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RESEARCH ARTICLE

Hybrid vigour in interspecific hybrids of cotton (*Gossypium hirsutum* L. x *Gossypium barbadenese* L.)

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SUMMARY

Thirty two hybrids of cotton (*Gossypium hirsutum* L. x *Gossypium barbadenese* L.) derived from four lines x eight testers were evaluated for yield and component traits. Data were analyzed for heterosis. Significant heterotic crosses for characters under study indicated the presence of genetic diversity among parental lines. Number of crosses exhibiting significant heterobeltiosis and standard heterosis for seed cotton yield were 22 and 12, respectively. The significant positive standard heterosis over G. cot.Hy.102 for seed cotton yield per plant was exhibited by G. cot. -10 x GSB-21 (82.95 per cent). It also exhibited high heterosis and per se performance for yield attributing traits *viz.,* lint yield per plant, number of bolls per plant, boll weight and number of sympodia per plant.

Key Words **:** Cotton, Heterobeltiosis, Standard heterosis, Seed cotton yield, Yield components

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Improvement in yield has been achieved through distance hybridization, particularly through interspecific hybridization. The identification of specific parental combination capable of producing the desired level of F_1 heterotic effects is important in improving the yield potential of this crop. Commercial exploitation of heterosis is considered to be an out standing application of the principles of genetics into the field of plant breeding. Thus, heterosis can be useful only with marked superiority over the best checks. The present study was, therefore, under taken to determine the extent of heterosis in cotton and to identify most heterotic hybrids.

MATERIALS AND METHODS

The experimental material consisted of 46 entries comprising of four lines, eight testers and resultant thirty two hybrids produced by line x testers mating design were evaluated along with two standard hybrids G.cot. Hy-102 and DCH-32 as checks. The experimental material was sown in a Randomized Block Design with three replications during *Kharif* 2009-2010. A single row of 6.0 meter length was assigned to each genotype with 10 dibbles having 60 cm intra row spacing and 120 cm inter row spacing. Five plants were randomly selected from each replication for each genotype and the average value was computed for recording observation on plant height, number of sympodia per plant, number of monopodia per plant, boll weight, number of bolls per plant, seed index ginning percentage, lint index, staple length, lint yield per plant, seed cotton yield per plant and oil content. While days to 50 per cent flowering and days to 50 per cent boll bursting were recorded on plot basis. Magnitude of heterosis and heterobeltiosis were computed as per procedure suggested by Meredith and Bridge (1972) and Fonesca and Patterson (1968), respectively.

RESULTS AND DISCUSSION

Analysis of variance revealed that the mean squares due to genotypes were significant for all the characters under study. Mean squares due to genotypes were further

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partitioned into mean square due to parents, hybrids, parents Vs hybrids, check Vs hybrids and between checks. The parents and hybrids differed significantly for all the characters. This indicated the existence of considerable genetic variability among the parents and hybrids for all the characters under study (Table 1). The analysis of variance further revealed that hybrids differed significantly for all the characters. The mean square due to parents Vs hybrids were significant for most of the traits suggesting presence of substantial amount of heterosis in crosses for all characters.

The perusal of data on performance of hybrids with respect to heterosis over better parent revealed that 22 hybrids manifested significant positive heterosis over their better parents for seed cotton yield per plant. The highest magnitude of heterobeltiosis.

for seed cotton yield per plant was exhibited by the hybrid G. cot. 10 x GSB-21 (221.18 per cent). It was observed that hybrids showing high heterobeltiosis for seed cotton yield per plant in general also manifested heterotic effects for its contributing characters like lint yield per plant, number of bolls per plant and boll weight (Table 2). This study thus substantiates the finding of Tuteja *et al.* (2004) and Chao-Zhu *et al.* (2007).

Improvement in yield is one of the important objectives,

Table 1 : Analysis of variance for various characters in cotton

Sources of variation	d.f.	Days to 50% flowering	Days to 50% boll bursting	Plant height	No. of sympodia/ plant	No. of monopodia / plant	Boll weight	No. of bolls / plant
Replications	2	0.659	9.283	8.834	11.988	0.312	0.062	41.949
Genotypes (G)	45	12.332**	19.399**	870.392**	209.627**	1.720**	0.700**	2308.103**
Parents (P)	11	4.694*	13.687**	622.671**	28.608**	0.557**	0.645**	409.511**
Females (F)	3	1.222	13.667	349.357	1.308	0.095	0.247**	63.683
Male (M)	7	6.756**	6.476	367.721	6.417	0.189	0.319**	62.244
(F Vs M)	1	0.681	64.222**	3227.257**	265.843**	4.515**	4.123**	3877.869**
Hybrids (H)	31	10.817**	19.720**	306.563*	142.487**	0.494**	0.560**	1554.317**
Female	3	3.611	6.288	505.002*	996.129**	0.378	0.964**	1606.210**
Male	7	7.286**	18.415**	417.872*	47.451**	0.358	0.666**	853.257**
F x M	21	13.024**	22.074**	241.111	52.217**	0.556**	0.467**	1780.591**
P Vs H	1	149.414**	39.781**	22304.080**	4289.862**	53.399**	6.665**	50867.359**
Checks Vs hybrids	1	32.980**	83.432**	1264.337**	117.346**	0.174	0.241*	234.932*
Between checks	1	0.667	0.667	229.278	39.784	0.752*	0.377**	130.667
Error	90	2.193	5.216	174.197	11.308	0.182	0.036	34.048

Table 1 Cont…

Sources of variation	d.f.	Seed index	Ginning percentage	Lint index	Staple length	Lint yield/ plant	Seed cotton yield/plant	Oil percentage
Replications	2	0.651	2.095	0.073	7.746*	1.296	118.478	0.001
Genotypes (G)	45	3.903**	13.465**	0.848**	71.403**	3028.231**	31562.728**	3.552**
Parents (P)	11	7.126**	8.453**	0.973**	119.058**	830.540**	7353.295**	4.995**
Females (F)	3	4.794**	1.396	0.988**	5.889	277.172**	2621.033**	0.504
Males (M)	7	7.613**	0.912	1.102**	4.804	62.554	828.441*	3.400**
(F Vs M)	1	10.711**	82.411**	0.030	1258.347**	7866.552**	67224.055**	29.632**
Hybrids (H)	31	2.907**	13.955**	0.716**	46.988**	2048.659**	22193.879**	3.014**
Female	3	4.515**	19.649**	0.331*	111.931**	2074.000**	31072.309**	1.727**
Male	7	2.659**	11.198**	0.927**	31.518**	1003.059**	10471.924**	2.938**
F x M	21	2.760**	14.060**	0.700**	42.867**	2393.572**	24832.850**	3.223**
P Vs H	1	4.864**	45.838**	4.938**	444.001**	62266.522**	644088.552**	1.786*
Checks Vs hybrids	1	1.910	20.879**	0.087	9.728	153.435	5997.330**	8.496**
Between checks	1	1.042	4.528*	0.000	2.667	984.322**	6742.401**	0.016
Error	90	0.504	0.853	0.119	2.709	49.572	382.846	0.410

* and ** indicate significance of values at p=0.05 and 0.01, respectively

Table 2 : Promising crosses for seed cotton yield per plant with heterodid over standard check and better parent and component traits showing significant desired standard heterosis in cotton

Sr. No.	Promising hybrids	Seed cotton yield(g)	Heterosis		Significant standard heterosis over G.cot.Hy.-102
			Standard heterosis	Better parent heterosis	
1.	G.cot-10 x GSB-21	494.65	82.95**	221.18**	DF, BW, NB, SL, LY, SCY, OC
2.	D-32-14-1-5 x BSC-9	420.11	55.38**	92.98**	DF, BW, NB, SI, SL, LY, SCY
3.	G.cot-10 x GSB-40	355.56	31.50**	130.87**	DB, BW, NB, LY, SCY
4.	G.cot-16 x GSB-41	349.54	29.28**	118.05**	DB, NB, LY, SCY
5.	G.cot-16 x GSB-40	347.13	28.39**	116.55**	DF, PH, NB, GP, LY, SCY

* and ** indicate significance of values at p=0.05 and 0.01, respectively

DF- Days to 50% flowering , SI- Seed index, DB- Days to 50% boll brusting, GP- Ginning percentage, PH- Plant height, LI- Lint index, NS- Number of sympodia per plant, SL- Staple length, NM- Number of monopodia per plant, LY- Lint yield per plant, BW- Boll weight, SCY- Seed cotton yield per plant NB- Number of bolls per plant, OC- Oil content

so the superiority of hybrids over best cultivated hybrids is essential for increasing its commercial value. In present study well known interspecific hybrids G. cot Hy.-02 and DCH-32 has been used as standard checks hybrids in order to obtain information on superiority of hybrids. The highest yielding hybrids G. cot.-10 x GSB-21 had highest standard heterosis (82.95) over the best check G. cot. Hy.-102. The hybrid G. cot.-10 x GSB-21 exhibited maximum seed cotton yield (494.65 g.) and highest standard heterosis (82.95) for seed cotton yield over the check G. cot. Hy.-102. In addition to this the hybrid G. cot.-10 x GSB-21 also exhibited significant amount of heterosis over better parent (221.18 per cent) for seed cotton yield per plant (Table 2). Several workers also reported the presence of considerable degree of heterosis for seed cotton yield per plant in cotton (Mueen *et al.,* 2008; Iqbal *et al.,* 2008 and Mendez *et al.,* 2007). With respect to yield contributing characters *viz.,* seed cotton yield per plant, lint yield per plant, number of boll per plant, boll weight, staple length, seed index, number of sympodia per plant G. cot.-10 x GSB-21 and D-32-14-1-5 x BSC-9 were found promising as they exhibited positive heterosis over G. cot.Hy.-102. This indicated that high degree of heterosis for seed cotton yield might be attributed to the heterosis for these component characters.

Further, the above mentioned promising hybrids exhibited significant negative standard heterosis for days to 50 per cent flowering and days to 50 per cent boll bursting suggesting that high yield in hybrids can be achieved along with early maturity. Thus considerable amount of heterobeltiosis and standard heterosis observed for seed cotton yield and other associated character suggested the presence of large genetic diversity among the males and the females as well as presence of high heterotic potential in the present material. However, the stable performance of hybrids across the environments is required to get their consistent performance during commercial cultivation.

REFERENCES

Chao-zhu, X.C., Xan, Y.U., Chang-duo, G.L., Wen-jung, W.H. and Yun-lei, Z. (2007). Heterosis performance and correlation analysis on economic traits of upland cotton hybrids in different ecological environments. *Cotton Sci.*, **19** (1): 3-7.

Fonseca, S. and Patterson, F. (1968). Hybrid vigour in a seven parent diallel cross in common wheat. *Crop Sci.,* **8**:858-888.

Iqbal, M., Hayat, K., Atiq M. and Khan, N.I.(2008). Evaluation and prospect of F_2 genotypes of cotton (*Gossypium hirsutum* L.) for yield and yield components. *Internat. J. Agric. Biol.*, **10**: 442–446.

Méndez, J. R., Rondón, A., Hernández, J., Fernando, J. and Merazo, P. (2007). Genetic studies in upland cotton (*Gossypium hirsutum* L.). *Pak. J. Bot.*, **39** (2): 385-395.

Meredith, W. R. and Bridge, R. R. (1972). Heterosis and gene action in cotton, *G. hirsutum* L. *Crop Sci.,* **12**: 304-310.

Mueen, A.K., Moazzam, J., Muhammad, N., Irfan A., Muhammad, S.K. and Aamir, S. (2008). Heterosis in three intervarietal crosses for yield and yield contributing traits in cotton (*Gossypium hirsutum* L.). *J. Appl. Biosci.,* **1** (1): 13–17.

Tuteja, O.P., Kumar, S., Verma, S.K. and Ahuja, S.L. (2004). Estimation of heterosis for seed cotton yield and its component characters in *G. hirsutum* L. *J. Cott. Res. Dev.*, **18**(1):38-41.

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