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## RESEARCH ARTICLE

## Heterosis for yield and yield components in okra

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**Abstract**

Fifty six hybrids obtained from eight parents (ArkaAbhay, ArkaAnamika, DBh-30, DBh-37, DBh-39, DBh-43, DBh-47 and DBh-55) which are crossed in full diallele fashion along with eight parents and four popular hybrids were evaluated for estimating heterosis for yield and yield related traits viz., days to 50 per cent flowering, plant height, number of branches, inter-nodal length, fruit length, fruit diameter, number of fruits per plant, average fruit weight, fruit yield per plant and fruit yield per hectare during rabi season of 2011-2012. The results revealed that the standard heterosis for fruit yield per plant was maximum in the hybrid ArkaAnamika x DBh-43, with a value of 96.97 per cent. This hybrid recorded high standard heterosis for number of fruits per plant, average fruit weight and fruit yield per hectare.

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**Introduction**

Okra (*Abelmoschus esculentus* (L.) Moench), one of the important vegetable crops of India, belongs to family Malvaceae and the genus *Abelmoschus*. It is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. It is native of tropical Africa. It is called lady's finger in England, gumbo in the United States of America, guino-gombo in Spanish, guibeiro in Portuguese and bhendi in India. It is often cross pollinated crop and thus heterosis can be exploited in it. Heterosis breeding based on the identification of the parents and their cross-combinations is capable of producing the highest level of transgressive segregates (Falconer 1960). It is one of the tools in overcoming yield barrier and increasing productivity. It also identifies the cross combinations which are promising in conventional breeding programme. Heterosis adaptability, biotic and abiotic resistance, general vigour and quality leads to increase in yield, reproductive ability, The initial selection of parents to be involved in any effective hybridization programme depends upon the nature and magnitude of heterobeltiosis (heterosis over better parent) and economic heterosis (heterosis over check) present in genetic stocks. The magnitude of heterosis provides a guide for the choice of desirable parents for developing superior F<sub>1</sub> hybrids, so as to exploit hybrid vigour. It also helps in choosing suitable crosses to be used for commercial exploitation as well as in component breeding programme.

**Materials and Methods**

Eight parents viz., ArkaAnamika, ArkaAbhay, DBh-30, DBh-37, DBh-39, DBh-43, DBh-47 and DBh-55 selected and were crossed in diallele fashion to analyse the combining ability and heterosis for yield and yield component traits. Fifty six hybrids obtained from full diallele crossing programme, eight parents along with four popular hybrids (Syngenta 152, Mahyco No. 10, Mahyco No. 55, and Mahyco No. 64) were evaluated in three replications of Randomized Block Design during rabi season of 2011-2012. Row-to-row and plant-to-plant distances were maintained at 60 cm and 30 cm, respectively. The crop protection and other cultural practices were carried out as required to raise a good crop.

Observations were recorded on five competitive plants excluding border plants in each replication for days to 50 per cent flowering, plant height, number of branches, inter-nodal length, fruit length, fruit diameter, number of fruits per

plant, fruit weight, fruit yield per plant and fruit yield per hectare. Heterobeltiosis was computed as deviation of mean performance of  $F_1$  from that of better parent (BP). The estimates of economic heterosis were computed as deviation of mean performance of  $F_1$  from that of the commercial hybrids (Syngenta 152, Mahyco No. 10, Mahyco No. 55, and Mahyco No. 64). Magnitude of heterosis and average heterosis was computed according to Turner (1953) and Hayes et al. (1956).

## Results and Discussion

The variance due to treatments was found highly significant for all the characters studied. The parents and hybrids exhibited highly significant variation for all the characters studied. It indicates significant difference among parents and hybrids. Parents vs hybrids exhibited significant variation for days to 50% flowering, plant height, number of branches days, inter-nodal length, number of fruits, fruit weight, average fruit yield per plant and yield per hectare and non-significant variation for fruit length and fruit diameter. Variance due to  $F_1$ 's and reciprocal was found significant for all characters studied. Variance due to  $F_1$ 's v/s reciprocal interaction was highly significant for days to 50% flowering, number of branches per plant, inter-nodal length, number of fruits, average fruit yield per plant and non-significant for plant height, fruit length, fruit diameter, fruit weight and fruit yield per hectare (Table 1).

The range of heterosis for the trait fruit yield per plant was -20.78 to 96.46 percent over mid parent, -35.22 to 89.13 over better parent and -29.82 to 78.25 over commercial hybrid, -9.15 to 6.08 percent and -3.37 to 6.08 per cent for days to 50 percent flowering, -5.56 to 4.63, -7.48 to 4.26 and 1.49 to 12.69 for days to 50 percent flowering, -29.69 to 56.46, -40.37 to 35.77 and -15.56 to 85.02 for plant height, -30.00 to 73.33, -36.36 to 62.50 and -33.33 to 44.44 for number of branches per plant, -15.69 to 44.56, -27.12 to 37.21 and 27.72 to 103.96 for inter-nodal length, -5.24 to 11.50, -11.00 to 6.97 and -6.94 to 12.75 for fruit length, -8.10 to 10.28, -11.67 to 9.43 and -7.27 to -7.27 for fruit diameter, -14.67 to 56.36, -30.43 to 48.28 and -23.81 to 47.62 for average fruit weight and -12.41 to 96.96, -24.42 to 89.10 and -15.6 to 86.68 for fruit yield per hectare respectively (Table 2).

The standard heterosis for days to 50 % flowering over Mahyco 64 ranged from 2.47 per cent (ArkaAnamika x DBh-55) to 16.67 per cent (DBh-43 x DBh-39) and none of hybrids exhibited significant negative heterosis. The negative average heterosis (-2.87%) also substantiated the fact that the hybrids in general were early in flowering. Swamy Rao (1997), Shukla and Gautam (1990), Bendale et al. (2003), Dahake et al. (2006), Amutha et al. (2007) and Weerasekara et al. (2008) also reported heterosis for earliness in okra hybrids. In case of plant height, 38 hybrids exhibited significant standard heterosis and an average heterosis of 13.74 per cent was observed for this character over the parents inferring that hybrids were taller than their parents. The predominance of tallness over dwarfness, indicated tallness as a dominant character as reported by Singh et al., (1975), Vijay and Manohar, (1986), Wankhade et al., (1997), Dhankar et al., (1996), Dhankar and Dhankar, (2002), Dahake et al., (2006), Amutha et al., (2007), Sriram et al., (2007) and Weerasekara et al., (2008). Four hybrids showed highly significant heterosis and an average heterosis was 9.66 per cent for number of branches per plant indicating that hybrids had more branches than their respective parents. 5 hybrids over mid-parent, 8 over better parent had expressed negative heterosis for internodal length. Negative heterosis is desirable for the character inter-nodal length. But, only few crosses recorded negative heterosis over mid parent, better parent and none of the hybrids exploited negative heterosis over standard checks. The average heterosis for the character was 15.48 per cent which indicates that hybrids had longer inter-nodal length than the parents.

**Table 1: Analysis of variance (mean sum of square) for Fruit yield and its component traits in okra**

Character	d.f.	Days to 50% flowering	Plant height (cm)	Number of branches per plant	Inter nodal length (cm)	Fruit length (cm)	Fruit Diameter (cm)	Number of fruits per plant	Average fruit weight (g)	Fruit yield per plant (g)	Fruit yield per hectare (T/ha)
Replicates	2	1.943	7.06	0.021	0.11	0.46	63.021	0.328	0.161	63.453	0.715
Treatments	63	9.680**	527.220**	0.735**	1.037**	1.406**	134.053**	15.497**	3.603**	4030.338**	10.314**
Parents	7	3.310**	383.501**	1.048**	0.911**	2.486**	190.476**	23.708**	2.381**	4714.736**	14.480**
Hybrids	55	9.787**	529.491**	0.696**	0.927**	1.281**	128.820**	14.018**	3.678**	3773.176**	8.951**
Parent Vs. Hybrids	1	48.382**	1408.352**	0.715*	7.955**	0.679	26.86	39.360**	8.048**	13383.510**	56.146**
F <sub>1</sub> 's	27	11.247**	606.506**	0.619**	0.902**	1.116**	154.630**	14.827**	4.802**	4475.661**	10.902**
Reciprocals	27	8.354**	471.788**	0.750**	0.863**	1.494**	107.231**	13.321**	2.224**	3122.593**	7.280**
F <sub>1</sub> Vs Reciprocals	1	9.054**	8.061	1.339**	3.343**	0.005	14.881	11.006**	12.595	2371.810**	1.414
Error	126	0.959	35.549	0.148	0.089	0.177	40.799	1.566	1.050	89.282	0.958
Total	191	3.846	197.425	0.34	0.402	0.585	71.79	6.148	1.883	1388.941	4.042

\* - Significant at 5%

\*\* - Significant at 1%

**Table 2: Estimation of heterosis range over mid parent, better parent and standard checks for 10 characters in 56 okra hybrids**

Characters	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta
Days to 50% flowering	-5.56 to 4.63	-7.48 to 4.26	-2.16 to 8.63	-1.45 to 9.42	1.49 to 12.69	0 to 11.03
Plant height (cm)	-29.69 to 56.46	-40.37 to 35.77	-15.56 to 85.02	-0.53 to 117.95	22.58 to 168.59	55.91 to 241.61
Number of branches	-30.00 to 73.33	-36.36 to 62.50	-33.33 to 44.44	-33.33 to 44.44	-33.33 to 44.44	0 to 116.67
Internodal length (cm)	-15.69 to 44.56	-27.12 to 37.21	-9.15 to 45.07	-8.51 to 46.10	-7.86 to 47.14	27.72 to 103.96
Fruit length (cm)	-5.24 to 11.50	-11.00 to 6.97	-6.94 to 12.75	5.32 to 27.59	3.74 to 25.69	-1.89 to 18.87
Fruit diameter (cm)	-8.10 to 10.28	-11.665 to 9.432	-7.27 to 7.27	-1.92 to 13.46	2.00 to 18.00	-3.77 to 11.32
Number of fruits	-14.67 to 56.36	-30.43 to 48.28	-23.81 to 47.62	-23.81 to 47.62	-11.11 to 72.22	-11.11 to 72.22
Average fruit weight (g)	-7.44 to 18.70	-12.50 to 16.67	-1.79 to 30.36	3.77 to 37.74	7.84 to 43.14	3.77 to 37.74
Fruit yield per plant (g)	-20.78 to 96.46	-35.22 to 89.13	-27.50 to 84.13	-22.44 to 96.99	-28.74 to 80.99	-29.82 to 78.25
Fruit yield per hectare (T)	-12.41 to 96.46	-24.42 to 89.10	-14.59 to 88.91	-10.95 to 96.97	-15.6 to 86.68	-12.72 to 93.05

**Table 3: Performance of top 10 hybrids for yield and yield related components in okra**

Crosses/ checks	Days to 50% flowering	Plant height (cm)	Number of branches per plant	Inter nodal length (cm)	Fruit length (cm)	Fruit Diameter (cm)	Number of fruits per plant	Average fruit weight (g)	Fruit yield per plant (g)	Fruit yield per hectare (T/ha)
ArkaAnamika × DBh-43	56.67	94.87	2.67	5.53	16.23	1.93	20.67	16.00	285.10	15.84
DBh-37 × ArkaAbhay	56.67	96.33	2.33	6.47	15.33	1.90	19.67	13.00	248.03	13.78
ArkaAnamika × DBh-47	57.67	66.87	2.33	5.80	16.80	1.87	14.67	16.00	255.29	13.55
DBh-43 × ArkaAnamika	59.67	64.67	4.33	5.60	15.83	1.90	18.67	12.00	232.88	12.94
ArkaAnamika × DBh-37	57.00	90.27	3.33	6.13	15.17	1.90	17.00	13.00	224.93	12.50
Arka Abhay × Arka Anamika	57.67	51.77	3.67	6.13	15.57	1.73	19.67	12.00	235.31	12.17
DBh-39 × ArkaAnamika	59.33	88.00	3.33	5.73	16.03	1.97	15.33	14.00	207.80	11.54
ArkaAnamika × DBh-39	57.33	63.20	3.00	5.97	14.90	1.80	16.33	13.00	205.15	11.40
DBh-55 × ArkaAnamika	59.67	57.67	3.00	4.50	15.67	1.80	16.00	13.00	202.47	11.22
DBh-43 × ArkaAbhay	60.67	68.00	4.00	5.43	16.13	1.87	15.67	12.00	187.23	11.15
Mahycono.10	58.67	52.07	3.00	4.73	14.90	1.83	14.00	11.00	154.84	8.38
Mahycono.55	59.33	44.20	3.00	4.70	13.17	1.73	14.00	10.00	144.73	8.04
Mahycono.64	54.00	35.87	3.00	4.67	13.37	1.67	12.00	13.00	157.52	8.48
Syngenta519	56.67	28.20	2.00	3.37	14.13	1.77	12.00	13.00	159.95	8.20

**Table 4: Heterosis (%) over mid-parent (MP), better-parent (BP) and standard checks for yield and yield related component traits in okra**

Crosses	Days to 50% flowering						Plant height (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
Arka Abhay x Arka Anamika	-4.42**	-4.95**	-1.7	-2.81*	6.79**	1.76	3.88	0.84	-0.58	17.12	44.33**	83.57**
ArkaAbhay x DBh-30	-1.92	-3.24*	1.7	0.56	10.49**	5.29**	-13.22	-14.35	-15.56	-0.53	22.58	55.91**
ArkaAbhay x DBh-37	-0.82	-2.16	2.84*	1.69	11.73**	6.47**	-29.69**	-40.37**	-15.56	-0.53	22.58	55.91**
ArkaAbhay x DBh-39	0	-1.61	3.98**	2.81*	12.96**	7.65**	-10.28	-23.94**	7.81	27.00*	56.51**	99.05**
ArkaAbhay x DBh-43	-5.56**	-5.56**	-3.41*	-4.49**	4.94**	0	-1.61	-16.18*	17.41	38.31**	70.45**	116.78**
ArkaAbhay x DBh-47	-1.12	-1.67	0.57	-0.56	9.26**	4.12**	-1.72	-11.86	9.48	28.96**	58.92**	102.13**
ArkaAbhay x DBh-55	-4.37**	-5.91**	-0.57	-1.69	8.02**	2.94*	9.3	5.84	11.4	31.22**	61.71**	105.67**
Arka Anamika x Arka Abhay	-3.87**	-4.40**	-1.14	-2.25	7.41**	2.35	1.2	-1.75	-3.14	14.1	40.61**	78.84**
ArkaAnamika x DBh-30	-7.36**	-8.11**	-3.41*	-4.49**	4.94**	0	21.22*	19.2	14.47	34.84**	66.17**	111.35**
ArkaAnamika x DBh-37	-6.81**	-7.57**	-2.84*	-3.93**	5.56**	0.59	47.90**	22.42**	73.37**	104.22**	151.67**	220.09**
ArkaAnamika x DBh-39	-6.52**	-7.53**	-2.27	-3.37*	6.17**	1.18	3.49	-14.36*	21.38*	42.99**	76.21**	124.11**
ArkaAnamika x DBh-43	-6.08**	-6.59**	-3.41*	-4.49**	4.94**	0	56.46**	30.07**	82.20**	114.63**	164.50**	236.41**
ArkaAnamika x DBh-47	-3.89**	-4.95**	-1.7	-2.81*	6.79**	1.76	18.35*	3.4	28.43**	51.28**	86.43**	137.12**
ArkaAnamika x DBh-55	-9.78**	-10.75**	-5.68**	-6.74**	2.47	-2.35	33.42**	25.55**	32.14**	55.66**	91.82**	143.97**
DBh-30 x ArkaAbhay	-3.01**	-4.32**	0.57	-0.56	9.26**	4.12**	-8.16	-9.35	-10.63	5.28	29.74*	65.01**
DBh-30 x ArkaAnamika	-4.63**	-5.41**	-0.57	-1.69	8.02**	2.94*	21.49*	19.47*	14.72	35.14**	66.54**	111.82**
DBh-30 x DBh-37	-3.78**	-3.78**	1.14	0	9.88**	4.71**	-1.62	-17.45**	16.9	37.71**	69.70**	115.84**
DBh-30 x DBh-39	-5.66**	-5.91**	-0.57	-1.69	8.02**	2.94*	21.16**	1.63	44.05**	69.68**	109.11**	165.96**
DBh-30 x DBh-43	-2.47*	-3.78**	1.14	0	9.88**	4.71**	4.12	-12.25	22.92*	44.80**	78.44**	126.95**
DBh-30 x DBh-47	-5.23**	-7.03**	-2.27	-3.37*	6.17**	1.18	17.67*	4.33	29.58**	52.64**	88.10**	139.24**
DBh-30 x DBh-55	-5.12**	-5.38**	0	-1.12	8.64**	3.53*	41.98**	35.77**	42.89**	68.33**	107.44**	163.83**
DBh-37 x ArkaAbhay	-6.85**	-8.11**	-3.41*	-4.49**	4.94**	0	54.05**	30.65**	85.02**	117.95**	168.59**	241.61**
DBh-37 x ArkaAnamika	-2.45*	-3.24*	1.7	0.56	10.49**	5.29**	52.92**	26.58**	79.26**	111.16**	160.22**	230.97**
DBh-37 x DBh-30	-1.62	-1.62	3.41*	2.25	12.35**	7.06**	36.31**	14.38*	61.97**	90.80**	135.13**	199.05**
DBh-37 x DBh-39	1.35	1.08	6.82**	5.62**	16.05**	10.59**	4.84	4.79	48.53**	74.96**	115.61**	174.23**
DBh-37 x DBh-43	2.47*	1.08	6.25**	5.06**	15.43**	10.00**	21.64**	20.98**	71.32**	101.81**	148.70**	216.31**
DBh-37 x DBh-47	0.83	-1.08	3.98**	2.81*	12.96**	7.65**	28.13**	20.25**	70.29**	100.60**	147.21**	214.42**

Contd...

Table 5 contd.....

Crosses	Days to 50% flowering						Plant height (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
DBh-37 x DBh-55	-3.50**	-3.76**	1.7	0.56	10.49**	5.29**	32.26**	15.28*	63.25**	92.31**	136.99**	201.42**
DBh-39 x ArkaAbhay	-0.55	-2.15	3.41*	2.25	12.35**	7.06**	10.82	-6.05	33.16**	56.86**	93.31**	145.86**
DBh-39 x ArkaAnamika	-3.26**	-4.30**	1.14	0	9.88**	4.71**	44.10**	19.24**	69.01**	99.10**	145.35**	212.06**
DBh-39 x DBh-30	-4.04**	-4.30**	1.14	0	9.88**	4.71**	24.93**	4.79	48.53**	74.96**	115.61**	174.23**
DBh-39 x DBh-37	0.81	0.54	6.25**	5.06**	15.43**	10.00**	9.81	9.76	55.57**	83.26**	125.84**	187.23**
DBh-39 x DBh-43	1.64	0	5.68**	4.49**	14.81**	9.41**	14.95*	14.27*	61.97**	90.80**	135.13**	199.05**
DBh-39 x DBh-47	1.1	-1.08	4.55**	3.37*	13.58**	8.24**	31.92**	23.76**	75.42**	106.64**	154.65**	223.88**
DBh-39 x DBh-55	-3.76**	-3.76**	1.7	0.56	10.49**	5.29**	22.86**	7.05	51.73**	78.73**	120.26**	180.14**
DBh-43 x ArkaAbhay	1.11	1.11	3.41*	2.25	12.35**	7.06**	9.44	-6.76	30.60**	53.85**	89.59**	141.13**
DBh-43 x ArkaAnamika	-1.1	-1.65	1.7	0.56	10.49**	5.29**	6.65	-11.33	24.20*	46.30**	80.30**	129.31**
DBh-43 x DBh-30	-7.95**	-9.19**	-4.55**	-5.62**	3.70*	-1.18	12.8	-4.94	33.16**	56.86**	93.31**	145.86**
DBh-43 x DBh-37	1.37	0	5.11**	3.93**	14.20**	8.82**	6.36	5.79	49.81**	76.47**	117.47**	176.60**
DBh-43 x DBh-39	3.28**	1.61	7.39**	6.18**	16.67**	11.18**	-9.59	-10.12	27.40**	50.08**	84.94**	135.22**
DBh-43 x DBh-47	2.23	1.67	3.98**	2.81*	12.96**	7.65**	1.74	-4.02	34.44**	58.37**	95.17**	148.23**
DBh-43 x DBh-55	-0.55	-2.15	3.41*	2.25	12.35**	7.06**	1.04	-11.52	23.94*	46.00**	79.93**	128.84**
DBh-47 x ArkaAbhay	0.56	0	2.27	1.12	11.11**	5.88**	-1.72	-11.86	9.48	28.96**	58.92**	102.13**
DBh-47 x ArkaAnamika	-1.67	-2.75*	0.57	-0.56	9.26**	4.12**	-2.89	-15.15*	5.38	24.13*	52.97**	94.56**
DBh-47 x DBh-30	-3.58**	-5.41**	-0.57	-1.69	8.02**	2.94*	0.35	-11.03	10.5	30.17**	60.41**	104.02**
DBh-47 x DBh-37	0.28	-1.62	3.41*	2.25	12.35**	7.06**	4.24	-2.17	38.54**	63.20**	101.12**	155.79**
DBh-47 x DBh-39	-2.2	-4.30**	1.14	0	9.88**	4.71**	0.63	-5.6	33.80**	57.62**	94.24**	147.04**
DBh-47 x DBh-43	-1.12	-1.67	0.57	-0.56	9.26**	4.12**	-15.50*	-20.29**	11.65	31.52**	62.08**	106.15**
DBh-47 x DBh-55	-1.1	-3.23*	2.27	1.12	11.11**	5.88**	4.35	-3.61	19.72*	41.03**	73.79**	121.04**
DBh-55 x ArkaAbhay	-1.09	-2.69*	2.84*	1.69	11.73**	6.47**	6.53	3.16	8.58	27.90*	57.62**	100.47**
DBh-55 x ArkaAnamika	-2.72*	-3.76**	1.7	0.56	10.49**	5.29**	11.83	5.23	10.76	30.47**	60.78**	104.49**
DBh-55 x DBh-30	-6.74**	-6.99**	-1.7	-2.81*	6.79**	1.76	39.82**	33.70**	40.72**	65.76**	104.28**	159.81**
DBh-55 x DBh-37	-1.35	-1.61	3.98**	2.81*	12.96**	7.65**	23.76**	7.87	52.75**	79.94**	121.75**	182.03**
DBh-55 x DBh-39	1.08	1.08	6.82**	5.62**	16.05**	10.59**	14.98*	0.18	42.00**	67.27**	106.13**	162.17**
DBh-55 x DBh-43	-3.28**	-4.84**	0.57	-0.56	9.26**	4.12**	2.3	-10.42	25.48**	47.81**	82.16**	131.68**
DBh-55 x DBh-47	-4.40**	-6.45**	-1.14	-2.25	7.41**	2.35	14.62*	5.88	31.50**	54.90**	90.89**	142.79**

Contd...

Table 5 contd.....

Crosses	Number of branches						Internodal length (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
Arka Abhay x Arka Anamika	29.41**	22.22*	22.22*	22.22*	22.22*	83.33**	30.96**	26.03**	29.58**	30.50**	31.43**	82.18**
ArkaAbhay x DBh-30	62.50**	62.50**	44.44**	44.44**	44.44**	116.67**	36.88**	33.33**	26.76**	27.66**	28.57**	78.22**
ArkaAbhay x DBh-37	5.26	-9.09	11.11	11.11	11.11	66.67**	17.53**	9.62*	20.42**	21.28**	22.14**	69.31**
ArkaAbhay x DBh-39	33.33**	25.00*	11.11	11.11	11.11	66.67**	15.00**	11.03*	13.38*	14.18**	15.00**	59.41**
ArkaAbhay x DBh-43	71.43**	50.00**	33.33**	33.33**	33.33**	100.00**	19.87**	5.65	31.69**	32.62**	33.57**	85.15**
ArkaAbhay x DBh-47	15.79	0	22.22*	22.22*	22.22*	83.33**	9.85*	7.41	2.11	2.84	3.57	43.56**
ArkaAbhay x DBh-55	12.5	12.5	0	0	0	50.00**	10.96*	3.18	14.08**	14.89**	15.71**	60.40**
Arka Anamika x Arka Abhay	5.88	0	0	0	0	50.00**	3.2	-0.68	2.11	2.84	3.57	43.56**
ArkaAnamika x DBh-30	5.88	0	0	0	0	50.00**	15.33**	8.22	11.27*	12.06*	12.86*	56.44**
ArkaAnamika x DBh-37	0	-9.09	11.11	11.11	11.11	66.67**	21.85**	17.95**	29.58**	30.50**	31.43**	82.18**
ArkaAnamika x DBh-39	12.5	0	0	0	0	50.00**	23.02**	22.60**	26.06**	26.95**	27.86**	77.23**
ArkaAnamika x DBh-43	6.67	-11.11	-11.11	-11.11	-11.11	33.33*	2.79	-6.21	16.90**	17.73**	18.57**	64.36**
ArkaAnamika x DBh-47	-30.00**	-36.36**	-22.22*	-22.22*	-22.22*	16.67	26.55**	19.18**	22.54**	23.40**	24.29**	72.28**
ArkaAnamika x DBh-55	17.65	11.11	11.11	11.11	11.11	66.67**	18.15**	14.01**	26.06**	26.95**	27.86**	77.23**
DBh-30 x ArkaAbhay	12.5	12.5	0	0	0	50.00**	13.31**	10.37	4.93	5.67	6.43	47.52**
DBh-30 x ArkaAnamika	-17.65	-22.22*	-22.22*	-22.22*	-22.22*	16.67	12.41**	5.48	8.45	9.22	10	52.48**
DBh-30 x DBh-37	-26.32**	-36.36**	-22.22*	-22.22*	-22.22*	16.67	6.34	-3.21	6.34	7.09	7.86	49.50**
DBh-30 x DBh-39	6.67	0	-11.11	-11.11	-11.11	33.33*	31.14**	23.45**	26.06**	26.95**	27.86**	77.23**
DBh-30 x DBh-43	28.57*	12.5	0	0	0	50.00**	11.48**	-3.95	19.72**	20.57**	21.43**	68.32**
DBh-30 x DBh-47	5.26	-9.09	11.11	11.11	11.11	66.67**	37.74**	37.21**	24.65**	25.53**	26.43**	75.25**
DBh-30 x DBh-55	-12.5	-12.5	-22.22*	-22.22*	-22.22*	16.67	44.56**	31.21**	45.07**	46.10**	47.14**	103.96**
DBh-37 x ArkaAbhay	-26.32**	-36.36**	-22.22*	-22.22*	-22.22*	16.67	33.33**	24.36**	36.62**	37.59**	38.57**	92.08**
DBh-37 x ArkaAnamika	-30.00**	-36.36**	-22.22*	-22.22*	-22.22*	16.67	1.32	-1.92	7.75	8.51	9.29	51.49**
DBh-37 x DBh-30	-15.79	-27.27**	-11.11	-11.11	-11.11	33.33*	23.24**	12.18*	23.24**	24.11**	25.00**	73.27**
DBh-37 x DBh-39	0	-18.18*	0	0	0	50.00**	1	-2.56	7.04	7.8	8.57	50.50**
DBh-37 x DBh-43	5.88	-18.18*	0	0	0	50.00**	2.7	-3.39	20.42**	21.28**	22.14**	69.31**
DBh-37 x DBh-47	-18.18*	-18.18*	0	0	0	50.00**	18.60**	8.33	19.01**	19.86**	20.71**	67.33**
DBh-37 x DBh-55	-5.26	-18.18*	0	0	0	50.00**	16.29**	15.92**	28.17**	29.08**	30.00**	80.20**

Contd...

Table 5 contd.....

Crosses	Number of branches						Internodal length (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
DBh-39 x ArkaAbhay	20	12.5	0	0	0	50.00**	27.86**	23.45**	26.06**	26.95**	27.86**	77.23**
DBh-39 x ArkaAnamika	25.00*	11.11	11.11	11.11	11.11	66.67**	18.21**	17.81**	21.13**	21.99**	22.86**	70.30**
DBh-39 x DBh-30	20	12.5	0	0	0	50.00**	31.14**	23.45**	26.06**	26.95**	27.86**	77.23**
DBh-39 x DBh-37	11.11	-9.09	11.11	11.11	11.11	66.67**	14.95**	10.90*	21.83**	22.70**	23.57**	71.29**
DBh-39 x DBh-43	53.85**	42.86**	11.11	11.11	11.11	66.67**	16.77**	6.21	32.39**	33.33**	34.29**	86.14**
DBh-39 x DBh-47	0	-18.18*	0	0	0	50.00**	20.44**	13.79**	16.20**	17.02**	17.86**	63.37**
DBh-39 x DBh-55	20	12.5	0	0	0	50.00**	17.88**	13.38**	25.35**	26.24**	27.14**	76.24**
DBh-43 x ArkaAbhay	71.43**	50.00**	33.33**	33.33**	33.33**	100.00**	4.49	-7.91	14.79**	15.60**	16.43**	61.39**
DBh-43 x ArkaAnamika	73.33**	44.44**	44.44**	44.44**	44.44**	116.67**	4.02	-5.08	18.31**	19.15**	20.00**	66.34**
DBh-43 x DBh-30	28.57*	12.5	0	0	0	50.00**	23.93**	6.78	33.10**	34.04**	35.00**	87.13**
DBh-43 x DBh-37	5.88	-18.18*	0	0	0	50.00**	7.51*	1.13	26.06**	26.95**	27.86**	77.23**
DBh-43 x DBh-39	38.46**	28.57*	0	0	0	50.00**	-9.94*	-18.08**	2.11	2.84	3.57	43.56**
DBh-43 x DBh-47	5.88	-18.18*	0	0	0	50.00**	-1.96	-15.25**	5.63	6.38	7.14	48.51**
DBh-43 x DBh-55	28.57*	12.5	0	0	0	50.00**	-13.77**	-18.64**	1.41	2.13	2.86	42.57**
DBh-47 x ArkaAbhay	-5.26	-18.18*	0	0	0	50.00**	12.88**	10.37	4.93	5.67	6.43	47.52**
DBh-47 x ArkaAnamika	-10	-18.18*	0	0	0	50.00**	12.73**	6.16	9.15	9.93	10.71*	53.47**
DBh-47 x DBh-30	-5.26	-18.18*	0	0	0	50.00**	20.62**	20.16**	9.15	9.93	10.71*	53.47**
DBh-47 x DBh-37	-18.18*	-18.18*	0	0	0	50.00**	8.77*	-0.64	9.15	9.93	10.71*	53.47**
DBh-47 x DBh-39	0	-18.18*	0	0	0	50.00**	8.76	2.76	4.93	5.67	6.43	47.52**
DBh-47 x DBh-43	5.88	-18.18*	0	0	0	50.00**	-15.69**	-27.12**	-9.15	-8.51	-7.86	27.72**
DBh-47 x DBh-55	-5.26	-18.18*	0	0	0	50.00**	-9.79*	-17.83**	-9.15	-8.51	-7.86	27.72**
DBh-55 x ArkaAbhay	12.5	12.5	0	0	0	50.00**	-6.85	-13.38**	-4.23	-3.55	-2.86	34.65**
DBh-55 x ArkaAnamika	5.88	0	0	0	0	50.00**	-10.89*	-14.01**	-4.93	-4.26	-3.57	33.66**
DBh-55 x DBh-30	-25.00*	-25.00*	-33.33**	-33.33**	-33.33**	0	14.39**	3.82	14.79**	15.60**	16.43**	61.39**
DBh-55 x DBh-37	-26.32**	-36.36**	-22.22*	-22.22*	-22.22*	16.67	6.71	6.37	17.61**	18.44**	19.29**	65.35**
DBh-55 x DBh-39	-20	-25.00*	-33.33**	-33.33**	-33.33**	0	6.62	2.55	13.38*	14.18**	15.00**	59.41**
DBh-55 x DBh-43	28.57*	12.5	0	0	0	50.00**	-2.99	-8.47*	14.08**	14.89**	15.71**	60.40**
DBh-55 x DBh-47	-5.26	-18.18*	0	0	0	50.00**	19.58**	8.92	20.42**	21.28**	22.14**	69.31**

Contd...



Table 5 contd.....

Crosses	Fruit length (cm)						Fruit diameter (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
Arka Abhay x Arka Anamika	-2.2	-4.89*	4.47	18.23**	16.46**	10.14**	-6.31	-7.15	-5.46	0.00	4.00	-1.89
ArkaAbhay x DBh-30	3.15	-1.29	2.46	15.95**	14.21**	8.02**	-3.63	-3.64	-3.63	1.93	6.00	0.00
ArkaAbhay x DBh-37	1.1	-1.29	2.46	15.95**	14.21**	8.02**	0.93	-1.82	-1.82	3.85	8.00	1.89
ArkaAbhay x DBh-39	-1.24	-5.60*	-2.01	10.89**	9.23**	3.3	2.75	1.82	1.82	7.69	12.00*	5.66
ArkaAbhay x DBh-43	-2.61	-3.66	0	13.16**	11.47**	5.42*	-2.61	-6.67	1.82	7.69	12.00*	5.66
ArkaAbhay x DBh-47	0.57	-4.96*	-1.34	11.65**	9.98**	4.01	-3.71	-5.46	-5.46	0.00	4.00	-1.89
ArkaAbhay x DBh-55	-0.45	-5.60*	-2.01	10.89**	9.23**	3.3	-5.46	-5.46	-5.46	0.00	4.00	-1.89
Arka Anamika x Arka Abhay	1.36	-1.43	8.28**	22.53**	20.70**	14.15**	-4.50	-5.36	-3.63	1.93	6.00	0.00
ArkaAnamika x DBh-30	-4.48*	-11.00**	-2.24	10.63**	8.98**	3.07	-8.11	-8.93	-7.27	-1.92	2.00	-3.77
ArkaAnamika x DBh-37	-2.47	-7.33**	1.79	15.19**	13.47**	7.31**	5.56	1.79	3.64	9.62	14.00**	7.55
ArkaAnamika x DBh-39	-2.19	-8.96**	0	13.16**	11.47**	5.42*	-1.82	-3.57	-1.82	3.85	8.00	1.89
ArkaAnamika x DBh-43	3.07	-0.81	8.95**	23.29**	21.45**	14.86**	0.00	-3.34	5.45	11.54*	16.00**	9.43
ArkaAnamika x DBh-47	11.50**	2.65	12.75**	27.59**	25.69**	18.87**	2.75	0.00	1.82	7.69	12.00*	5.66
ArkaAnamika x DBh-55	3.64	-4.28*	5.15*	18.99**	17.21**	10.85**	-0.90	-1.79	0.00	5.77	10.00	3.77
DBh-30 x ArkaAbhay	1.58	-2.8	0.89	14.18**	12.47**	6.37**	0.00	0.00	0.00	5.77	10.00	3.77
DBh-30 x ArkaAnamika	-1.64	-8.35**	0.67	13.92**	12.22**	6.13*	-0.90	-1.79	0.00	5.77	10.00	3.77
DBh-30 x DBh-37	-2.31	-4.3	-5.37*	7.09**	5.49*	-0.24	4.67	1.82	1.82	7.69	12.00*	5.66
DBh-30 x DBh-39	2.48	2.36	-2.91	9.87**	8.23**	2.36	-0.92	0.00	-1.82	3.85	8.00	1.89
DBh-30 x DBh-43	-0.91	-4.19	-2.68	10.13**	8.48**	2.59	-6.09	-10.00	-1.82	3.85	8.00	1.89
DBh-30 x DBh-47	7.29**	5.90*	0.45	13.67**	11.97**	5.90*	3.71	5.66	1.82	7.69	12.00*	5.66
DBh-30 x DBh-55	4.05	3.07	-2.24	10.63**	8.98**	3.07	3.64	3.64	3.64	9.62	14.00**	7.55
DBh-37 x ArkaAbhay	1.55	-0.86	2.91	16.46**	14.71**	8.49**	6.54	3.64	3.64	9.62	14.00**	7.55
DBh-37 x ArkaAnamika	3.54	-1.63	8.05**	22.28**	20.45**	13.92**	5.56	1.79	3.64	9.62	14.00**	7.55
DBh-37 x DBh-30	3.23	1.13	0	13.16**	11.47**	5.42*	4.67	1.82	1.82	7.69	12.00*	5.66
DBh-37 x DBh-39	1.73	-0.45	-1.57	11.39**	9.73**	3.77	5.66	3.71	1.82	7.69	12.00*	5.66
DBh-37 x DBh-43	-2.46	-3.74	-2.24	10.63**	8.98**	3.07	-5.36	-11.665*	-3.63	1.93	6.00	0.00
DBh-37 x DBh-47	6.90**	3.39	2.24	15.70**	13.97**	7.78**	4.76	3.77	0.00	5.77	10.00	3.77

Contd...

Table 5 contd.....

Crosses	Fruit length (cm)						Fruit diameter (cm)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
DBh-37 x DBh-55	2.8	-0.23	-1.34	11.65**	9.98**	4.01	8.41	5.45	5.45	11.54*	16.00**	9.43
DBh-39 x ArkaAbhay	1.47	-3.02	0.67	13.92**	12.22**	6.13*	4.59	3.64	3.64	9.62	14.00**	7.55
DBh-39 x ArkaAnamika	5.25**	-2.04	7.61**	21.77**	19.95**	13.44**	7.27	5.36	7.27	13.46*	18.00**	11.32*
DBh-39 x DBh-30	1.06	0.94	-4.25	8.35**	6.73**	0.94	-2.75	-3.64	-3.63	1.93	6.00	0.00
DBh-39 x DBh-37	1.73	-0.45	-1.57	11.39**	9.73**	3.77	9.43207*	7.41	5.45	11.54*	16.00**	9.43
DBh-39 x DBh-43	-1.71	-5.07*	-3.58	9.11**	7.48**	1.65	3.51	-1.67	7.27	13.46*	18.00**	11.32*
DBh-39 x DBh-47	5.50*	4.26	-1.34	11.65**	9.98**	4.01	10.289*	9.26	7.27	13.46*	18.00**	11.32*
DBh-39 x DBh-55	3.46	2.6	-2.91	9.87**	8.23**	2.36	4.59	5.56	3.64	9.62	14.00**	7.55
DBh-43 x ArkaAbhay	5.45**	4.31	8.28**	22.53**	20.70**	14.15**	-2.61	-6.67	1.82	7.69	12.00*	5.66
DBh-43 x ArkaAnamika	0.53	-3.26	6.26**	20.25**	18.45**	12.03**	-1.72	-5.00	3.64	9.62	14.00**	7.55
DBh-43 x DBh-30	-5.24*	-8.37**	-6.94**	5.32*	3.74	-1.89	0.87	-3.34	5.45	11.54*	16.00**	9.43
DBh-43 x DBh-37	0.45	-0.88	0.67	13.92**	12.22**	6.13*	-1.79	-8.34	0.00	5.77	10.00	3.77
DBh-43 x DBh-39	0.11	-3.3	-1.79	11.14**	9.48**	3.54	-1.75	-6.67	1.82	7.69	12.00*	5.66
DBh-43 x DBh-47	0.81	-3.74	-2.24	10.63**	8.98**	3.07	0.88	-5.00	3.64	9.62	14.00**	7.55
DBh-43 x DBh-55	0.46	-3.74	-2.24	10.63**	8.98**	3.07	-4.35	-8.34	0.00	5.77	10.00	3.77
DBh-47 x ArkaAbhay	0.8	-4.74*	-1.12	11.90**	10.22**	4.25	0.92	1.85	0.00	5.77	10.00	3.77
DBh-47 x ArkaAnamika	-1.55	-9.37**	-0.45	12.66**	10.97**	4.95*	-1.82	-3.57	-1.82	3.85	8.00	1.89
DBh-47 x DBh-30	1.79	0.47	-4.70*	7.85**	6.23*	0.47	0.92	0.00	0.00	5.77	10.00	3.77
DBh-47 x DBh-37	-2.69	-5.88*	-6.94**	5.32*	3.74	-1.89	3.77	1.85	0.00	5.77	10.00	3.77
DBh-47 x DBh-39	0.96	-0.24	-5.59*	6.84**	5.24*	-0.47	1.85	1.85	0.00	5.77	10.00	3.77
DBh-47 x DBh-43	-1.96	-6.39**	-4.92*	7.59**	5.99*	0.24	-5.26	-10.00	-1.82	3.85	8.00	1.89
DBh-47 x DBh-55	1.33	0.96	-6.04**	6.33*	4.74	-0.94	0.92	0.00	0.00	5.77	10.00	3.77
DBh-55 x ArkaAbhay	0.45	-4.74*	-1.12	11.90**	10.22**	4.25	0.92	0.00	0.00	5.77	10.00	3.77
DBh-55 x ArkaAnamika	3.64	-4.28*	5.15*	18.99**	17.21**	10.85**	-1.82	-3.57	-1.82	3.85	8.00	1.89
DBh-55 x DBh-30	5.24*	4.25	-1.12	11.90**	10.22**	4.25	2.75	1.82	1.82	7.69	12.00*	5.66
DBh-55 x DBh-37	-2.1	-4.98*	-6.04**	6.33*	4.74	-0.94	-3.77	-5.56	-7.27	-1.92	2.00	-3.77
DBh-55 x DBh-39	2.03	1.18	-4.25	8.35**	6.73**	0.94	0.00	0.00	-1.82	3.85	8.00	1.89
DBh-55 x DBh-43	-1.15	-5.29*	-3.8	8.86**	7.23**	1.42	-5.26	-10.00	-1.82	3.85	8.00	1.89
DBh-55 x DBh-47	7.36**	6.97**	-0.45	12.66**	10.97**	4.95*	8.41	9.43	5.45	11.54*	16.00**	9.43

Contd...

Table 5 contd.....

Crosses	Number of fruits						Average fruit weight (g)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
Arka Abhay x Arka Anamika	24.21**	22.92**	40.48**	40.48**	63.89**	63.89**	-6.25*	-7.69*	7.14	13.21**	17.65**	13.21**
ArkaAbhay x DBh-30	16.13**	14.89*	28.57**	28.57**	50.00**	50.00**	-2.44	-4.76	7.14	13.21**	17.65**	13.21**
ArkaAbhay x DBh-37	-11.36	-17.02*	-7.14	-7.14	8.33	8.33	-0.83	-4.76	7.14	13.21**	17.65**	13.21**
ArkaAbhay x DBh-39	8.43	-4.26	7.14	7.14	25.00**	25.00**	2.48	-1.59	10.71**	16.98**	21.57**	16.98**
ArkaAbhay x DBh-43	-9.89	-12.77	-2.38	-2.38	13.89	13.89	7.09*	6.25	21.43**	28.30**	33.33**	28.30**
ArkaAbhay x DBh-47	10.53	-10.64	0	0	16.67	16.67	0	-6.35	5.36	11.32**	15.69**	11.32**
ArkaAbhay x DBh-55	1.37	-21.28**	-11.9	-11.9	2.78	2.78	10.00**	4.76	17.86**	24.53**	29.41**	24.53**
Arka Anamika x Arka Abhay	-5.26	-6.25	7.14	7.14	25.00**	25.00**	-1.56	-3.08	12.50**	18.87**	23.53**	18.87**
ArkaAnamika x DBh-30	-8.51	-10.42	2.38	2.38	19.44*	19.44*	-7.20*	-10.77**	3.57	9.43*	13.73**	9.43*
ArkaAnamika x DBh-37	14.61*	6.25	21.43**	21.43**	41.67**	41.67**	17.07**	10.77**	28.57**	35.85**	41.18**	35.85**
ArkaAnamika x DBh-39	16.67**	2.08	16.67*	16.67*	36.11**	36.11**	10.57**	4.62	21.43**	28.30**	33.33**	28.30**
ArkaAnamika x DBh-43	34.78**	29.17**	47.62**	47.62**	72.22**	72.22**	11.63**	10.77**	28.57**	35.85**	41.18**	35.85**
ArkaAnamika x DBh-47	14.29*	-8.33	4.76	4.76	22.22*	22.22*	7.68	-2.79	25.00**	32.08**	37.25**	32.08**
ArkaAnamika x DBh-55	10.81	-14.58*	-2.38	-2.38	13.89	13.89	14.75**	7.69*	25.00**	32.08**	37.25**	32.08**
DBh-30 x ArkaAbhay	3.23	2.13	14.29	14.29	33.33**	33.33**	5.69	3.17	16.07**	22.64**	27.45**	22.64**
DBh-30 x ArkaAnamika	-8.51	-10.42	2.38	2.38	19.44*	19.44*	10.40**	6.15	23.21**	30.19**	35.29**	30.19**
DBh-30 x DBh-37	-10.34	-15.22*	-7.14	-7.14	8.33	8.33	6.78*	5	12.50**	18.87**	23.53**	18.87**
DBh-30 x DBh-39	0	-10.87	-2.38	-2.38	13.89	13.89	5.08	3.33	10.71**	16.98**	21.57**	16.98**
DBh-30 x DBh-43	2.22	0	9.52	9.52	27.78**	27.78**	0	-3.13	10.71**	16.98**	21.57**	16.98**
DBh-30 x DBh-47	25.33**	2.17	11.9	11.9	30.56**	30.56**	14.78**	10.00**	17.86**	24.53**	29.41**	24.53**
DBh-30 x DBh-55	11.11	-13.04	-4.76	-4.76	11.11	11.11	14.53**	11.67**	19.64**	26.42**	31.37**	26.42**
DBh-37 x ArkaAbhay	34.09**	25.53**	40.48**	40.48**	63.89**	63.89**	14.05**	9.52**	23.21**	30.19**	35.29**	30.19**
DBh-37 x ArkaAnamika	12.36*	4.17	19.05*	19.05*	38.89**	38.89**	4.07	-1.54	14.29**	20.75**	25.49**	20.75**
DBh-37 x DBh-30	-12.64*	-17.39*	-9.52	-9.52	5.56	5.56	18.64**	16.67**	25.00**	32.08**	37.25**	32.08**
DBh-37 x DBh-39	-6.49	-12.2	-14.29	-14.29	0	0	-3.45	-3.45	0	5.66	9.80*	5.66
DBh-37 x DBh-43	5.88	2.27	7.14	7.14	25.00**	25.00**	0	-4.69	8.93*	15.09**	19.61**	15.09**
DBh-37 x DBh-47	25.71**	7.32	4.76	4.76	22.22*	22.22*	13.27**	10.34**	14.29**	20.75**	25.49**	20.75**
DBh-37 x DBh-55	34.33**	9.76	7.14	7.14	25.00**	25.00**	-4.35	-5.17	-1.79	3.77	7.84	3.77

Contd...

Table 5 contd.....

Crosses	Number of fruits						Average fruit weight (g)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
DBh-39 x ArkaAbhay	22.89**	8.51	21.43**	21.43**	41.67**	41.67**	4.13	0	12.50**	18.87**	23.53**	18.87**
DBh-39 x ArkaAnamika	9.52	-4.17	9.52	9.52	27.78**	27.78**	18.70**	12.31**	30.36**	37.74**	43.14**	37.74**
DBh-39 x DBh-30	7.32	-4.35	4.76	4.76	22.22*	22.22*	15.25**	13.33**	21.43**	28.30**	33.33**	28.30**
DBh-39 x DBh-37	9.09	2.44	0	0	16.67	16.67	6.90*	6.9	10.71**	16.98**	21.57**	16.98**
DBh-39 x DBh-43	25.00**	13.64	19.05*	19.05*	38.89**	38.89**	6.56*	1.56	16.07**	22.64**	27.45**	22.64**
DBh-39 x DBh-47	53.85**	38.89**	19.05*	19.05*	38.89**	38.89**	18.58**	15.52**	19.64**	26.42**	31.37**	26.42**
DBh-39 x DBh-55	38.71**	19.44*	2.38	2.38	19.44*	19.44*	11.30**	10.34**	14.29**	20.75**	25.49**	20.75**
DBh-43 x ArkaAbhay	3.3	0	11.9	11.9	30.56**	30.56**	2.36	1.56	16.07**	22.64**	27.45**	22.64**
DBh-43 x ArkaAnamika	21.74**	16.67*	33.33**	33.33**	55.56**	55.56**	2.33	1.54	17.86**	24.53**	29.41**	24.53**
DBh-43 x DBh-30	0	-2.17	7.14	7.14	25.00**	25.00**	3.23	0	14.29**	20.75**	25.49**	20.75**
DBh-43 x DBh-37	-1.18	-4.55	0	0	16.67	16.67	1.64	-3.13	10.71**	16.98**	21.57**	16.98**
DBh-43 x DBh-39	-10	-18.18*	-14.29	-14.29	0	0	-3.28	-7.81*	5.36	11.32**	15.69**	11.32**
DBh-43 x DBh-47	20.55**	0	4.76	4.76	22.22*	22.22*	4.2	-3.13	10.71**	16.98**	21.57**	16.98**
DBh-43 x DBh-55	-5.71	-25.00**	-21.43**	-21.43**	-8.33	-8.33	-7.44*	-12.50**	0	5.66	9.80*	5.66
DBh-47 x ArkaAbhay	7.89	-12.77	-2.38	-2.38	13.89	13.89	3.39	-3.17	8.93*	15.09**	19.61**	15.09**
DBh-47 x ArkaAnamika	6.49	-14.58*	-2.38	-2.38	13.89	13.89	5	-3.08	12.50**	18.87**	23.53**	18.87**
DBh-47 x DBh-30	-14.67*	-30.43**	-23.81**	-23.81**	-11.11	-11.11	7.83*	3.33	10.71**	16.98**	21.57**	16.98**
DBh-47 x DBh-37	8.57	-7.32	-9.52	-9.52	5.56	5.56	-2.65	-5.17	-1.79	3.77	7.84	3.77
DBh-47 x DBh-39	13.85	2.78	-11.9	-11.9	2.78	2.78	11.50**	8.62*	12.50**	18.87**	23.53**	18.87**
DBh-47 x DBh-43	15.07*	-4.55	0	0	16.67	16.67	2.52	-4.69	8.93*	15.09**	19.61**	15.09**
DBh-47 x DBh-55	30.91**	24.14*	-14.29	-14.29	0	0	12.50**	10.53**	12.50**	18.87**	23.53**	18.87**
DBh-55 x ArkaAbhay	6.85	-17.02*	-7.14	-7.14	8.33	8.33	10.00**	4.76	17.86**	24.53**	29.41**	24.53**
DBh-55 x ArkaAnamika	29.73**	0	14.29	14.29	33.33**	33.33**	9.84**	3.08	19.64**	26.42**	31.37**	26.42**
DBh-55 x DBh-30	16.67*	-8.7	0	0	16.67	16.67	12.82**	10.00**	17.86**	24.53**	29.41**	24.53**
DBh-55 x DBh-37	16.42*	-4.88	-7.14	-7.14	8.33	8.33	2.61	1.72	5.36	11.32**	15.69**	11.32**
DBh-55 x DBh-39	3.23	-11.11	-23.81**	-23.81**	-11.11	-11.11	13.04**	12.07**	16.07**	22.64**	27.45**	22.64**
DBh-55 x DBh-43	5.71	-15.91*	-11.9	-11.9	2.78	2.78	-4.13	-9.38**	3.57	9.43*	13.73**	9.43*
DBh-55 x DBh-47	56.36**	48.28**	2.38	2.38	19.44*	19.44*	16.07**	14.04**	16.07**	22.64**	27.45**	22.64**

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Table 5 contd.....

Crosses	Fruit yield per plant (g)						Fruit yield per hectare (T/ha)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
Arka Abhay x Arka Anamika	23.30**	20.88**	51.97**	62.58**	49.38**	47.11**	13.99*	12.51	45.17**	51.37**	43.46**	48.35**
ArkaAbhay x DBh-30	-2.33	-7.67	11.52*	19.30**	9.62	7.95	5.9	-0.85	24.61*	29.93**	23.14*	27.35**
ArkaAbhay x DBh-37	-3.58	-14.54**	3.23	10.43	1.47	-0.07	-7.2	-18.25*	2.74	7.13	1.53	5
ArkaAbhay x DBh-39	8.66*	-7.48	11.76*	19.56**	9.85*	8.19	14.52	-3.04	21.87*	27.07**	20.43*	24.54*
ArkaAbhay x DBh-43	-4.78	-8.28*	10.79*	18.52**	8.9	7.25	-2.37	-8.13	15.47	20.40*	14.11	18
ArkaAbhay x DBh-47	2.61	-22.14**	-5.95	0.61	-7.56	-8.96	4	-21.45**	-1.27	2.94	-2.44	0.89
ArkaAbhay x DBh-55	-0.69	-26.56**	-11.29*	-5.1	-12.81*	-14.13**	2.8	-24.42**	-5.01	-0.95	-6.13	-2.93
Arka Anamika x Arka Abhay	-12.92**	-14.63**	7.33	14.82**	5.5	3.89	-11.86	-13	12.25	17.04	10.92	14.71
ArkaAnamika x DBh-30	-12.71**	-19.01**	1.82	8.93	0.08	-1.43	-12.41	-18.98*	4.53	9	3.3	6.83
ArkaAnamika x DBh-37	32.63**	15.55**	45.27**	55.41**	42.79**	40.62**	32.64**	15.53*	49.07**	55.43**	47.31**	52.34**
ArkaAnamika x DBh-39	25.81**	5.39	32.50**	41.75**	30.24**	28.26**	25.77**	5.36	35.94**	41.75**	34.34**	38.93**
ArkaAnamika x DBh-43	54.97**	46.46**	84.13**	96.99**	80.99**	78.25**	57.50**	46.41**	88.91**	96.97**	86.68**	93.05**
ArkaAnamika x DBh-47	75.17**	31.15**	64.88**	76.39**	62.07**	59.61**	67.36**	25.30**	61.67**	68.57**	59.76**	65.22**
ArkaAnamika x DBh-55	23.05**	-10.16*	12.95*	20.84**	11.02*	9.34	23.20**	-10.17	15.9	20.85*	14.54	18.45
DBh-30 x ArkaAbhay	6.42	0.59	21.51**	29.99**	19.43**	17.62**	5.96	-0.79	24.69*	30.02**	23.22*	27.43**
DBh-30 x ArkaAnamika	2.66	-4.75	19.75**	28.11**	17.71**	15.92**	2.98	-4.75	22.90*	28.15**	21.45*	25.60**
DBh-30 x DBh-37	-5.14	-11.41*	-4.71	1.94	-6.34	-7.76	-3.95	-10.04	-1.35	2.86	-2.51	0.81
DBh-30 x DBh-39	7.58	-3.74	3.54	10.76*	1.77	0.23	8	-3.08	6.28	10.82	5.03	8.61
DBh-30 x DBh-43	0.99	-0.97	10.83*	18.57**	8.94	7.29	3.1	2.55	13.68	18.53	12.34	16.17
DBh-30 x DBh-47	46.77**	16.04**	24.82**	33.53**	22.69**	20.83**	47.44**	16.86	28.15**	33.62**	26.64**	30.96**
DBh-30 x DBh-55	28.52**	-1.17	6.3	13.72*	4.49	2.9	29.23**	-0.54	9.07	13.72	7.78	11.46
DBh-37 x ArkaAbhay	49.63**	32.62**	60.19**	71.37**	57.46**	55.07**	48.46**	30.78**	64.37**	71.39**	62.44**	67.98**
DBh-37 x ArkaAnamika	17.06**	1.98	28.21**	37.16**	26.02**	24.11**	17.32*	2.19	31.85**	37.48**	30.29**	34.74**
DBh-37 x DBh-30	6.29	-0.74	6.77	14.22**	4.95	3.35	18.27*	10.77	21.47*	26.66**	20.04*	24.14*
DBh-37 x DBh-39	-9.90*	-13.96*	-19.70**	-14.09**	-21.07**	-22.27**	0.65	-3.86	-7.95	-4.02	-9.04	-5.93
DBh-37 x DBh-43	5.46	-3.3	8.22	15.78**	6.38	4.76	7.27	-0.04	10.82	15.55	9.51	13.25
DBh-37 x DBh-47	43.58**	19.89**	11.89*	19.70**	9.98*	8.31	43.56**	19.89*	14.79	19.69*	13.44	17.31
DBh-37 x DBh-55	30.68**	5.85	-1.21	5.68	-2.9	-4.37	30.94**	5.9	1.39	5.72	0.2	3.62

Contd...

Table 5 contd.....

Crosses	Fruit yield per plant (g)						Fruit yield per hectare (T/ha)					
	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519	MP	BP	Mahyco No. 10	Mahyco No. 55	Mahyco No. 64	Syngenta 519
DBh-39 x ArkaAbhay	24.10**	5.67	27.64**	36.55**	25.46**	23.56**	23.07**	4.21	30.97**	36.57**	29.43**	33.85**
DBh-39 x ArkaAnamika	27.43**	6.75	34.21**	43.57**	31.92**	29.92**	27.39**	6.72	37.69**	43.57**	36.07**	40.72**
DBh-39 x DBh-30	25.38**	12.18**	20.66**	29.09**	18.61**	16.81**	25.78**	12.87	23.78*	29.06**	22.32*	26.49**
DBh-39 x DBh-37	12.95**	7.86	0.66	7.69	-1.05	-2.55	12.96	7.89	3.3	7.71	2.08	5.57
DBh-39 x DBh-43	31.54**	15.67**	29.45**	38.49**	27.25**	25.32**	34.10**	19.76*	32.76**	38.43**	31.20**	35.68**
DBh-39 x DBh-47	85.41**	60.96**	36.68**	46.23**	34.35**	32.31**	53.81**	33.53**	16.38	21.35*	15.01	18.94
DBh-39 x DBh-55	54.81**	30.15**	10.52*	18.23**	8.63	6.99	67.27**	40.37**	22.35*	27.57**	20.90*	25.03*
DBh-43 x ArkaAbhay	3.93	0.11	20.92**	29.36**	18.86**	17.06**	12.42	5.79	32.96**	38.64**	31.39**	35.88**
DBh-43 x ArkaAnamika	26.58**	19.63**	50.40**	60.90**	47.84**	45.60**	28.69**	19.63**	54.35**	60.95**	52.53**	57.74**
DBh-43 x DBh-30	4.63	2.59	14.82**	22.84**	12.86**	11.15*	6.85	6.28	17.81	22.84*	16.42	20.40*
DBh-43 x DBh-37	2.21	-6.28	4.89	12.21*	3.1	1.54	4.23	-2.87	7.67	12.27	6.4	10.04
DBh-43 x DBh-39	-20.78**	-30.33**	-22.03**	-16.59**	-23.36**	-24.52**	0.32	-10.4	-0.68	3.57	-1.85	1.5
DBh-43 x DBh-47	25.51**	-2.19	9.47	17.11**	7.61	5.97	43.43**	13.24	25.53**	30.89**	24.05*	28.28**
DBh-43 x DBh-55	-14.60**	-35.22**	-27.50**	-22.44**	-28.74**	-29.82**	0.49	-22.96**	-14.59	-10.95	-15.6	-12.72
DBh-47 x ArkaAbhay	4.86	-20.43**	-3.89	2.82	-5.53	-6.96	3.87	-21.54**	-1.39	2.82	-2.55	0.77
DBh-47 x ArkaAnamika	2.64	-23.16**	-3.39	3.35	-5.04	-6.48	17.18*	-12.27	13.2	18.03	11.87	15.68
DBh-47 x DBh-30	-7.66	-26.99**	-21.47**	-15.99**	-22.81**	-23.98**	3.34	-18.09*	-10.18	-6.34	-11.24	-8.21
DBh-47 x DBh-37	5.73	-11.72*	-17.61**	-11.86*	-19.01**	-20.24**	10.64	-7.6	-11.53	-7.75	-12.57	-9.59
DBh-47 x DBh-39	25.34**	8.82	-7.6	-1.15	-9.17	-10.55*	25.33*	8.8	-5.17	-1.12	-6.29	-3.09
DBh-47 x DBh-43	15.48**	-10.00*	0.73	7.76	-0.99	-2.49	23.03*	-2.87	7.67	12.27	6.4	10.04
DBh-47 x DBh-55	46.99**	41.51**	-11.52*	-5.34	-13.03**	-14.35**	53.89**	47.83**	-5.13	-1.08	-6.25	-3.05
DBh-55 x ArkaAbhay	13.85**	-15.80**	1.7	8.8	-0.03	-1.55	12.91	-16.99*	4.33	8.79	3.1	6.62
DBh-55 x ArkaAnamika	42.46**	4.01	30.76**	39.89**	28.53**	26.58**	42.27**	3.73	33.84**	39.55**	32.26**	36.77**
DBh-55 x DBh-30	33.22**	2.44	10.19*	17.88**	8.31	6.67	33.99**	3.12	13.08	17.91	11.75	15.56
DBh-55 x DBh-37	21.73**	-1.4	-7.98	-1.55	-9.55	-10.92*	27.34*	2.99	-1.39	2.82	-2.55	0.77
DBh-55 x DBh-39	16.55**	-2.01	-16.79**	-10.99*	-18.21**	-19.45**	36.72**	14.74	0	4.27	-1.18	2.19
DBh-55 x DBh-43	1.2	-23.24**	-14.09**	-8.09	-15.56**	-16.84**	19.16	-8.64	1.27	5.6	0.08	3.49
DBh-55 x DBh-47	96.46**	89.13**	18.26**	26.51**	16.24**	14.48**	96.84**	89.10**	21.35*	26.53**	19.92*	24.01*

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