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Heterotic studies for yield and its component traits in *desi cotton (Gossypium arboreum L.)*

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ABSTRACT: The investigation was undertaken to estimate standard heterosis with an objective of exploring possibilities of its commercial utilization. The experimental material comprised of 22 crosses along with 8 parents and one standard check (JLA 794) and, grown at Mahatma Phule Krishi Vidyapeeth, Agricultural Research Station, Jalgaon in randomized block design with 3 replications. Observations were recorded for characters namely; seed cotton yield (kg/ha), bolls/plant, average boll weight (g) and ginning percentage. The standard heterosis was calculated over check variety JLA 794. Marked economic heterosis was observed for most of the characters studied .Among all the crosses studied, cross combinations the maximum heterosis for seed cotton yield of JLA 0613 X ARBa 08-34(17.31%), bolls/plant JLA 0613 x GBav 109(29.1 l%), for average boll weight(g) Turab x GBav 109 (43.30%) and for ginning percentage Turab x JLA 605(3.38%). Where ever cross combinations involving JLA 0613 and JLA 605 as a female parent recorded significant positive heterosis for most of the yield contributing characters. Thus the female parent JLA 0613 and JLA 605 can be used for exploitation of heterosis.

Key words: *Gossypium arboreum,* heterosis, quantitative traits, seed cotton yield

Cotton is an important commercial crop grown extensivily in Maharashtra. It provides 85 per cent row material to tertile industry besides earning valuable. Foreign exchange by exporting of raw material and finished goods. Out of the 50 *Gossypium* species out which 2 *G. hirsutum* and *G. barbadense* allotetraploids and 2 *G. herbasium* and *G. arboreum* diploids are cultivated. For the success of cotton breeding programme, the basic need in selecting proper parents for hybridization. The knowledge of combining ability provide a useful clue for selection of desirable parents for the development of better hybrids. Thus, information regarding heterosis and combing ability are the basic requirements for a thorough understanding of genetic architecture of yield and it components. The results obtained in the present invistigation on the above aspects are discussed below.

Twenty eight specific crosses were undertaken during *kharif* 2011-2012 by using 8 parents having diverse origin of *G. arboreum viz.*,JLA 794,JLA 605, Turab, PA 402, JLA 613, ARBa 08-34, GBav 106 and GBav 109. These hybrids along with check JLA 794 were grown in 2 row plot of 6 m length in randomized block design with 3 replications at MPKV, Agriculture Research Station, Jalgaon,during *kharif* 2011-2012. Observations were recorded on ramdomly selected 5 plants on seed cotton yield (kg/ha), bolls/plant, average boll weight (g), and ginning percentage. The useful heterosis (heterosis over best check) was estimated as per standard method.

Mean performance and heterosis over best check JLA 794 for 4 characters is presented in Table 1. The results indicated that the phenomenon of heterosis was of general occurrence, however its magnitude varied with characters. The range of mean values among the cross combination for seed cotton yield varied from 744 kg/ha (Turab x PA402) to 1190 kg/ha (JLA 0613 x ARBa 08-34). For average bolls/plant, the range of mean values among the hybrids was observed lowest in ARBa 08-34 x GBav 109 (9.4 bolls/plant) and highest of 15.8 bolls/plant in cross, JLA 0613 x GBav 106. The check exhibited lowest average boll weight while the cross, Turab

Table 1. Mean performance and heterosis

Sr. No.	Name of the Cross	Mean seed cotton yield (kg/ha)	Standard hertrosis SCY over best check variety	Bolls/ plant	Standard hetrosis for bolls/ plant check variety	Mean boll weight (g) over best check variety	Standard hetrosis for boll weight over ?	Mean GP (%)	Standard hetrosis for GP over best check variety
1	JLA 794 x Turab	1001	1.7	12.4	9.68	2.35	37.02	36.84	3.07**
2	JLA 794 x JLA 605	903	-8.97	11.6	3.45	2.2	32.73	35.9	0.53
3	Turab x JLA 605	799	-23.15	10.8	-3.7	1.88	21.28	36.96	3.38**
4	JLA 794 x PA 402	924	-6.49	11	-1.82	2.19	32.42	35.11	-1.71
5	Turab x PA 402	744	-32.26	9.4	-19.15	2.07	28.5	35.26	-1.28
6	JLA 605 x PA 402	1027	4.19	13.4	16.42**	2.46	39.84*	35.56	-0.42
7	JLA 794 x JLA 0613	869	-13.23	11.6	3.45	1.85	20	36.26	1.52
8	Turab x JLA 0613	856	-14.95	9.8	-14.29	1.97	24.87	35.83	0.33
9	JLA 605 x JLA 0613	1012	2.77	12.8	12.50**	2.17	31.8	36.2	1.35
10	PA 402 x JLA 0613	904	-8.85	11.6	3.45	1.84	19.57	36.36	1.79**
11	JLA 794 x ARBa 08-34	998	1.4	11	-1.82	1.64	9.76	35.46	-0.71
12	Turab x ARBa 08-34	941	-4.57	10.2	-9.8	1.6	7.5	36.53	2.24**
13	JLA 605 x ARBa 08-34	1172	16.04**	13.2	15.15**	1.79	17.32	36.34	1.73**
14	PA 402 x ARBa 08-34	899	-9.45	11.4	1.75	1.73	14.45	35.2	-1.45
15	JLA 0613 x ARBa 08-34	1190	17.31**	13.8	18.84**	1.9	22.11	35.65	-0.17
16	JLA 794 x GBav106	869	-13.23	11.4	1.75	1.73	14.45	36.87	3.15**
17	Turab x GBav 106	837	-17.56	13.4	16.42**	1.66	10.84	36.56	2.32**
18	JLA 605 x GBav 106	1168	15.75**	13.5	17.04**	2	26	35.4	-0.88
19	PA 402 x GBav 106	1063	7.43	14.8	24.32**	1.84	19.57	35.28	-1.22
20	JLA 0613 x GBav 106	1069	7.95	15.8	29.11**	1.78	16.85	36.07	1
21	ARBa 08-34-4 x GBav 106	990	0.61	11	-1.82	2.06	28.16	35.49	-0.62
22	JLA 794 x GBav 109	1123	12.38	13.8	18.84**	1.9	22.11	36.86	3.12**
23	Turab x GBav 109	992	0.81	11.4	1.75	2.61	43.30*	35.69	-0.06
24	JLA 605 x GBav 109	1159	15.1	13.6	17.65	2.18	32.11	36.14	1.19
25	PA 402 x GBav 109	873	-12.71	10.2	-9.8	1.66	10.84	35.56	-0.42
26	JLA 0613 x GBav 109	947	-3.91	12.3	8.94	1.97	24.87	36.65	2.56**
27	ARBa 08-34 x GBav 109	773	-27.3	9.4	-19.15	2.35	37.02	35.57	-0.39
28	GBav 106 x GBav 109	880	-11.82	10	-12	1.88	21.28	35.58	-0.37
29	JLA 794©	984	0	11.2	0	1.48	0	35.71	0
	Mean	**964.34**		**11.92**		**1.96**		**35.96**	
	Range	**744-1190**		**9.4-15.8**		**1.48-2.61**		**35.11-36.96**	
	SE (kg/ha)	87.12		0.3		0.95		0.11	
	P=0.05 (kg/ha)	250.09		0.83		2.63		0.3	
	P=0.05	343.74		1.18		3.47		0.43	
	CV (%)	13							
	Mean+SE	**1158.24**		**11.8**		**3.38**		**36.31**	

x GBav 109 recorded highest average boll weight in tune of 2.61 g.The mean GP varied from 35.11 per cent (JLA 794 x PA 402) to 36.96 per cent (Turab x JLA 605) .

High magnitude of significant positive heterosis over check JLA 794 was observed for seed cotton yield in crosses *viz.,* JLA 0613 x ARBa 08-34 (17.31%), JLA 605 x ARBa 08-34 (16.04%) and JLA 605 x Gbav 106 (15.75 %) . Kajjidoni and Patil (2003) and Patel *et al.,* (2003) also reported significant heterosis for seed cotton yield in interspecific crosses of diploid cotton. While Pradeep *et al.,* (2003) reported positive heterobeltiosis in interspecific and intraspecific crosses of diploid cotton. Similar findings have been also reported by Kalsy *et al.,* (1992).

For bolls/plant mean range varies from 9.40 to 15.80. The significant positive heterosis for bolls/plant was found in crosses, JLA 0613 x GBav 106 (29.11%),PA 402 X GBav 106 (24.32 %) and JLA 794 x GBav 109(18.84). These findings are in agreement with the results reported by Amolic (1993), Kajjidoni and Patil (2003) and Patel *et al.,* (2003).

The mean value for average boll weight ranged from 1.48g to 2.61g. Only one cross *i.e.* JLA 605 x PA 402 (39.84%) showed significant positive heterosis for average boll weight. Patel *et al.,* (2003) reported highly significant standard heterosis for boll weight in interspecific crosses of diploid cotton, while Jain (1996) and Kumar *et al.,* (2003) have recorded similar findings for these traits in *G. hirsutum* L. cotton.

The ginning percentage is important character. The ginning percentage varied from 35.11 to 36.96 per cent. The 9 crosses recorded positive significant heterosis for ginning percentage. The cross Turab x JLA 605 recorded maximum significant heterosis of 3.38 per cent and followed by cross combination JLA 794 x GBav 106 (3.15 %). Patel *et al.,* (2003) also reported highly significant and positive standard heterosis for ginning outturn in interspecific crosses of diploid cotton.

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