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Heterotic study for seed cotton yield and fibre quality parameters in *Gossypium hirsutum* L.

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An field experiment was conducted at Cotton Research Unit, Department of Agricultural Botany, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Kharif* 2007-2008 to estimate heterosis for seed cotton yield and fibre quality parameters. Twenty two hybrids were obtained by crossing two lines and eleven testers in a line x tester mating design. These parents and hybrids were grown in Randomized Block Design with three replications. The parents vs. hybrids indicated substantial amount of heterosis present in the population. Among 22 hybrids, hybrid AKH-0601 x BBP-1 exhibited highest economic heterosis (52.4%) for seed cotton yield which was followed by AKH-0601 x BBP-6 (47.5%) and AKH-0601 x BBPSPS-25 (45.9%). These hybrids also exhibited significant and desirable standard heterosis for yield components traits as well as for fibre quality parameters.

Key words : Heterosis, Seed cotton, Fibre quality parameters

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INTRODUCTION

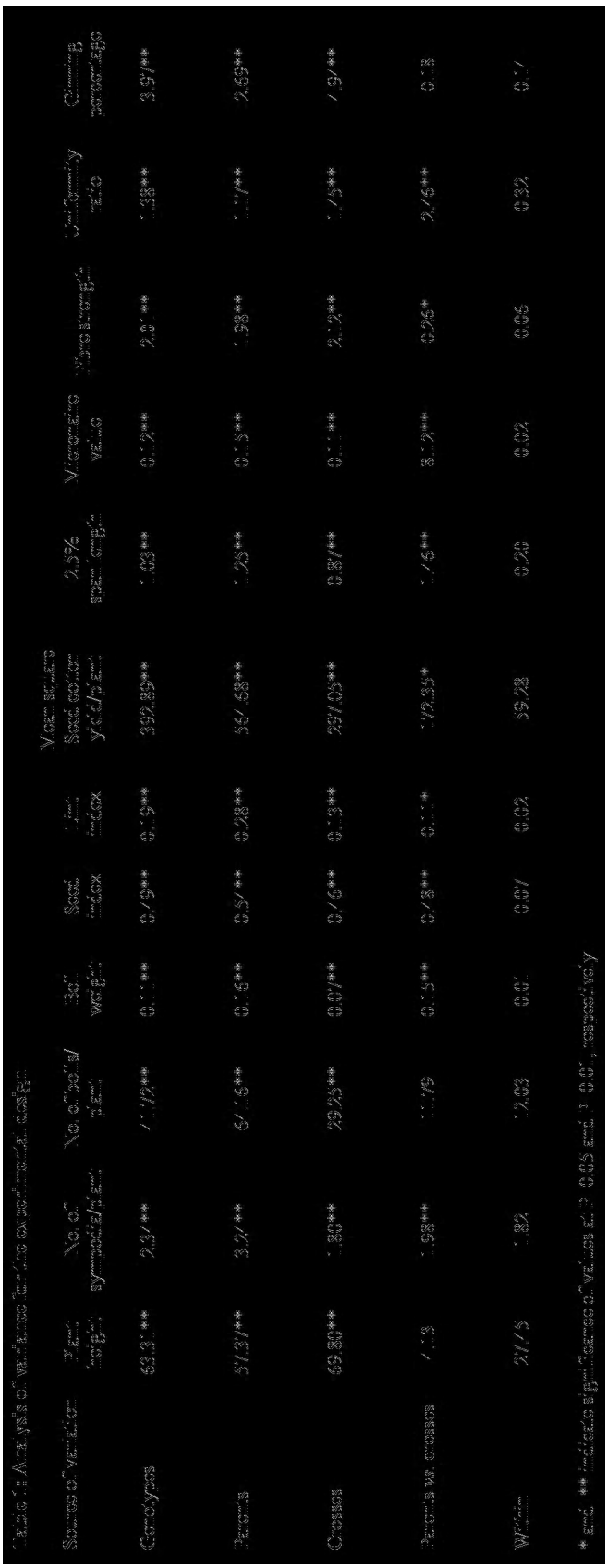
Cotton is an important commercial crop which provides raw material in the form of lint to the textile industry. It is grown in tropical and sub-tropical regions of more than 110 countries the over world. In India, nearly 70 per cent of the area is occupied with commercially hybrids. Cotton had tremendous potential for improvement of quantitative and qualitative characters by better commercial exploitation of hybrid vigour (Chinnadurai and Rangaswamy, 1974). Therefore, present investigation was undertaken to find out the extent of heterosis for seed cotton yield and fibre quality traits in upland cotton (*G. hirsutum* L.).

RESEARCH METHODOLOGY

An experiment was conducted during *Kharif*, 2007-2008 at Cotton Research Unit, Akola. The experimental materials comprised of 2 lines (females) namely; AKH 081 and AKH 0601 and 11 testers (males) namely; BBP-1, BBP SPS-4, BBP-6, BBP-8, BBPSPS-10, BBPSPS-25, BBPSPS-41, BBP-109, BBP-126, BBP-187 and BBP-188 were taken to generate 22 crosses by Line x Tester crossing method. These 22 hybrids along with 13 parents were grown in Randomized Block Design with three replications. Each plant is spaced planted of 90 cm between rows and 60 cm between plants. Five plants were chosen to record the data on plant height (cm), number of sympodia per plant, number of bolls per plant, boll weight (g), seed index, lint index, seed cotton yield per plant, 2.5 per cent span length, micronaire value, fibre strength, uniformity ratio and ginning percentage. Heterosis was estimated over the standard parent (PKV Hy. 5) of Meredith and Bridge (1972).

RESEARCH FINDINGS AND ANALYSIS

The analysis of variance for mean square due to parents for all the characters were found significant indicating considerable amount of variability among the thirteen genotypes for various traits (Table 1). The mean square due to hybrids as well as parents vs. hybrids comparison for all the characters were found highly significant indicating substantial amount of heterosis present in the population. The measure of heterosis over standard parent (PKV Hy. 5) are rational parameters for assessing its practically utility. Therefore, in present investigation heterosis is reported over standard parent. Several workers reported substantial heterosis for various agronomic and quality traits.



The heterosis for plant height was upto 27.2 per cent in cross combination AKH-0601 x BBP-187 over standard parent (Table 2). Out of 22 hybrids, cross AKH-081 x BBP-126 had recorded highest negative heterosis over PKV Hy. 5. Similar results were reported by Tuteja *et al*. (2004), Verma *et al*. (2004) and Giri *et al*. (2006).

The heterosis for no. of sympodia per plant was found in positive direction for six hybrids. The highest economic heterosis was observed in AKH-0601 x BBPSPS-10 (13.5%) followed by AKH-0601 x BBP-8 (12.9%). These results were confirmed by with the work of Tuteja *et al*. (2004) and Verma *et al*. (2004).

The manifestation of heterosis for number of bolls was to the extent of 24.2 per cent over standard parent. Hybrid AKH-0601 x BBP-188 had highest economic heterosis over standard parent. In case of boll weight, 15 cross combinations registered significant positive economic heterosis. The highest economic heterosis in cross combination AKH-0601 x BBP-126 (14%) which was followed by cross combinations AKH-0601 x BBP-187 and AKH-0601 x BBP-188. Wankhade *et al*. (2009) and Deosarkar *et al*. (2009) reported similar results in upland cotton.

The range of heterosis for seed index was from -18.6 per cent to 13.1 per cent. Eight hybrids reported significant positive economic heterosis. Hybrid AKH-0601 x BBP-188 was superior for seed index among 22 hybrids. Deosarkar *et al*. (2009) reported 10.59 per cent heterosis over check NHH-44. In case of lint index, seven crosses had significant positive heterosis. Hybrid AKH-081 x BBP-109 (12.4%) had maximum heterosis for lint index, which was followed by AKH-081 x BBP-187 and AKH-0601 x BBPSPS-25. The above result is according with Wandhade *et al*. (2009) and Giri *et al*. (2006).

The range of heterosis for seed cotton yield was 52.4 per cent to -35.6 per cent. Eight hybrids had significant positive economic heterosis for seed cotton yield. The cross combination AKH-0601 x BBP-16 had 52.4 per cent economic heterosis which was followed by AKH-0601 x BBP-6 (47.5%), AKH-0601 x BBPSPS-25 (45.9%), AKH-081 x BBP-187 and AKH-0601 x BBP-126 (44.4). While eight hybrids reported negative significant heterosis over PKV Hy. 5. Similar results were found by Tuteja *et al*. (2004), Tuteja *et al*. (2006), Patil *et al*. (2012) and Giri *et al*. (2006).

Among 22 hybrids, 12 crosses exhibited significant positive heterosis for fibre length. Cross AKH-0601 x BBPSPS-10 registered 11.2 per cent standard heterosis. In case of fibre strength, all hybrids exhibited significant desirable standard heterosis except for two where significant negative heterosis (AKH-081 x BBP-41 and AKH-081 x BBP-109). Hybrid AKH-0601 x BBP-8 possessing maximum economic heterosis *i.e.* 23.9 per cent. Rajamani *et al*. (2006) reported 11.49 per cent economic heterosis for fibre length while for fibre strength 25.05 per cent heterosis.

Less micronaire value indicates more fibre fineness therefore, hybrids exhibiting maximum negative heterosis are generally preferred. Range of standard heterosis was from -13.5 per cent to 21.3 per cent. The cross AKH-081x BBP-6 (-13.5%) showed higher negative standard heterosis followed by AKH-0601 x BBP-6 (-8.7%). Out of 21 significant crosses, thirteen crosses exhibiting significant negative heterosis over standard check (PKV Hy. 5) in desirable direction while nine crosses exhibited highly significant positive heterosis but in reverse direction. This result is akin with Rajamani *et al*. (2006).

Standard heterosis for uniformity ratio ranged from -18.6 to 13.1 per cent. Cross AKH-0601 x BBP-188 (13.1%) showed highest significant positive economic heterosis which, was followed by AKH-0601 x BBP-109 (9.7%). Similarly for ginning percentage, standard heterosis varied from -19.0 (AKH-0601 x BBP-1) to 3.3 per cent (AKH-08 x BBP-6). Out of 20 significant crosses AKH-08 x BBP-6 showed highest significant positive heterosis, while 19 crosses exhibited highly significant negative heterosis but in reverse direction. Significant positive for uniformity ratio and ginning percentage was reported by Wandhade *et al*. (2009) and Rajamani *et al*. (2006).

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