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HETEROSIS IN INTRA-*GOSSYPIUM ARBOREUM* L. COTTON HYBRIDS

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ABSTRACT

Maximum heterosis for seed cotton yield was shown by cross LD 135 x HD 31 (67.6%). Crosses Virnar x HD 31 (64.4%), AKH 4 x HD 31 (60.9%), Daulat x G 1 (58.9%), LD 133 x Shyamali (57.1%), St 877 x HD 31 (52.6%), RG 3 x RG 2 (51.2%), LD 133 x HD 31 (50.6%) and LD 133 x RG 2 (50.1%) also showed exploitable heterosis. These crosses also exhibited significant heterosis for yield components. However, heterosis for halo length was low.

Key words: *Gossypium arboreum*, heterosis, hybrids.

Development of hybrids is the most important genetic tool in improving yield. However, production of desi hybrid is a comparatively recent phenomenon in cotton breeding. In order to identify potential crosses for further exploitation, it is imperative to have prior information about heterosis and the nicking ability of the parents involved. The present investigation aims to establish the extent of heterosis in a line x tester study in desi cotton.

MATERIALS AND METHODS

Fourteen lines, viz., RG 3, LD 124, LD 133, LD 135, AKH 4, CJ 73, 1946, Y 1, Daulat, Virnar, LBS, St 875, St 877 and St 905 and four testers, G 1, HD 31, Shyamali and RG 2, were used in line x tester study. The resulting 56 hybrids alongwith 18 parents were grown in a randomized block design with three replications at three locations, Hanumangarh, Sri Ganganagar and Sri Karanpur during Kharif 1982. The parents and hybrids were separated in two groups and planted in the same experiment [1]. Each plot consisted of 4.5 m long row spaced 60 cm apart. Plant to plant distance was maintained at 45 cm. Recommended cultural practices and full plant protection measures were used. Data were recorded on five randomly selected competitive plants in each plot. Heterosis as percent increase or decrease over the better parent (BP) and check G 1 was estimated for seed cotton yield, boll number, boll weight, seeds per boll; halo length from the data pooled over three locations.

RESULTS AND DISCUSSION

Analysis of variance over locations for characters indicated large variability. Mean square due to parents as well as hybrids were highly significant. The magnitude of heterosis was higher for seed cotton yield and boll number while for rest of the characters parents showed more variation than their hybrids.

Out of 56 crosses, 44 over BP and 37 over check G 1 showed significant positive heterosis for seed cotton yield. Maximum BP heterosis for seed cotton yield was recorded in cross LD 135 x HD 31 (67.6%), followed by Virnar x HD 31 (64.4%), AKH 4 x HD 31 (60.9%), Daulat x G 1 (58.9%), LD 133 x Shyamali (57.1%), St 877 x HD 31 (52.6%), RG 3 x RG 2 (51.2%), LD 133 x HD 31 (50.6%), and LD 133 x RG 2 (50.1%). These crosses were also expressed significant heterosis over local check G 1, e.g. cross LD 135 x HD 31 (98.5%), followed by RG 3 x RG 2 (93.0%), Daulat x G 1 (81.1%), LD 133 x HD 31 (78.2%), AKH 4 x HD 31 (72.4%), LD 133 x RG 2 (72.1%), Virnar x HD 31 (71.8%), St 877 x HD 31 (60.7%), and LD 133 x Shyamali (47.1%) (Table 1). High heterosis for seed cotton yield was also reported earlier [2–6]. All these high heterotic crosses were also found superior in per se performance for seed cotton yield except cross LD 124 x HD 31.

Table 1. Heterosis over better parent, Check G-1 and per se performance of high heterotic crosses in *G. arboreum* cotton

Cross	Seed cotton yield			Boll number			Boll weight			Number of seeds/boll			Halo length		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
LD 135 x HD31	67.6**	98.5*	68.3	27.1**	61.3*	45.8	8.0**	11.8*	1.9	7.1	6.9*	26.3	2.3	3.4	15.0
Virnar x HD31	64.4**	71.8*	59.1	48.1**	50.3*	42.7	12.7**	17.6*	2.0	9.6*	8.9*	26.8	–6.7**	28.3*	18.6
AKHG x HD31	60.9**	72.4*	59.3	27.7**	31.0*	37.2	4.8	17.6*	2.0	5.2	5.3*	25.9	–12.5**	11.7*	16.2
Daulat x G 1	58.9**	81.1*	62.3	47.0**	84.1*	52.3	10.4**	5.9	1.8	9.3*	4.9*	25.8	–1.7	2.7	14.9
LD 133 x Shyamali	57.1**	47.1*	50.6	24.6**	45.1*	41.2	–5.6*	17.6*	2.0	5.9	11.4*	27.4	–9.1**	18.6*	17.2
St 877 x HD31	52.6**	60.7*	55.3	66.5**	51.0*	42.9	16.8**	5.9*	1.8	1.6	4.1	23.6	–7.0**	17.9*	17.1
RG 3 x RG 2	51.2**	93.0*	66.4	13.5**	40.5*	39.9	14.5**	23.5*	2.1	5.5	9.7*	27.0	3.4*	6.9	15.5
LD 133 x HD31	50.6**	78.2*	61.3	35.0**	46.1*	41.5	–1.7	23.5*	2.1	4.2	11.4*	27.4	–2.0	2.7	14.9
LD 133 x RG 2	50.1**	72.1*	59.2	24.9**	43.3*	40.7	5.0*	23.5*	2.1	2.2	6.5*	26.2	–7.3**	3.4	15.0

A—Heterosis percentage over superior parent, B—Heterosis percentage over check G 1, C—per se performance.
*,**Significant at 5% and 1% levels, respectively.

As regards direct components for seed cotton yield, the magnitude of heterosis for number of bolls was much higher than for boll weight and number of seeds per boll, the range of BP heterosis being –12.8–66.5% (boll No.), –9.9–18.6% (boll wt.) and –2.0–9.6% (seeds/boll). It was in agreement with the earlier findings [2–4, 7, 8].

The crosses which depicted high heterosis for seed cotton yield also exhibited significant heterosis for number of bolls. However, the opposite was not a rule for any of the direct components. High heterosis for boll number (45.7%) was recorded in cross St 877 x G 1 while it was at par with the better parent for seed cotton yield. Similarly, cross CJ 73 x HD 31 which exhibited maximum heterosis for boll weight (18.6%) did not show significant heterosis for seed cotton yield.

The magnitude of BP heterosis for halo length was low and in most of the hybrids in negative direction. It ranged from –12.5 to 4.3%. None of the hybrids depicting positive heterosis was superior than the best cross in per se performance, Virnar x Shyamali (19.9 mm). Generally, the crosses found superior in per se performance for halo length exhibited negative heterosis. Similar reports were made by earlier workers also [9, 10]. The negative relationship between seed cotton yield and staple length may be due to lack of genes or gene complexes for these two attributes evolved in opposite direction as observed in exotic x Indian crosses in sorghum [11].

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