GENETIC ARCHITECTURE OF SOME QUANTITATIVE TRAITS OF COTTON

(Gossypium hirsutum L.)

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ABSTRACT: An 8 x 8 diallel cross was made to study the genetic make up of different characters of upland cotton. The character studied were number of bolls/plant, seed cotton yield/plant, number of seeds/boll and oil %age. The analysis of variance revealed that differences among the parents were highly significant The Hayman-Jinks model proved to be adequate for number of bolls/plant, seed cotton yield/plant and partially adequate for number of seeds/boll and oil %age in F_1 generation. All these characters were governed by over dominance type of gene action for their inheritance.

INTRODUCTION: Cotton as a commercial crop is playing significant role in industrial development and foreign exchange earning of Pakistan. Importance of the crop has attracted maximum attention of the plant breeders and their streneus efforts have lead to the evolution of high yielding varieties which largely account for hastening cotton production in the country. It is therefore, mandatory to have knowledge about the inheritance mechanism for various characters. Many scientists like Baker *et al*. (1973), Raza *et al*. (1990), Murtaza *et al*. (1992) and Azhar *et al*. (1994) working on cotton with special reference to its qualitative traits have reported different types of gene action. The present study was conducted to know the pattern of gene action in some important native cultivars of cotton under the agro-climatic conditions of Dera Ismail Khan (Pakistan).

MATERIALS AND METHODS: The F_1 material was developed by crossing eight indigenous cultivars (i.e. CIM-443, MNH-93, CIM-448, NIAB-78, SLS-1, CIM-446, FH-634 and CIM-1100) in all possible combinations at Faculty of Agriculture, Gomal University, D. I. Khan during the cropping season 1997. The data were statistically analyzed through diallel technique developed by Hayman (1954) and applied by Mather and Jinks (1977).

RESULTS ANDS DISCUSSION: The results for the analysis of variance revealed that the mean genetic differences among the hybrids and their parents in F_1 generation were highly significant for all the characters studied viz; number of bolls/plant, seed cotton yield/plant, number of seeds/boll and oil percentage (Table 1). This showed variability in the breeding material under Dera Ismail Khan (Pakistan) conditions. Therefore, the data were arranged in diallel tables for analysis of variance. Results achieved on various plant traits regarding genetic analysis are presented and summarized as under:

1) Additive genetic variance seemed to exist for these traits, as the mean squares due to both male and female parents are significant ($P \leq 0.01$). The interaction and reciprocal differences between male and female were also significant except number of seeds / boll (Table 2). To test adequacy of additive dominance model for the data set, regression analysis was carried out which revealed that regression coefficient (b) deviated significantly from zero and were equal to unit slope. The results of analysis of variance (Table 4) showed that Wr-Vr did not differ significantly between the arrays. The Hayman-Jinks model proved to be adequate for number of bolls/plant and seed cotton yield/plant, hence it is not valid to draw graph of regression of Wr on Vr in these two parameters, while it was partially adequate for number of seeds and oil percentage.

The estimate of components of genetic variation showed that both additive and non-