GAU Res. J. 1994. 19 (2) : 62--64

Genetic Architecture of Lint Component Characters in Interspecific Hybrids of Cotton

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ABSTRACT

In interspecific crosses between varieties of Asiatic (*Gossypium hirsutum* L.) and Egyptian (*G. barbadense* L.) cotton all three kinds of gene effects (Additive, Dominance and Epistatic) were involved in the inheritance of lint yield per plant, seed index and lint index. Additive and epistatic gene effects were important for inheritance of ginning percentage and number of motes per boll.

(Received on 17th June, 1992)

INTRODUCTION

Major break through in quality cotton production came with the release of an inter-specific hybrids of upland cotton and Egyptian cotton. Long staple cotton is produced from a *hirsutum* type. Superior long staple cottons are produced from *hirsutum barbadense* and their intra and interspecific hybrids. Lint quality is important factor for long and superior long staple cotton. Hence, this study was taken to know the genetic architecture of lint components characters in interspecific hybrid with its various generations. The information on gene effects may help in planning effective breeding programme.

MATERIALS AND METHODS

The material of the present investigation consisted of two interspecific cotton crosses (*G. hirsutum* L. x *G. barbadense* L.) (H 51-3 x Suvin and H 51-3 x SILS-9). Six generations i.e. P_1, P_2, F_1 (P_1 x P_2), F_2, BC_1 (F_1 x P_1) and BC_2 (F_1 x P_2) of each of two crosses were produced and evaluated in compact Family Block Design with four replications during the year 1984-85 at Plant Breeding Farm, GAU, Anand. Each parental and F_1 generation was represented by two rows, BC generation by four rows and F_2 by six rows of 6 m row length with 120 x 60 inter and intra row spacing. Data were recorded on five competitive plants in each row for five lint component characters (Table 1). The data were subjected to statistical analysis for six-parameter model (6, 7) to obtain estimates of m, (d), (h), (i), (j) and (l).

RESULTS AND DISCUSSION

The estimates of different parameters are presented in Table 1. The mean value was significant for all the characters studied in both the crosses.

TABLE 1

Gene action for the lint component characters in hybrid H 51-3 x Suvin (H_1) and H 51-3 x SILS-9 (H_2).

Characters	*M*		*d*		*h*		*i*		*j*		*l*	
	H_1	H_2	H_1	H_2	H_1	H_2	H_1	H_2	H_1	H_2	H_1	H_2
Lint-yield per plant	36.40**	50.03**	-19.61**	10.41	242.58**	55.86	130.78**	37.39	-41.69**	-23.74**	-59.84**	58.59
Ginning percentage	29.17**	29.30**	0.38	1.31*	1.26	-1.68	2.12	-1.26	1.18*	2.99**	-6.88**	0.50
Number of motes per boll	1.42**	1.39**	0.11*	-0.02	-0.44	-0.56	-0.59*	-0.56**	0.06	0.03	1.03*	0.39
Seed index	10.05**	10.59**	-0.71*	0.87**	6.50**	2.38**	5.18**	0.98	-1.05**	0.22	-2.79	1.52
Lint index	4.17**	4.39**	-0.18	0.57**	2.76**	0.94	2.46**	0.46	-0.13	0.53**	-2.56**	0.01

* Significant at 5% level; ** Significant at 1% level

M = mean value d = additive h = dominance i = epistasis (a x a)

j = epistasis (a x d) l = epistasis (d x d)

For lint yield per plant mean value was higher with cross H 51-3 x SILS-9. All the three types of gene effects viz., additive, dominance and epistasis (additive x additive, additive x dominance and dominance x dominance) were involved for this trait in cross H 51-3 x Suvin 9, whereas for cross H 51-3 x SILS-9 only additive x dominance gene interaction was significant.

Mean value of ginning percentage was more or less equal for both the crosses. The important role of both additive x dominance and dominance x dominance digenic interaction were observed in cross H 51-3 x Suvin whereas for cross H 51-3 x SILS-9 additive as well as additive x dominance gene effects were important.

For number of motes per boll mean value was more or less equal. In cross H 51-3 x Suvin, additive and epistasis viz., additive x addtive and dominance x dominance gene action were significant, whereas in cross H 51-3 x SILS-9 only duplicate epistatic gene action was significant for expression of this trait.

Mean value of seed index was more or less equal. Except dominance x dominance gene effect, all the other gene effects were imporant in cross H 51-3 x Suvin, whereas in cross H 51-3 x SILS-9 only main gene effect (additive and dominance) showed importance in inheritance of this character.

For lint index mean value was more or less equal with both the crosses. In cross H 51-3 x Suvin, dominance, additive x additive and dominance x dominance gene effects were involed, whereas in cross H 51-3 x SILS-9 additive as well as additive x dominance gene components were found to be important in expression of lint index.

The findings are in agreement with for lint yield per plant (1), for ginning percentage (3,5,8,10) for number of motes per boll (2), for seed index (1,8,9) and for lint index(4,8).

In inheritance of above various characters magnitude of non-fixable gene effects (dominance and epistasis) were high, hence *inter se* crossing as well as reciprocal recurrent selection is suggested for improvement of above studied traits in desired direction.

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