Table 3. Distribution of parents and hybrids on the basis of individual G X E interaction components for grain yield

Parameter	Parents	Single cross	Three way cross	Double cross	Varietal cross
Predictable					
G X E present (both B and s d nonsignificant)	7	10	19	93	5
G X E present (onlu b significant)	-	1	1	-	-
Unpredictable					
Both b and s^{-2} d significant	-	1	-	3	-
Only s^{-2} d significant	1	3	10	24	1
Total	8	15	30	120	6

additive gene interactions may be involved in determining high stability.

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CORRELATION AND PATH COEFFICIENT ANALYSIS IN COTTON

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ABSTRACT

Correlation and path coefficient analysis made in 10 *Gossypium hirsutum* genotypes, 12 *G.barbedense* accessions, 3 cytosteriles and their isogenic maintainers revealed the importance of number of sympodia and number of bolls per plant to be considered for yield improvement by selection. Shorter duration may tend to reduce the seed cotton yield.

KEY WORDS : Cotton, Correlation, Path Analysis

Correlation of characters is a measure of strength of relationship between a group of characters. The estimation of correlation coefficient is an important step in planning selection experiments as it forms the basis for developing a selection index. A breeder is interested to assess the correlated response of the yield components in selection programmes besides the yield *per se*, because yield is a function of not only its components but also their inter-relationships. Paramasivam and Udayasoorian (1989) reported association of seed cotton yield with other related characters. Path coefficient analysis is used to determine the direct effect of each independent character on a dependent character among a group of metrical traits. This will be useful to work out the cause and effect relationship so that the selection will be more effective. An attempt was made in this study to find out the various effects of yield components on cotton ield.

MATERIALS AND METHODS

A total number of 22 accessions in the species *G.hirsutum* and *G.barbedense*, 3 cytosteriles and their isogenic maintainers formed the material for study. The crop was raised during summer irrigated season (February - June) of 1993 at the Cotton Breeding Station, Tamil Nadu Agricultural University, Coimbatore, in a randomised block design with three replications. The genotypes or raised in plots of 6m row and spacing of 75 x 30 cm had a population of 10 plants in a row. All the recommended agronomic practices were followed to raise a good crop. The data for correlation and path coefficient analysis were recorded for plant height, number of sympodia per plant, days to 50 per cent flowering, number of bolls per plant, boll weight, seed cotton yield, ginning out-turn, pollen stainability, 2.5 per cent span length and bundle strength. Correlation coefficients (Goulden 1959)

Table 1. Genotypic and Phenotypic correlation coefficients between different characters in the parents

Characters		No. of sympodia/ plant	Days to 50% flowering	No. of bolls/ plant	Boll weight	Seed Cotton yield	Ginning outturn	Pollen staina-bility	2.5% span length	Bundle strength
Plant height	G	0.5224**	0.0748	0.7437**	0.0375	0.7230**	-0.2564	-0.0480	0.4305*	0.2657
	P	0.4047*	0.0669	0.4601*	0.0294	0.4626*	-0.1837	- 0.0398	0.2821	0.1735
Number of sympodia/plant	G		-0.5149**	0.9726**	-0.0199	0.8808**	-0.4255*	-0.2899	- 0.2323	-0.4499*
	P		-0.2758	0.5592**	-0.0393	-0.5500**	- 0.2565	-0.1473	-0.1239	-0.2018
Days to 50% flowering	G			-0.4586*	- 0.0973	-0.4397*	-0.1498	0.1708	0.5886**	0.6494**
	P			-0.3283	-0.0960	-0.3297	-0.1468	0.1655	0.5317**	0.5273**
Number of bolls/plant	G				-0.0610	0.9660**	-0.2868	-0.1970	-0.2302	-0.3832*
	P				-0.0805	0.9447**	- 0.2053	-0.1600	-0.1056	0.1440
Boll weight	G					0.2093	0.1109	0.1431	-0.0611	-0.0813
	P					0.1379	0.1025	0.1476	-0.0529	-0.0905
Seed cotton yield	G						-0.2182	-0.1420	-0.2250	-0.3593
	P						-0.1680	- 0.1114	-0.1158	-0.1381
Ginning outturn	G							-0.0380	-0.5082**	-0.2808
	P							- 0.0327	-0.4496*	-0.2321
Pollen stainability	G								0.1443	0.1184
	P								0.1287	0.8315
2.5% span length	G									0.9193**
	P									0.8112**

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

and path coefficients (Dewey and Lu, 1959) were worked out.

RESULTS AND DISCUSSIONS

The genotypic and phenotypic correlation coefficients between different characters studied are furnished in Table 1. The seed cotton yield had positive correlations with plant height, number of sympodia per plant and number of bolls per plant both at phenotypic and genotypic levels. Its association with duration to 50 per cent flowering was negative at the genotypic level, while all the other characters did not show any significant association either at phenotypic or at genotypic levels.

Significant positive inter correlations at the genotypic and phenotypic levels existed between the character pairs, plant height and number of bolls, number of sympodia per plant and number of bolls per plant, days to 50 per cent flowering and 2.5 per cent span length and days to 50 per cent flowering and bundle strength at 1/8" gauge. The relationship was positive at the genotypic level only in respect of plant height and fibre length at 2.5 per cent span. There were also negative relationships between some of the character pairs of these, the association of number of sympodia and humber of bolls with days to 50 per cent flowering is of interest because early varieties may tend to be less productive because of lower number of sympodia per plant. Reports on positive

Table 2. Direct and indirect effects of different characters in parents (based on genotypic correlations)

Characters	Plant height	No. of sympodia/ plant	Days to 50% flowering	No. of bolls/ plant	Boll weight	Ginning outturn	Pollen staina-bility	2.5% span length	Bundle Strength	Seed cotton yield
Plant height	-0.3416	0.5056	0.0137	0.5221	0.0100	-0.1192	-0.0073	0.0463	0.0934	0.7230
Number of sympodia per plant	-0.1748	0.9677	-0.0946	0.6127	- 0.0052	-0.1978	-0.0440	-0.0250	-0.1582	0.8808
Days to 50% flowering	-0.0255	-0.4983	0.1837	-0.3219	-0.0257	- 0.0696	0.0259	0.0633	0.2283	-0.4397
Number of bolls/plant	-0.2540	0.9411	-0.0843	0.7020	-0.0161	- 0.1333	-0.0299	-0.0248	-0.1347	0.9660
Boll weight	-0.0128	-0.0192	-0.0179	-0.0428	0.2640	0.0515	0.0217	-0.0066	-0.0286	0.2093
Ginning outturn	0.0876	-0.4118	-0.0275	-0.2014	0.0293	0.4648	-0.0058	-0.0547	-0.0987	-0.2182
Pollen stainability	0.0164	-0.2806	0.0314	-0.1383	0.0378	- 0.0177	0.1553	0.0155	0.0416	-0.1420
2.5% span length	-0.1470	-0.2248	0.1081	-0.1616	-0.0161	- 0.2362	0.0219	0.1076	0.3232	-0.2250
Bundle Strength	-0.0907	-0.4354	0.1193	-0.2690	-0.0215	- 0.1305	0.0180	0.0989	0.3515	-0.3593

Residual effect = 0.1245

association of plant height with seed cotton yield, number of sympodia with seed cotton yield and number of bolls per plant with seed cotton yield are already available.

Among the nine yield components subjected to path analysis, number of sympodia per plant and number of bolls per plant exerted high direct and positive effects on seed cotton yield (Table 2). The direct effects of ginning outturn, bundle strength and boll weight were moderate and positive. The days to 50 per cent flowering, pollen stainability and 2.5 per cent span length had low and positive direct effects. Among the indirect effects, the influence of plant height through most of the yield components was positive and particularly through number of sympodia and number of bolls was high. The effect of number of sympodia via number of bolls and the influence of number of bolls through number of sympodia were high and positive. Similiarly, the indirect effects of days to flowering through number of sympodia and number of bolls were negative. Prominent negative indirect effect was noticed in ginning out-turn through number of sympodia.

It can be concluded that the two most important characters in present study were number of sympodia and number of bolls per plant. The study also discloses that precocity will reduce the yield and cautions the breeders not to reduce the duration beyond certain limit.

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GENOTYPE X ENVIRONMENT INTERACTION FOR GRAIN YIELD IN COWPEA

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ABSTRACT

Thirteen varieties of cowpea were evaluated in three environments and stability parameters were studied for yield. The varieties IT- 86-D-1056 and Co-4 had average response to changes in environmental conditions with higher mean yield as against the population mean yield. VCP-4 had the highest mean seed yield among the materials studied and was found specially suited for unfavourable growing season.

KEY WORDS : Cowpea, Grain Yield, Genotype, Environment, Interaction

Cowpea (*Vigna unguiculata* (L.) Walp.) is one of the major pulse crops in India. The most obivious problem is raising the present cowpea production level is by increasing it's yield potential. However, when the hazards besetting the crop in low lands of tropics are considered, increasing yield level *per se* may be a lower order of priority than stabilising productivity. There are reports of stability for forage yield (Sanghi and Kandalkar, 1981) seed yield and 100 grain weight (Mehrotra and Chaudhary, 1981). In the present study, 13 varieties of cowpea were evaluated for their yield stability.

MATERIALS AND METHODS

The experimental material consisted of 13 varieties grown in three different seasons *viz.*, summer, *kharif* and *rabi*, 1994. The experiments were conducted at the National Pulses Research Centre, Vamban, Tamil Nadu Agricultural University in a randomised block design with three replications in 4 x 3 m^2 plots spaced 45 cm X 15 cm apart in each environment. The plot yield was subjected to statistical analysis and stability parameters were worked out (Eberhart and Russel, 1966).