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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences, 1 (3): 235-236, 1998 *Research Article*

Genotypic and Phenotypic Correlation Analysis of Some Quality Characters and Yield of Seed Cotton in Upland Cotton (*Gossypium hirsutum* L.)

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Abstract
The study was undertaken to determine genotypic and phenotypic correlations between some quality characters and yield of seed cotton. Seed index and fibre fineness had negative genotypic and phenotypic correlation with yield of seed cotton which is significant at genotypic level. Lint index and staple length had positive genotypic and phenotypic correlation with yield of seed cotton. Seed index had negative genotypic and phenotypic correlation with staple length which is significant at genotypic level while positive and significant genotypic and phenotypic correlation with lint index. Lint index had negative genotypic and phenotypic correlation with fibre fineness.

Key words: *Gossypium hirsutum* L., cultivars, genotypes quality characters, Pakistan

Introduction
Seed cotton yield is the most important consideration in cotton breeding programme. Therefore, it is essential to know which factors or traits influence seed cotton yield. The present study was carried out to determine correlation among yield and some quality characters. The information thus obtained will be utilized in hybridization programme and selection criteria for seed cotton improvement. Baluch *et al*. (1979) concluded negative and significant genotypic correlation between seed index and yield of seed cotton. Memon *et al*. (1980) showed that lint index was positively and significantly correlated with yield of seed cotton. Singh (1982) reported positive and strong correlation between seed index, lint index and yield of seed cotton. Tariq *et al*. (1992) reported positive and significant value of genotypic correlation among seed index and lint index. Kalwar and Shahani (1983) found that seed index showed high positive correlation with lint index and low positive correlation with staple length and fibre fineness. Azhar *et al*. (1984) found that seed index, lint index and staple length were positively and significantly correlated with seed cotton, yield. Khan and Khan (1966) reported positive association for yield of seed cotton with staple length.

Materials and Methods
The experimental material consisted of ten elite cotton genotypes viz. B-284, B-363, B-496, B-622, B-630, B-727, B-811, B-828, B-843 and one check variety NIAB-78 and research studies were carried out in the Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad during the year 1996-97. The experiment was planted in a triplicated Randomized Complete Block Design keeping row to row distance 75 cm and plant to plant distance 30 cm. Ten plants were used for recording the data in each replication of each genotype. The data were recorded on yield of seed cotton, seed index, lint index, staple length and fibre fineness. Weight of 100 seeds was considered as seed index, whereas lint index was calculated by the following formula:

$$\text{Lint index} = \frac{\text{Seed index} \times \text{G.O.T. \%age}}{\text{100-G.O.T. \%age}}$$

Staple length was measured by tuft method and fibre fineness was measured with the help of Sheffield micronaire.

The data thus collected was subjected to statistical analysis of variance and covariance following the methodology given by Steel and Torrie (1980). Phenotypic and genotypic correlations were worked out as given by Kwon and Torrie (1964).

Results and Discussion
The analysis of variance (Table 1) showed that genotypic differences for all the traits were highly significant. The results pertaining to genotypic and phenotypic correlations (Table 2) indicate the intensity of relationship between the two traits for the present breeding material. Generally genotypic correlations were higher than the phenotypic correlations which reflected that the genetic factors were more active in the development of association as compared to environmental ones as earlier found by De Carvalho *et al*. (1994). The results with respect to correlations revealed that correlation of seed index with lint index (rg = 0.454, rp = 0.423) and fibre fineness (rg = 0.0282, rp = 0.1090) were positive while it was negative with staple length (rg = -0.194, rp = -0.222) and yield of seed cotton per plant (rg = -0.359, rp = -0.309). Earlier Maksudov and Eugalychev (1984), Aguilar *et al*. (1980) and Tariq *et al*. (1992) observed a strong and positive association both at genotypic and phenotypic level between seed index and lint index while Kalwar and Shahani (1983) observed low positive correlation between seed index and fibre fineness.

Table 1: Mean squares for analysis of variance for various quality characters and yield of seed cotton

S.O.V.	D.F.	Seed index	Lint index	Staple length	Fibre fineness	Yield of seed cotton
Replication	2	0.0005	0.2130	0.0160	0.0008	166.717
Genotype	9	0.2037**	1.9340**	2.550**	0.1360**	619.994**
Error	18	0.0018	0.1420	0.0410	0.0035	67.760

** = Highly significant ($p < 0.001$)

Table 2: Genotypic and phenotypic correlation coefficients metrix for quality traits and yield of seed cotton

		Lint index	Staple length	Fibre fineness	Yield of seed cotton
Seed index	rg	0.454*	-0.194*	0.0282	-0.359*
	rp	0.423*	-0.222	0.1090	-0.309
Lint index	rg		0.292	-0.0634	0.419*
	rp		0.222	-0.0519	0.415*
Staple length	rg			0.104	0.159
	rp			0.155	0.184
Fibre fineness	rg				-0.239*
	rp				-0.190

* = Significant, ** = Highly significant

Lint index is positively correlated with staple length and significantly correlated with yield of seed cotton per plant which tallies with earlier findings of Azhar *et al*. (1984) while negatively correlated with fibre fineness. Staple length was positively correlated with fibre fineness which confirmed with early research findings reported by Bocharova (1979) and yield of seed cotton per plant. Fibre fineness and yield of seed cotton were negatively correlated which is significant at genotypic level. These results suggested that longer staple length with higher lint index would tend to increase yield of seed cotton.

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