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CHARACTER ASSOCIATION AND COMPONENT ANALYSIS IN UPLAND COTTON

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ABSTRACT

Genotypic and phenotypic correlation co-efficients and path co- efficients were worked out in 51 diverse, genotypes of upland cotton. Number of bolls per plant and plant height had positive correlation with seed cotton yield both at genotypic and phenotypic levels. And these two characters showed significantly positive correlation between themselves also. Path co-efficient analysis indicated that plant height, bolls per plant, ginning out turn, lint index and seed index contributed directly to yield.

KEY WORDS : Upland Cotton, Component Analysis, Character Association

Yield is a complex character and is dependent on several component characters. The knowledge of the associations between yield and its components and among components themselves is of immense practical value in making selections. Path co-efficient analysis by (Wright, 1921) provides an effective means of finding direct and indirect causes of association. In the present study, association of certain characters, their direct contribution to yield and indirect effects through other characters on yield in upland cotton *(Gossypium hirsutum L.)* were assessed.

MATERIALS AND METHODS

Fifty one genotypes of upland cotton of diverse origin were taken as the material for the present study. These genotypes were grown in a randomised block design with three replications during March 1991 at the Agricultural College and Research Institute, Madurai. Each genotype was raised in a single row of 6m length with a spacing of 75 x 30 cm.

Data on ten randomly selected plants in each genotypes were collected for days to 50 per cent flowering, plant height, sympodial branches per plant, bolls per plant, boll weight, seed cotton yield per plant, ginning per cent, lint index, seed index and mean halo length. The genotypic and phenotypic correlation co- efficients were computed using genotypic and phenotypic variances and covariances (Al.Jibouri *et al.,* 1958). The path co- efficient analysis was done according to the method by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The genotypic and phenotypic correlation co-efficients between yield and yield attributes are given in Table 1. The present study indicated that seed cotton yield per plant was highly and positively influenced by plant height and bolls per plant, both at phenotypic and genotypic levels. This was in accordance with the result obtained by Sardul Singh Gill and Singh (1981) and Sangwan and Yadava (1987). Increase in bolls per plant may be due to increase in plant height which inturn

Table 1. Phenotypic and genotypic correlation coefficients

Character		Plant height	Sympodial branches per plant	Bolls per plant	Boll weight	Ginning per cent	Lint index	Seed index	Mean halo length	Seed cotton yield per plant
Days to 50%	P	0.17	-0.01	0.17	0.16	-0.04	0.11	0.19	0.21	-0.10
flowering	G	0.21	-0.02	0.22	0.27	-0.10	0.26	0.22	0.29*	-0.14
Plant height	P		0.03	0.29*	0.11	-0.13	0.08	0.14	0.27	0.28
	G		0.03	0.32*	0.13	-0.18	0.03	0.14	0.33*	0.32*
Sympodial	P			-0.06	0.05	0.11	0.13	0.06	0.20	-0.02
branches/plant	G			-0.15	0.16	0.16	0.16	0.10	0.26	-0.01
Bolls per plant	P				-0.02	-0.11	0.03	0.05	0.02	0.41**
	G				0.01	-0.18	-0.06	0.09	-0.01	0.48**
Boll weight	P					0.15	0.46**	0.44**	0.10	0.18
	G					0.22	0.63**	0.67**	0.23	0.18
Ginning per cent	P						0.58	-0.01	-0.15	0.03
	G						0.69**	0.08	-0.15	0.07
Link index	P							0.78**	0.29**	0.18
	G							0.78**	0.39**	0.19
Seed index	P								0.48**	0.17
	G								0.69**	0.18
Mean halo length	P									0.13
	G									0.15

* Significant at 5% level ** Significant at 1% level P = Phenotype G = Genotype

produced more seed yield. No association was found to exist between seed cotton yield and the other traits studied, since they exhibited non-significant correlation co-efficients with seed cotton yield per plant.

The important yield contributing characters in the present study are the bolls per plant and plant height which had significantly positive correlation between themselves. The trait boll weight had significant positive association with lint index (Sanyasi, 1981) and seed index (Sinde and Deshmukh, 1985). Further, a significantly positive relationship between ginning outturn and lint index was observed as already reported by Jagtap and Kolhe (1984). Lint index showed positive association with seed index (Sangwan and Yadava, 1987) as well as mean halo length (Jagtap and

Table 2. Direct and indirect effects as partitioned by path analysis.

Character	Days to 50% flowering	Plant height	Sympodial branches per plant	Bolls per plant	Boll weight	Ginning per cent	Lint index	Seed index	Mean halo length	Seed cotton yield per plant
Days to 50% flowering	-0.71	0.21	0.01	0.03	-0.04	-0.73	-0.91	2.24	-0.22	-0.14
Plant heigh	-0.15	0.01	-0.01	0.03	-0.02	-1.24	-0.29	1.25	-0.24	0.32*
Sympodial branches/plant	0.12	0.03	-0.20	-0.01	-0.01	1.12	-1.89	1.13	-0.19	-0.01
Bolls per plant	-0.15	0.12	0.23	0.99	-0.01	-0.05	0.35	0.39	0.01	0.48*
Boll weight	-0.19	0.13	-0.01	0.01	-0.15	1.54	-1.97	1.00	-0.01	0.18
Ginning per cent	0.08	-0.18	-0.03	-0.02	-0.03	0.92	-1.54	0.76	0.11	0.07
Link index	-0.19	0.03	-0.05	-0.01	-0.09	0.74	-0.99	1.04	-0.29	0.19
Seed index	-0.33	0.14	-0.05	0.01	0.09	0.58	-0.58	1.02	-0.51	0.18
Mean halo length	-0.21	0.33	-0.05	-0.01	-0.03	0.04	-0.30	1.21	0.75	0.15

* Significant at 5% level ** Significant at 1% level Diagonal values indicate direct effects Residual effect = 0.32

Kolhe, 1984). The seed index exhibited significantly positive correlation with mean halo length. Such a positive association between these two traits was already reported by Jagtap and Kolhe (1984).It may be concluded that an intentional selection for plant height and bolls per plant may result in simultaneous improvement of the seed cotton yield per plant, since these two characters are positively correlated with seed cotton yield and also inter related.

In general, there were not much differences between the phenotypic and genotypic correlation co-efficients. This indicated that the environment did not play much role in the expression of different traits. Hence, selection based on phenotypic performance of different traits will be effective in the improvement of seed cotton yield. The path co-efficient analysis of yield components and their effect on yield are presented in Table 2. From the observation, it was clear that the positive correlation between bolls per plant and seed cotton yield was mainly due to the high positive direct effect of bolls per plant. Tyagi *et al.* (1988) and Ananda Choudary and Hanumantha Rao (1987) reported similar findings. The indirect effect of bolls per plant through lint index and seed index were also high. Another yield contributing character namely plant height had very high positive direct effect on seed cotton yield. Further, the plant height exerted its high influence on seed cotton yield through seed index also.

The traits *viz.*, days to 50 per cent flowering, ginning out turn, seed index and mean halo length though had no significant association with seed cotton yield, showed their high direct effect on seed cotton yield. However, the other two traits which had no association with seed cotton yield *viz* sympodial branches and boll weight had low direct effect on seed cotton yield. But all these traits showed high to very high indirect effect through ginning out turn, and seed index either positively or negatively. Therefore, it may be concluded that eventhough the traits ginning out turn, and seed index were not correlated with seed cotton yield, these traits had direct influence and the other traits had indirect effect through these two traits on seed cotton yield. Hence, apart from plant height and bolls per plant, the two traits *viz.*, ginning out turn, and seed index also play major role for manipulation of seed cotton yield. All the characters, excert negative indirect influence through lint index. Although, this effect is nullified to certain extent by other characters, care should be taken to avoid lint index as a criterian for selection in the programmes oriented to seek improvement in yield. The high direct negative influence observed in the case of days to 50 per cent flowering, will also go to show that breeding for earliness may also tend to reduce the yield. Hence, the critical stage of the crop duration beyond which significant yield reduction occurs should be fixed before taking up yield improvement work. The residual effects observed in the path co-efficient analysis are moderate showing that a few other characters than those involved in the present study might also contribute to seed cotton yield in the present set of materials.

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