

Diallel analysis in cotton (*Gossypium hirsutum* L.)

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SUMMARY

The present investigation was carried out to study the combining ability in 4x4 diallel crosses for ten quantitative characters. The four parents and the resultant 12 crosses were utilized to estimate the mean performance, *gca* effects and *sca* effects for 10 characters viz., days to first flower, plant height, number of bolls per plant, boll weight, number of seeds per boll, seed cotton yield, seed index, lint index, ginning outturn and fiber length. Based on mean and *gca* effect the parents DS 28 and ADT 1 were found to be superior for seed cotton yield and its component traits. The crosses ADT 1 x DS 28 and SVPR 1 x DS 28 showed higher and significant mean and *sca* effects for most of the characters studied, thus indicating the scope for heterosis breeding in crop improvement. The combining ability variance indicated the preponderance of additive gene action for all the traits except fiber length.

Key words: Cotton, Combining ability, Heterosis

Cotton (*Gossypium hirsutum* L., $2n=4x=52$) has secured a place of pride, as it plays a vital role in our economy and social affairs of the world. Cotton is an important industrial crop of India, contributing to about 85 per cent of raw materials to textile industry. It is also an important commodity for export in the form of raw cotton, cotton yarn etc. As considerable amount of heterosis has been reported in this crop (Singh, 1982), a knowledge on choosing appropriate parent of good genetic potential is very essential. Exploitation of hybrid vigour and selection of parents on the basis of combining ability have opened a new line of approach in crop improvement. Among many biometrical approaches, diallel analysis is one of the efficient biometrical tool to predict the merits of parents in the earliest generation, F_1 itself.

MATERIALS AND METHODS

The field experiment was carried out during summer and *kharif*, 2005 at Plant Breeding Farm, Faculty of Agriculture, Annamalai University, Annamalai Nagar. The experimental material consisted of seven parents viz., ADT 1, Anjali, DS 28, H 436, LD 341, LD 360 and SVPR1. They were raised in randomized block design, replicating thrice. The crop was raised under moderate saline condition; the EC was found to be 3.5 - 4.0 dsm^{-1} and the pH was found to be 7.2. Only four parents, viz., ADT 1, Anjali, DS 28 and SVPR 1 survived. These four parents were crossed in full diallel manner inclusive of reciprocal crosses. The four parents and 12 hybrids were raised in rows with spacing of 90cm between rows and 75 cm within the row. The experiment was laid out in a

randomized block design with three replications. In each cross, 20 plants were maintained and observations were recorded on 10 randomly selected plants for 10 characters viz., Days to first flower, Plant height, Number of bolls per plant, Boll weight, Number of seeds per boll, Seed cotton yield per plant, Seed index, Lint index, Ginning outturn and Fibre length. The observations recorded on parents and hybrids were subjected to full diallel analysis based on Griffing (1956) method 1, model 1 to estimate the combining ability of the parents and hybrids.

RESULTS AND DISCUSSION

The mean performance of parents and hybrids for different traits are given in Table 1. The information on *per se* performance is necessary for selection of suitable parents for development of hybrids. Gilbert (1958) suggested that parents with good *per se* performance would result in better genotypes. The parent DS 28 had superior performance for seed cotton yield per plant (100.40g), number of seeds per boll (28.33) and seed index (6.80) with tall nature (112.43cm). The next high yielding parent was ADT 1 (91.51g) with early flowering (62.03days). The parent Anjali showed highest *per se* performance for boll weight (4.47g), lint index (3.72), ginning outturn (37.39 per cent) and fiber length (26.54mm). The genetic potential of hybrid is judged based on the *per se* performance which is major component for increasing the yield (Kalia et al., 1991). The hybrids ADT 1 x DS 28 and SVPR 1 x DS 28 were found to be superior for seed cotton yield and its component traits.

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