

S U M M A R Y

Analyses of variance of 8 and 9 characters were computed in the varieties of two species G. hirsutum L. and G. arboreum L. sown in kharif (summer) and rabi (winter) seasons respectively. All the characters in all four sets of experiments were found to be significant.

Fourteen varieties each from G. barbadense L. , G. hirsutum L. and G. arboreum L. were taken for the present study. As the varieties belonging to G. barbadense L. were found to be the most nonadaptive to the agroclimatic conditions of West Bengal, those were, therefore, discarded from the study. Altogether, four sets of experiments, two of each in kharif (summer) and in rabi (winter) were taken up in the present study.

The varieties were tested over environments. As the crop is in introduction stage in the State, therefore, more emphasis was given on the possibilities of isolation of varieties having high yield and earliness to cope with the existing cropping pattern of the State. The quality attributes of the lint were ignored.

The heritability percentage in the broad sense of different characters were computed. High heritability percentage of yield components were observed in almost all the four sets of experiments.

Significant positive correlation between yield and number of bolls per plant in all the four sets of experiments were observed. The days to fifty per cent flowering was positively correlated with yield in summer sown crop but negatively associated in the rabi sown crop in the varieties belonging to G. hirsutum L. In the path analysis, the direct effect of number of bolls per plant on yield was also high and positive. The apparent contradiction between genotypic correlation and path analysis observed between the yield on the one hand and position of first sympodial node on the other was due to relative low positive correlation during kharif sown crop in G. hirsutum L. between these two characters. This was also observed in the cultivars belonging to G. arboreum L. The correlation of all the characters excepting that between the position of first sympodial node and ginning percentage in two sets of experiments with American upland cotton were found to be negative. The direct effect of ginning percentage on yield in all four sets of experiments were negative and quite high. The correlation between yield and number of seeds per boll were positive in all the four sets of experiments. But its direct effect on yield in the case of kharif sown upland cotton was positive while the same effect was negative in the case of rabi sown upland cotton.

The duration from flowering to boll maturity could be adjudged in rabi sown experiments only. The character is negatively correlated with yield, number of bolls per plant, weight of kapas (Crude cotton) per boll and number of seeds per boll. But its direct effect on yield in case of hirsutum cotton

was negative while in the case of arboreum cotton, it was positive but very low in magnitude. High significant positive correlation was observed between weight of kapas per boll and number of seeds per boll in all the four sets of experiments.

14 varieties of G. hirsutum L. cotton sown in kharif season were divided into five clusters, when analysis of D^2 statistics was studied. Cluster I included 4 varieties, cluster II included 3, Cluster III consisted of 4, clusters IV consisted of two, cluster V included only one variety. The mean yield and earliness were the highest in cluster V. Number of bolls per plant contributed maximum to the divergence. The weight of kapas per boll contributed the least towards the total divergence. The distance between cluster IV and cluster V was the maximum.

When the same varieties were sown in rabi season, the clustering pattern changed altogether. Here the varieties got divided into eight clusters. Cluster I consisted of four varieties, 3 varieties were included in cluster II, cluster III considered of two varieties. Cluster IV, V, VI, VII and VIII, included a single variety each. The distance between cluster IV and cluster VIII was the largest.

The 14 varieties belonging to species G. arboreum L. sown in summer season could be divided into six clusters of which cluster I included 4 varieties, cluster II included four varieties, and cluster III included 3 varieties. The remaining 3 clusters i.e., clusters IV, V and VI included only one variety each. The variety belonging to cluster V was much superior in respect of yield

to any other cluster. The mean yield is comparable to that of any variety belonging to G. hirsutum L. grown in the season.

The clustering pattern of G. arboreum L. also was quite different, when the same varieties were sown in the winter season as was observed in case of G. hirsutum L. Here the varieties were divided into eight clusters. The only similarity was that here also the single variety Sanguenum G-129 and Arboreum from North Gujarat constituted the single variety cluster. Cluster I and II were the two largest variety clusters having four varieties in each. The farthest apart cluster in this series in cluster III. It was also diametrically opposite to cluster V. Here also the variety arboreum from North Gujarat which constituted the cluster IV was the most superior variety. It's yield was sometimes higher than some varieties belonging to G. hirsutum L.

Experiments were also conducted to study the commercial feasibility of bast fibre from the three species of cotton viz., Gossypium hirsutum L., Gossypium barbadense L. and Gossypium arboreum L. The study was conducted in both kharif (summer) and rabi (winter) sown crops and also at two stages of harvest i.e. at the time of flowering, around 90-110 days of crop age and at the time of boll maturation, around 135-150 days of crop age. The fibre extracted from 90-110 days of crop age of winter sown crop and the fibre extracted from 135-150 days of crop age of summer season crop were very poor from quality aspect. It was probably due to reduced bacterial activity during retting on account of prevailing low temperature.

It was observed that, in general, average fibre yield per plant was more from the plant when it was extracted at the time of boll maturation.

From the genotypic and phenotypic correlations of fibre yield and its attributes G. hirsutum L. it was seen that no clear cut correlations of components of characters, i.e., yield height, basal diameter and fibre percentage, could be obtained. The erratic pattern of behaviour of correlation coefficient of yield and its attributes in case of G. hirsutum L. is probably due to the fact that the particular species is very susceptible to environmental variations and larger number of secondary branches which is an undesirable character if the fibre yield is concerned.

The path analysis of bast fibre yield and its component characters revealed that direct effect of fibre percentage on yield is the highest contributor. From the study of physical qualities, it could be revealed that the high tenacity value of bast fibre could be obtained from the plant when it was harvested at the time of boll maturation. It is a very interesting character in view of making the crop a perfectly dual purpose. In other words, both fibre and bast fibre can be extracted from the same plant.

Another interesting feature of cotton bast fibre is its fineness which is finer than the average fineness of white and Tossa jute i.e., Corchorus capsularis L. and C. olitorius L. respectively. It was also observed that the fibre strands were gummed very tightly. Therefore, there is ample scope of using the

fibre as a suitable substitute in the textile industry if the necessary degumming process could be evolved.

From the overall physical qualities it could be revealed that the cotton bast fibre could be comparable to weak grade of white jute (C. capsularis L.).

The transverse section of cotton stem resembles remarkable the T.S. of white jute (C. capsularis L.). The periderm formation is very conspicuous which hampers the bacterial activity during retting. The extra stellar region is thicker than jute stem.