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RESEARCH ARTICLE

Heterosis for seed cotton yield and fibre quality in upland cotton (*G. hirsutum* L.)

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SUMMARY

The present investigation was undertaken by adopting diallel analysis including reciprocals involving six diverse parents to estimate the extent of heterosis for yield, its components and fibre during *Kharif* 2006-2007 in *G. hirsutum*. The analysis of variance indicated that the mean squares due to parents and hybrids were highly significant for all the characters under study. The best performing F_1s AKH 8660 x AKH 081 and LRK 516 x AKH 081 and reciprocals AKH-081 x LRK-516 and AKH-081 x AKH-8660 showed significant positive heterosis over standard parent 18.64, 25.83, 28.38 and 14.93 per cent, respectively. These crosses also reported economic heterosis for more than one components traits and fibre quality parameters.

Key Words : Diallel analysis, Heterosis, Upland cotton

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Cotton is one of the most important industrial and economic crops of India. Cotton being often cross pollinated crop and is highly amenable to both heterosis and recombination breeding. For the commercial exploitation of heterosis, the magnitude of heterosis provides a basis for genetic diversity and is guide for choice of desirable parents for developing superior F_1 hybrids. Heterosis in cotton has been reported by several workers *viz*., Dheva *et al*. (2002), Tuteja *et al.* (2006) Rajamani *et al*. (2009) and Wankhade *et al.* (2009). Hence, present investigation was undertaken to out the extent of heterosis for seed cotton yield and fibre properties in upland cotton.

MATERIALS AND METHODS

The experimental material consisted of six genetically diverse genotypes *viz*., AKH 8660, AKH 87B, AKH 70G, LRK 516, AKH 081 and LCMS 2. The parental genotypes were crossed in a diallel fashion including reciprocals. The experiment was conducted at Cotton Research Unit, Dr. PDKV, during *Kharif* 2006-2007. These 30 hybrids along with their six parents and a check (PKV Hy. 2) were grown in randomized block design with three replications. The spacing was 90 cm between rows and 60 cm between plant to plant. Observations were recorded on plant height (cm), number of sympodia per plant, number of bolls per plant, boll weight (g), number of locule per boll, number of seeds per locule, seed cotton yield per plant (g), ginning percentage (%), seed index (g), lint index, 2.5 per cent span length (mm), uniformity ratio (%), micronaire value (µg/inch) and fibre strength (g/tex). Heterosis was estimated over the better parent as per the standard procedure of Meredith and Bridge (1972).

RESULTS AND DISCUSSION

The analysis of variance indicated that the mean squares due to parents and hybrids were highly significant for all the characters under study. The mean square due to the parents vs. hybrids were significant for all the traits, while non-significant for ginning percentage, seed index, lint index, uniformity ratio and micronaire value (Table 1).

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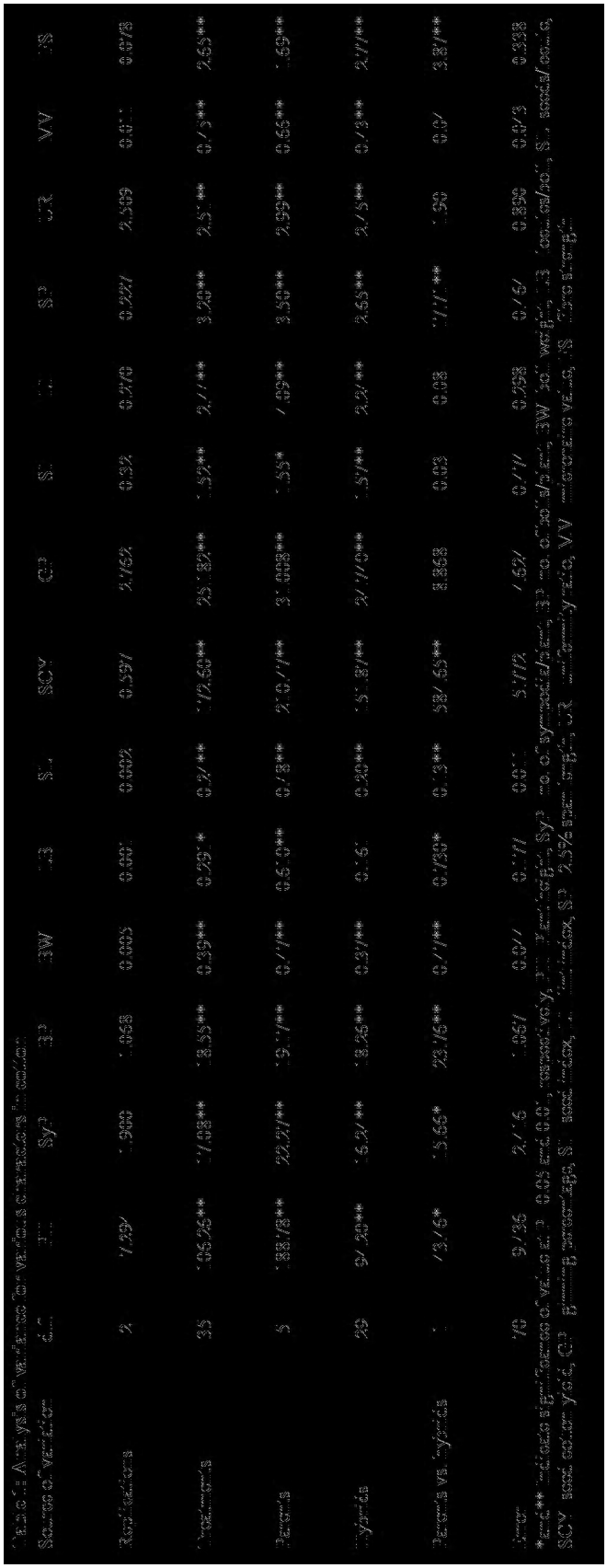

Estimation of standard heterosis in F_1 crosses and reciprocal crosses are presented in Table 2. For plant height, heterosis ranged from -18.54 to 10.84 per cent and -13.37 to 3.18 in F_1 and reciprocal crosses, respectively. Similarly for no. of sympodia per plant, from -18.54 to 10.84 per cent and -13.37 to 3.18 per cent; for bolls per plant -40.58 to 12.46 per cent and -35.52 to 7.99 per cent; for boll weight -33.14 to 12.50 per cent and -29.95 to 12.15 per cent; for no. of locules per boll -4.10 to 2.68 and -5.61 to 28.03 per cent; for no. of seeds per locule -4.85 to 9.70 per cent and -.354 to 8.33 per cent; seed cotton yield per plant -29.01 to 11.46 per cent and -39.51 to 10.55 per cent; for ginning percentage -18.56 to 12.35 per cent and -15.01 to 9.33 per cent; for seed index -24.49 to 10.20 per cent and -18.37 to 8.16 per cent; for lint index -30.57 to 22.33 per cent and -33.93 to 19.76 per cent; for 2.5 span length -9.95 to 3.56 per cent and -6.02 to 1.60 per cent; for uniformity ratio -2.04 to 2.04 per cent and -4.08 to 4.08 per cent; for micronaire value -10.00 to 21.67 per cent and -15.00 to 17.50 per cent and for fibre strength -6.03 to 6.91 per cent and -9.57 to 12.06 per cent in F_1 and reciprocals crosses, respectively.

A result of standard heterosis in respect of F_1 crosses was of higher magnitude for most of the characters except number of locules per boll, ginning percentage, uniformity ratio, micronaire value and fibre strength. The results also indicated that the magnitude of heterosis was high for morphological characters followed fibre quality traits in both F_1 as well as reciprocal crosses. The results obtained are in conformity with Basu *et al*. (1995), Pavasia *et al*. (1997), Ahuja *et al*. (2000) and Dukre *et al*. (2009). Dheva *et al.* (2002) reported range of heterosis for fibre properties was -7.35 to 14.10 per cent for span length and -18.90 to 15.65 per cent for micronaire value.

The data revealed that the number of sympodia per, number of bolls per plant and boll weight appeared to be the major component of yield heterosis followed by locules per boll, seeds per locule and seed index. The result is similar as that of Khorgade *et al*. (2000), Tuteja (2001) and Dukre *et al*. (2009).

In present investigation first two top ranking F_1 crosses *viz*., AKH-8660 x AKH-081, LRK-516 x AKH-081 and two reciprocal crosses AKH-081 x LRK-516, AKH-081 x AKH-8660 were selected on the basis of *per se* performance (Table 3). Theses crosses involving parents with high gca x high gca combination, indicating the additive and additive x additive gene effects were predominance in the expression of the characters. It might through good transgressive segregants in later generation. Also these hybrids having significant heterosis for its components traits, which would contributes to heterotic in seed cotton yield. Considering the above facts, it could be suggested that cross combination should be selected on the basis of heterotic response or *per se* performance would be more reliable than on the basis of sca effects.

Table 3 : Comparison of four crosses on the basis of *per se* performance, standard heterosis for seed cotton yield, gca effects of parents and significant heterotic effects for other traits

Crosses	*Per se* performance	Standard heterosis	Types of parent with gca effects	Sca effects	Significant heterosis for desirable direction for other traits
F_1 crosses					
AKH-8660 x AKH-081	51.56	18.64**	H x H (3.0** x 5.0**)	2.64**	SyP, BW, SL, SP, FS
LRK-516 x AKH-081	50.40	25.83**	H x H (4.0** x 5.0**)	1.42	BP, GP, LI, SP
Reciprocal crosses					
AKH-081 x LRK-516	51.14	28.38**	H x H (5.0** x 4.0**)	-0.43	BP, SL, GP
AKH-081 x AKH-8660	50.24	14.93**	H x H (5.0 ** x 3.0**)	0.66	SyP, SP

*and** Indicate significance of value at P= 0.05 and 0.01, respectively

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