

A study of genetic architecture of quantitative traits of economic importance in upland cotton (Gossypium hirsutum L.)

By

AJMAR SINGH MEHLA

Major Advisor: Dr. B.R.Mor,
Professor,
Department of Plant Breeding,
Haryana Agricultural University,
Hisar-125 004.

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Genetic analysis of generation means ($P_1, P_2, F_1, F_2, F_3, B_1$ and B_2) was conducted in two intervarietal crosses (H 655 x Super Okra and H 777 x Coker 417) of upland cotton to determine the nature and magnitude of gene effects involved in inheritance of ten quantitative characters viz., days to first flowering, days to first boll opening, first fruiting node number, boll number, boll weight, seed cotton yield/plant, halo length, ginning outturn, seed index and lint index.

Both individual scaling (A, B, C and D) and joint scaling tests revealed the presence of epistasis in the two crosses for all the characters studied. In the sequential model fitting, the digenic models involving 4, 5 and 6-parameters were also applied to find the best fitting model. The six parameter model seemed to be best fitted in both the crosses at Hisar for days to flowering; cross II at both locations for boll number and boll weight; cross I at Sirsa and cross II at both locations for seed cotton yield; cross I at both locations for halo length; cross I at Hisar for ginning outturn; cross I and II at both locations for seed index and in cross I at both locations and cross II at Hisar for lint index. The inconsistency in model fitting over locations was also evident.

Both additive as well as dominance gene effects were present in the present material. Epistatic effects were detected for all the characters. However, it was apparent that additive x additive and dominance x dominance effects were more important than additive x dominance effects.

Heritability estimates were high for days to first boll opening, halo length, seed index and lint index. For remaining traits, variable estimates of heritability were recorded across the crosses and locations. The dominance ratio indicated over dominance for days to first flowering, first fruiting node number, boll number, boll weight and seed cotton yield. Partial dominance was observed for days to first boll opening, halo length, seed index and lint index.

The breeding implications for improving upland cotton has been discussed.

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