

Association Analysis in Desi Cotton (*G. arboreum* L.)*

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Yield of seed-cotton was positively correlated with ginning out-turn but negatively with halo length. Lint index showed positive association with seed index and ginning out-turn. Halo length had, on the other hand, negative relationship with lint index. It was evident from the *path* analysis that lint index and ginning out-turn were the most important components of yield of seed-cotton in *arboreum* cotton.

The inadequate knowledge of interrelationship among various traits and the practice of selection based on individual agronomic traits hardly help in the genetic improvement of a crop plant. Information on genetic association among components of economic worth is invariably of considerable help in improving the efficiency of selection programmes. There are limited reports on correlation and path analysis of important traits in *Gossypium arboreum* (Singh *et al.* 1971; waldia *et al.* 1979). Accordingly the main objective of the present study was to investigate the extent of genetic correlation and the magnitude of direct and indirect paths of various quality traits on yield of seed-cotton.

MATERIALS AND METHODS

Nineteen varieties of *desi* cotton were grown in a randomized block design with three replications. Sowing was done with plant to plant distance of 30 cm in single-row plots spaced 60 cm apart. Observations were recorded on five competitive plants for lint index, seed index, halo length, ginning out-

turn and yield of seed cotton. Path analysis was carried out following Dewey and Lu (1959).

RESULTS AND DISCUSSION.

Correlation :

Genotypic correlation coefficients between all pairs of five characters are presented in Table 1. Lint index was positively associated with seed index and ginning out-turn. High and negative correlation of lint index with halo length pointed to the difficulty in the simultaneous improvement of these traits. Halo length was also negatively correlated with yield of seed-cotton. Under such situations there are two alternatives, (1) break the undesirable associations between these traits or (2) seek adjustment between the two attributes to find out an acceptable level of both the characters under improvement. Butany *et al.* (1966) also reported negative association of halo length with ginning out-turn and lint index, thus supporting present findings. Lint index was strongly and positively correlated with seed index. Similar association was

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reported by Singh and Bains (1968) in upland-cotton.

Ginning out-turn was high and positively correlated with yield of seed-cotton. This revealed that varieties with high ginning out-turn were, in general, also high yielding. The correlation studies made at genotypic level indicated that yield of seed-cotton was positively correlated with ginning out-turn but it was negatively associated with halo length.

Path analysis.

The path analysis facilitates the partitioning of the correlation coefficients into direct and indirect effects, thereby providing the relative importance of each of the causal factors. The direct and indirect effects of the quality traits on yield of seed-cotton are given in Table II. The direct effect of lint index was highest. However, its total contribution was reduced by the negative indirect effects via seed index and halo length. The direct contribution of seed index was negative. It was interesting to observe that the halo length which showed negative association with yield of seed-cotton had positive direct effect. This clearly indicated how the results of correlation analysis could be misleading. The true picture of association between characters is revealed by path analysis. Balakotalah (1975) also observed considerable positive direct effect of halo length on yield. The direct effect of ginning out-turn was positive and considerably high. Ginning out-turn also contributed to yield of seed-cotton through lint index.

Therefore, it is evident from present finding and studies made earlier that the lint index and ginning out-turn were most important component traits in cotton and while breeding for high yield these attributes should be given emphasis.

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TABLE—I Genetic correlations between yield and some quality characters in *desi* cotton.

| Characters | Seed index | Halo length | Ginning out-turn | Yield of seed-cotton |
|------------------|------------|-------------|------------------|----------------------|
| Lint index | 0.7112 | -0.3360 | 0.3059 | 0.6125 |
| Seed index | | 0.3480 | 0.3111 | 0.1764 |
| Halo length | | | -0.0445 | -0.4718 |
| Ginning out-turn | | | | 0.7185 |

TABLE—II Direct and indirect effects of some quantitative attributes in *desi* cotton.

| Character | Lint index | Seed index | Halo length | Ginning out-turn | Correlation with seed cotton |
|------------------|---------------|----------------|---------------|------------------|------------------------------|
| Lint index | 0.6370 | -0.1312 | -0.1192 | 0.2259 | 0.6125 |
| Seed index | 0.3530 | -0.3658 | 0.0496 | 0.1396 | 0.1764 |
| Halo length | -0.4325 | -0.1620 | 0.1426 | -0.0197 | -0.4713 |
| Ginning out-turn | 0.5204 | -0.2448 | 0.0062 | 0.4491 | 0.7185 |

Residual effect=0.6472.

Note: Bold figures denote the direct effects.