereas, AOL 09-25 x GO-2 recorded the minimum standard heterosis (-16.67%) for primary branches per plant. High magnitude of heterosis and large number of hybrids exhibiting positive significant heterosis revealed the presence of dominant alleles for this trait. The heterosis for primary branches per plant has also been reported by Amutha *et al.* (2007), Desai *et al.* (2007), Hosamani *et al.* (2008) and Wammanda *et al.* (2010).

With regards to fruit length, the extent of heterobeltiosis and standard heterosis varied from -17.67 (AOL 08-2 x AOL 09-27) to 24.50 per cent (AOL 08-10 x GO-2) and -6.78 (AOL 09-24 x AOL 08-2) to 27.27 per cent (AOL 08-10 x GO-2), respectively. Out of 28 crosses studied, only 6 and 5 crosses displayed significant positive heterobeltiosis and standard heterosis for this trait, respectively. Significant positive heterosis for fruit length has also been reported by Ahlawat (2004), Bhalekar *et al.* (2004), Amutha *et al.* (2007), Manivannan *et al.* (2007), Mehta *et al.* (2007), Hosamani *et al.* (2008) and Wammanda *et al.* (2010).

Fruit weight is an important yield contributing trait. The range of better parent heterosis and standard heterosis varied from -34.27 to 22.07 per cent and -18.60 to 42.69 per cent for fruit weight, respectively. It is observed that the cross AOL 09-27 x GO-2 ranked first and second in heterobeltiosis and standard heterosis, respectively. This cross combination also occupied second and third rank in fruit yield per plant in heterobltiosis and standard heterosis, respectively. The results indicated the association of fruit weight and fruit yield per plant. Heterosis for fruit weight was also reported by Bhalekar *et al.* (2004), Amutha *et al.* (2007), Manivannan *et al.* (2007), Hosamani *et al.* (2008) and Ramya and Senthil kumar (2010).

With respect to fruits per plant, fourteen cross combinations revealed positive significant heterobeltiosis of which top ranking was GO-2 x AOL

09-28 (50.12 %) followed by AOL 09-25 x AOL 09-27 (38.57 %) and AOL 09-25 x AOL 09-26 (38.00 %). While only one cross combination recorded positively significant standard heterosis for fruits per plant namely GO-2 x AOL 09-28 (24.64 %). It is noted that all the three top ranking standard heterotic crosses in this trait also placd in top three positions for fruit yield per plant indicating contribution of this trait to the economic fruit yield per plant. Bhalekar *et al.* (2004), Amutha *et al.* (2007), Desai *et al.* (2007), Manivannan *et al.* (2007), Hosamani *et al.* (2008) and Wammanda *et al.* (2010) also reported higher heterosis for fruits per plant.

Fruit yield per plant is the character of economic importance for which considrabl degree of heterosis was registered in a number of crosses. In all, 14 and 3 hybrids manifested significant positive heterobeltiosis and standard heterosis, respectively. The magnitude of heterosis ranged from 21.80 (AOL 09-26 x AOL 09-28) to 62.12 per cent (AOL 09-25 x AOL 09-26) over better parent, while it varied between -31.81 (AOL 08-2 x AOL 09-26) to 44.11 per cent (AOL 09-25 x AOL 09-26) over standard check. Interestingly, the magnitude in positive direction was too high particularlyin heterobltiosis. Perusal of Table 1 also revealed th the number of crosses displaying hterobeltiosis in various yield attributing characters were small, whereas, the number of crosses showing heterobeltiosis in fruit yield were large (14). This result indicatd that the favourable combination of yield contributing characters resulted in a higher proportion of cross combinations showing significant positive heterobeltiosis. Sood and Kalia (2001), Kapadia (2002), Rawale *et al.* (2003), Manivannan *et al.* (2007), Hosamani *et al.* (2008), Dabhi *et al.* (2009) and Ramya and Senthil Kumar (2010) also reported higher heterosis for fruit yield in okra.

Three most promising hybrids were identified for fruit yield, based on magnitude of standard heterosis over chck (JOH-2) from evaluation of 28 crosses (Table-2). The hybrid AOL 09-25 x AOL 09-26 with the highest *per se* performance ranking first in both types of heterosis involving good x average general combining parents. The hybrid AOL 09-27 x GO-2 involving average x good combiners and ranking second in heterobeltiosis, occupied third rank in *per se* performance, while hybrid GO-2 x AOL 09-28 involving good x average parents and ranking third in heterobeltiosis, stood second in *per se* performance. This might be due to varied constellation of genes in the average parent implicated in the cross combination, thereby resulting in favourable complementation and ultimately the high heterobeltiosis.

In the present investigation, the cross combination AOL 09-25 x AOL 09-26 accomplished the top rank followed by GO-2 x AOL 09-28 and AOL 09-27 x GO-2. The result indicated an association among heterosis, combining ability and *per se* performance to some extent suggesting thereby the consideration of all the three aspects in selecting superior cross combination. Moreover, these three top yielding crosses exhibited high sca effects as well as *per se* performance having at least one parent as good general combiner for green fruit yield, it is expected that such type of cross combinations would yield desirable transgrassive segregants in later generations. In crops like okra where improved varieties are under cultivation, these crosses could be evaluated and utilized to get desirable segregants for improvement. Hence, these crosses could be advanced for selection in segregating generations to identify superior segregants for the development of improved varieties. The high yielding F_1 hybrid AOL 09-25 x AOL 09-26 showed 44.11 per cent heterosis for fruit yield over standard check JOH-2 may be recommended for commercial exploitation.

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Table 1 Heterosis in percentage in F_1 hybrids over better parent (BP) and standard check (SC) for various characters in okra

Crosses	Days to first flowering		Plant height		Nodes per plant		Length of internode	
	BP	SC	BP	SC	BP	SC	BP	SC
AOL-08-10 x AOL-09-24	11.28**	-5.73*	4.15	-20.10**	3.60	-11.11	-5.96**	-10.29
AOL-08-10 x AOL-08-2	0.75	-14.65**	5.39*	-8.76	1.77	-6.49	3.74	-0.96
AOL-08-10 x AOL-09-25	6.30**	-14.01**	-4.64	-15.32*	9.63**	-7.49	-12.72**	-7.78
AOL-08-10 x AOL-09-26	11.28**	-5.73*	-5.79*	-12.95	14.58**	-1.46	-17.68**	-10.93
AOL-08-10 x AOL-09-27	13.53**	-3.82	4.14	-21.54**	18.57**	-6.61	-10.11**	-14.21*
AOL-08-10 x GO-2	-2.26*	-17.20**	-0.50	-0.88	0.12	1.39	-1.07	-1.73
AOL-08-10 x AOL-09-28	12.03**	-5.10*	-21.80**	-41.08**	-21.13**	-33.74**	-6.08**	-10.36
AOL-09-24 x AOL-08-2	8.27**	-8.28**	1.35	-12.25	-31.36**	-20.40*	16.85**	10.99
AOL-09-24 x AOL-09-25	3.94**	-15.92**	2.72	-8.79	-15.30**	-27.33**	25.08**	32.20**
AOL-09-24 x AOL-09-26	20.30**	1.91*	-7.37**	-14.40*	12.11**	-3.58	-17.37**	-10.60
AOL-09-24 x AOL-09-27	15.04**	-2.55	10.66**	-15.60*	1.63	-12.80	8.72**	-2.63
AOL-09-24 x GO-2	12.78**	-4.46	-19.48**	-19.78**	-3.23	-2.02	-16.80**	-17.38**
AOL-09-24 x AOL-09-28	13.53**	-3.82	3.33	-21.19**	3.09	-11.55	0.00	-10.36
AOL-08-2 x AOL-09-25	17.72**	-5.10	12.79**	0.16	-14.29**	-21.24**	21.07**	27.86**
AOL-08-2 x AOL-09-26	15.04**	-2.55	-3.98	-11.27	-18.71**	-25.30**	11.75**	20.91**
AOL-08-2 x AOL-09-27	3.88**	-14.65**	15.92**	0.37	5.10	-3.43	10.10**	4.65
AOL-08-2 x GO-2	15.04**	-2.55	-1.80	-2.17	-1.85	-0.61	-0.62	-1.35
AOL-08-2 x AOL-09-28	14.29**	-3.18	10.00**	-4.76	1.02	-7.18	8.51**	3.11
AOL-09-25 x AOL-09-26	18.90**	-3.82	8.05**	-0.16	22.38**	5.26	-11.70**	-4.40
AOL-09-25 x AOL-09-27	2.36*	-17.20**	5.17*	-6.61	11.33**	-6.05	-4.70*	0.65
AOL-09-25 x GO-2	4.72**	-15.29**	-7.56**	-7.91	-22.68**	-21.71**	12.57**	18.99**
AOL-09-25 x AOL-09-28	6.30**	-14.01**	-0.33	-11.49	-2.37	-17.61*	2.53	8.34
AOL-09-26 x AOL-09-27	13.95**	-6.37**	1.35	-6.35	-0.36	-14.30	1.96	10.35
AOL-09-26 x GO-2	2.00*	-2.55	-21.67**	-21.96**	-19.26**	-18.24*	-11.03**	-3.74
AOL-09-26 x AOL-09-28	6.67**	1.91	-14.77**	-21.25**	1.60	-12.61	-15.41**	-8.45
AOL-09-27 x GO-2	-1.55	-19.11**	0.21	-0.17	2.47	3.76	-2.53	-3.22
AOL-09-27 x AOL-09-28	12.40**	-7.64**	15.10**	-22.00**	-4.02	-19.36*	9.95**	-3.17
GO-2 x AOL-09-28	-9.38**	-7.64**	6.18**	13.77*	7.78**	17.20*	-1.69	-2.41
S. E. (±)	1.34	1.34	10.78	10.78	2.18	2.18	0.39	0.39
Range	-9.38 to 20.30	-19.11 to 1.91	-21.80 to 15.92	-41.08 to 13.77	-31.36 to 22.38	-33.74 to 17.20	-17.68 to 25.08	-17.38 to 32.20

*,** Significant at 5% and 1%, respectively

Table 1 Contd…

Crosses	Primary branches per plant		Fruit length		Fruit weight		Fruits per plant		Fruit yield per plant	
	BP	SC	BP	SC	BP	SC	BP	SC	BP	SC
AOL-08-10 x AOL-09-24	-30.37**	42.42**	3.87	12.41	-12.49**	9.91	8.47	-27.83**	13.54**	-17.43
AOL-08-10 x AOL-08-2	10.84**	39.39**	9.26**	18.75*	-18.88**	0.16	23.80**	-12.16	35.11**	7.53
AOL-08-10 x AOL-09-25	52.28**	21.21	-10.51**	8.69	-13.15**	7.22	13.28*	-24.42*	-3.84	-21.82*
AOL-08-10 x AOL-09-26	-28.93**	30.30*	15.85**	23.63**	2.75	20.05	31.29**	8.62	-13.06**	-30.28**
AOL-08-10 x AOL-09-27	70.91**	42.42**	-14.78**	-2.47	-10.52**	10.47	12.68*	-25.03*	9.17*	-16.72
AOL-08-10 x GO-2	-15.00**	3.03	24.50**	27.27**	12.71**	39.17**	21.45**	-34.78**	13.88**	-20.93*
AOL-08-10 x AOL-09-28	-49.64**	6.06	12.38**	20.91*	5.54*	30.70**	-2.74	-21.79*	-19.37**	-26.59**
AOL-09-24 x AOL-08-2	-20.74**	62.12**	-14.24**	-6.78	-22.08**	-2.12	18.46**	-15.95	13.03**	-10.04
AOL-09-24 x AOL-09-25	-18.52**	66.67**	-8.49**	11.16	13.61**	42.69**	26.31**	-15.73	39.48**	13.40
AOL-09-24 x AOL-09-26	-43.70**	15.15	3.76	12.28	-25.37**	-6.28	-12.07**	-27.25**	12.52**	-9.76
AOL-09-24 x AOL-09-27	-36.30**	30.30**	5.71**	-6.53	-23.70**	-4.16	6.11	-31.16*	2.43	-21.86*
AOL-09-24 x GO-2	1.88	108.33**	1.68	10.03	-16.39**	5.00	10.00*	-8.67	9.78*	-20.17*
AOL-09-24 x AOL-09-28	-4.08	102.02**	-4.91	2.91	-26.33**	-7.48	-20.17**	-35.81**	1.96	-7.18
AOL-08-2 x AOL-09-25	-15.66**	6.06	-14.15**	4.28	-19.98**	-5.73	3.03	-26.90*	0.87	-17.99*
AOL-08-2 x AOL-09-26	-7.00**	70.45**	-0.29	8.38	-5.11	11.50	-27.99**	-40.42**	-14.97**	-31.81**
AOL-08-2 x AOL-09-27	4.34	31.31**	-17.67**	-5.78	-20.92**	-7.12	-4.33	-32.12**	-7.23	-26.17**
AOL-08-2 x GO-2	53.01**	92.42**	-2.19	6.32	-15.30**	-0.49	1.67	-15.59	3.96	-17.26
AOL-08-2 x AOL-09-28	-28.06**	51.52**	3.57	12.57	-11.36**	9.77	-1.32	-20.65	-12.89**	-20.69*
AOL-09-25 x AOL-09-26	-19.39**	47.73**	-10.96**	8.16	5.50	24.29*	38.00**	15.91	62.12**	44.11**
AOL-09-25 x AOL-09-27	45.45**	21.21	-7.59**	12.25	17.01**	37.87**	38.57**	-7.55	-5.13	-22.88*
AOL-09-25 x GO-2	-31.25**	-16.67	-7.87**	11.91	2.62	20.90*	-20.59**	-34.07**	1.65	-17.36
AOL-09-25 x AOL-09-28	-40.05**	26.26*	-4.63*	15.84	-34.27**	-18.60	-16.71**	-33.03**	-16.19**	-23.70**
AOL-09-26 x AOL-09-27	-27.27**	33.33*	-9.04**	4.10	-2.11	12.14	13.17**	-6.37	26.49**	1.44
AOL-09-26 x GO-2	-22.31**	42.42**	-7.23**	-1.00	-5.38	-0.65	-19.48**	-33.15**	18.88**	-4.66
AOL-09-26 x AOL-09-28	3.60	118.18**	0.38	8.00	-15.52**	4.61	-18.10**	-32.24**	-21.80**	-28.80**
AOL-09-27 x GO-2	29.17**	56.57**	4.86*	20.01*	22.07**	39.83**	35.29**	12.33	55.30**	18.47*
AOL-09-27 x AOL-09-28	4.32*	119.70**	-7.35**	6.03	-7.46**	14.58	8.96*	-12.38	12.35**	2.29
GO-2 x AOL-09-28	-41.01**	24.24	-10.23**	-3.41	-28.93**	-12.00	50.12**	24.64*	38.15**	42.75**
S. E. (±)	0.44	0.44	0.91	0.91	1.09	1.09	2.05	2.05	30.98	30.98
Range	-49.64 to 70.91	-16.67 to 119.70	-17.67 to 24.50	-6.78 to 27.27	-34.27 to 22.07	-18.60 to 42.69	-27.99 to 50.12	-40.42 to 24.64	-21.80 to 62.12	-31.81 to 44.11

Table 2. Three best *per se* performing parents and three top ranking heterotic crosses along with range of heterosis and number of crosses showing significant heterosis in desired direction for various characters in okra

Characters	Best *per se* performing parents	Heterosis over better parent (BP)			Heterosis over standard check (SC) (JOH-2)		
		Best crosses	Heterosis (%)	N	Best crosses	Heterosis (%)	N
Days to first flowering	AOL-09-25	GO-2 x AOL-09-28	-9.38	2	AOL-09-27 x GO-2	-19.11	16
	AOL-09-27	AOL-08-10 x GO-2	-2.26		AOL-08-10 x GO-2	-17.20	
	AOL-08-10	AOL-09-27 x GO-2	-1.55		AOL-09-25 x AOL-09-27	-17.20	
Plant height (cm)	GO-2	AOL-08-2 x AOL-09-27	15.92	9	GO-2 x AOL-09-28	13.77	1
	AOL-09-26	AOL-09-27 x AOL-09-28	15.10		AOL-08-2 x AOL-09-27	0.37	
	AOL-09-25	AOL-08-2 x AOL-09-25	12.79		AOL-08-2 x AOL-09-25	0.16	
Nodes per plant	GO-2	AOL-09-25 x AOL-09-26	22.38	7	GO-2 x AOL-09-28	17.20	1
	AOL-08-2	AOL-08-10 x AOL-09-27	18.57		AOL-09-25 x AOL-09-26	5.26	
	AOL-09-26	AOL-08-10 x AOL-09-26	14.58		AOL-09-27 x GO-2	3.76	
Length of internode (cm)	AOL-09-26	AOL-09-24 x AOL-09-25	25.08	9	AOL-09-24 x AOL-09-25	32.20	4
	AOL-09-25	AOL-08-2 x AOL-09-25	21.07		AOL-08-2 x AOL-09-25	27.86	
	GO-2	AOL-09-24 x AOL-08-2	16.85		AOL-08-2 x AOL-09-26	20.91	
Primary branches per plant	AOL-09-28	AOL-08-10 x AOL-09-27	70.91	7	AOL-09-27 x AOL-09-28	119.70	20
	AOL-09-24	AOL-08-2 x GO-2	53.01		AOL-09-26 x AOL-09-28	118.18	
	AOL-09-26	AOL-08-10 x AOL-09-25	52.28		AOL-09-24 x GO-2	108.33	
Fruit length (cm)	AOL-09-25	AOL-08-10 x GO-2	24.50	6	AOL-08-10 x GO-2	27.27	5
	AOL-09-27	AOL-08-10 x AOL-09-26	15.85		AOL-08-10 x AOL-09-26	23.63	
	AOL-08-2	AOL-08-10 x AOL-09-28	12.38		AOL-08-10 x AOL-09-28	20.91	
Fruit weight ,(g)	AOL-09-24	AOL-09-27 x GO-2	22.07	5	AOL-09-24 x AOL-09-25	42.69	7
	AOL-09-28	AOL-09-25 x AOL-09-27	17.01		AOL-09-27 x GO-2	39.83	
	AOL-08-10	AOL-09-24 x AOL-09-25	13.61		AOL-08-10 x GO-2	39.17	
Fruits per plant	GO-2	GO-2 x AOL-09-28	50.12	14	GO-2 x AOL-09-28	24.64	1
	AOL-09-26	AOL-09-25 x AOL-09-27	38.57		AOL-09-25 x AOL-09-26	15.91	
	AOL-09-28	AOL-09-25 x AOL-09-26	38.00		AOL-09-27 x GO-2	12.33	
Fruit yield per plant (g)	AOL-09-28	AOL-09-25 x AOL-09-26	62.12	14	AOL-09-25 x AOL-09-26	44.11	3
	AOL-09-25	AOL-09-27 x GO-2	55.30		GO-2 x AOL-09-28	42.75	
	AOL-09-2	AOL-09-24 x AOL-09-25	39.48		AOL-09-27 x GO-2	18.47	

N = Number of crosses showing significant desirable heterosis

Table 3 Most heterotic crosses along with their *per se* performance, GCA and SCA effects for fruit yield per plant

Sr. No.	Crosses	Fruit yield / plant (g)	Heterosis (%) over		SCA	GCA effects of parents	
			BP	SC		Female	Male
1	AOL 09-25 x AOL 09-26	453.99	62.12**	44.11**	143.18**	14.60* (G)	4.15 (A)
2	GO-2 x AOL 09-28	433.27	38.15**	42.75**	117.77**	14.59* (G)	9.28 (A)
3	AOL 09-27 x GO-2	408.08	55.30**	18.47*	98.12**	3.75 (A)	14.59* (G)

*,** Significant at 5% and 1%, respectively, A = Average, G = Good