Combining ability analysis in *Gossypium hirsutum* L.

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SUMMARY

Combining ability study utilizing line x tester analysis was conducted in *Gossypium hirsutum* L. at Dr. P.D.K.V., Akola (M.S.). The experimental material comprised of eight lines and five testers and forty hybrids. The analysis of variance for combining ability revealed that variances due to line x tester interaction was also found to be significant for almost all characters except days to 50 per cent flowering, plant height, number of sympodia per plant, number of bolls per plant and fibre strength. The general combining ability variances revealed that lines CAK 053 'A' and IC 1547 'A' and testers AKH 31R and AKH-2R are good general combiners. For obtaining the superior segregates, the cross showing high mean performance, high heterosis, high gca of parents involved in the cross and comparatively low sca effects may serve as a better source. In the present study cross Abadita 'A' x AKH 31R and CAK 053 'A' x Surat dwarf can be identified from this point of view. These crosses should be advanced in further generations for development of superior variety. The crosses CAK 053 'A' x AKH 31R, IC 1547 'A' x AKH 02R and LCMS-1 'A' x Surat dwarf indicated high mean performance high heterosis high significant sca effects and high gca x high gca or high gca x low gca parental combination. These crosses can be tested in multi location trials of hybrids for their possible commercial exploitation.

In Vidarbha, 1.81 million ha area is under cotton, which is nearly 56.00 per cent of cotton area of the state (Anonymous, 2004). However, average yield of lint in this region is very low because of cultivation under rainfed conditions, cultivation on any type of soils, terminal stress during the boll development etc. Cotton productivity grown in rainfed agro-ecosystems prevalent in Vidarbha region of Maharashtra State is fluctuating mainly because of seasonal weather variations. In this region, cotton based cropping systems are dominant due to excellent ability of cotton to overcome water stress. Efforts to improve this ability through breeding proved to be fruitful during last 40 years in India. Continuing these efforts, to develop broad base parentage useful for diverse situations, is necessary for improving yield and quality of cotton. The choice of parents in breeding programme for rainfed areas has to be based on the complex genetic information and knowledge of combining ability of parents and not merely on the field performance of different genotypes. However, knowledge about combining ability of parents becomes more important, for which different bio-metrical tools have been developed for identifying desirable parents. Among these line x tester analysis (Kempthorne,

1957) is useful technique suitable for identification of cross combination and parents to be used in crossing programme.

MATERIALS AND METHODS

The experimental material comprised of eight lines and five testers and forty hybrids. The lines and testers used in the present study are lines *viz.,* CAK 053 'A', IC 1547 'A', Abadita 'A', G Cot-10 'A', Supria 'A', Laxmi 'A', LCMS-1 'A', CMSHS-6 'A' etc. and testers-AKH 31 R, AKH 02 R, DR-8, Ne, Surat dwarf etc. Crosses were performed in line x tester fashion during *kharif* 2000-01 and were evaluated during *kharif* 2001-02.

Evaluation of 40 F_1s and 13 parents was done in randomized block design with three replications. Each genotype was sown in single row of 12 hills by dibbling 2 seeds per hill and thinned to 1 plant per hill after establishment. Hybrids and parents were grown in separate blocks randomization was done separately for hybrids and parents. Recommended packages of practices were followed to raise the healthy crop. Five competitive plants from each progeny were selected randomly in each replication. Observations were recorded on morphological characters *viz.,* Days to 50 per cent flowering, plant height (cm), number of monopodia, number of sympodia and number of bolls per plant, boll weight (g) etc.; Economic characters *viz.,* ginning percentage (%), lint index, seed index (g); Fibre quality characters *viz.,* 2.5 per cent span length, fibre bundle strength (g/tex), fibre fineness (Micronaire value μg/inch), fibre quality index and yield

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