stress environment resulted in water economy which contributed to increased pod yield. The number of functional leaves, leaf area and harvest index were positively associated with pod yield. Chhonkar and Kumar (1987) also concluded that leaf area was positively correlated with pod yield in groundnut. The specific leaf weight also exhibited negative correlation with transpiration rate. Hence the increased leaf thickness resulted in reduced transpiration. Leaf area and dry matter production were positively associated. Negative association of transpiration rate with yield and specific leaf weight and the positive relationship between dry matter production and yield have already been reported (Arjunan *et al.*, 1988).

The results of path analysis are presented in Table 2. Dry matter production had the highest positive direct effect on pod yield. The number of functional leaves also had positive direct effect. All the other characters had only negative direct effect on yield. The indirect effects of specific leaf weight on leaf area, and transpiration rate and leaf area on DMP were positive and high.

Thus, it is clearly brought out that total dry matter production and the number of functional leaves at harvest can be used as selection indices for development of drought resistant/tolerant groudnut varieties.

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CHARACTER ASSOCIATION AND COMPONENT ANALYSIS IN UPLAND COTTON

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ABSTRACT

Genotypic correlation coefficients and path coefficients were worked out in 45 crosses and their 10 parents in American cotton, (*G. hirsutum* L.) Number of bolls per plant, plant height, number of monopodia, sympodia and seeds per boll had positive correlation with seed cotton yield, while ginning percentage showed significant negative association. All these traits showed either significant positive or negative association with number of bolls per plant. Path coefficient analysis revealed that among all the characters studied, number of bolls per plant should receive greater emphasis in cotton improvement programmes as it contributes significantly through other characters.

KEY WORDS : Upland cotton, Character association, Component analysis

Cotton in an important fiber crop grown in Andhra Pradesh. Yield is a complex character which depends on several component characters. Therefore, direct selection for yield is often not effective. Thus it is essential to study the association of yield components with yield which are less influenced by environmental factors. Path coefficient analysis (Wright, 1921) provides an effective means of finding direct and indirect causes of association. In the present investigation,

Table 1. Genotypic correlation coefficient

Character	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	YIELD
X1 days to 50% flow.	0.0733	0.1294	0.4403**	-0.2055	-0.4719**	-0.2766*	-0.0451	-0.4382**	-0.4075**	0.1742	0.3991**	0.0697	0.2614
X2 O.B.D.		0.9544**	0.1245	-0.1110	-0.1889	0.0957	-0.0135	-0.0655	-0.0431	-0.0812	-0.1455	-0.1615	-0.1897
X3 O.L.D			0.1484	-0.0895	-0.3208*	0.0414	-0.1399	-0.2163	-0.1619	-0.0693	-0.1326	-0.1856	-0.2065
X4 no of monopodia				0.0873	-0.2730	-0.1062	0.2736*	-0.2064	-0.3881**	-0.1464	0.5653**	0.3260*	0.4451**
X5 no of sympodia					0.3036*	-0.1847	0.2245	0.3185*	0.0455	-0.4203**	0.4531**	0.4026**	0.5332**
X6 boll weight						0.8276**	0.6055**	0.8502**	0.7459**	-0.1985	-0.1225	0.1555	0.1370
X7 locs/ boll							0.4624**	0.7100**	0.8159**	0.0789	-0.2769*	-0.1021	-0.1036
X8 no of seeds/boll								0.4451**	0.2776*	-0.3131*	0.1941	0.2696*	0.3471**
X9 seed index									0.7450**	-0.4121**	-0.0996	0.2285	0.1117
X10 lint index										0.1468	-0.4012**	0.1878	0.2107
X11 G P											-0.4378**	-0.6335**	-0.4822**
X12 no of bolls												0.7339**	0.9588**
X13 plant heigth													0.7672**

* Significant at 5% level
** Significant at 1% level
OBD : Open boll damage
OLD : Open locule damage

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

Character	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
X1 Days to 50% flow	-0.0082	0.0095	-0.0202	-0.0564	-0.0189	-0.0299	-0.0404	-0.0029	0.0103	0.0226	0.0015	0.3923	0.0022
X2 O.B.D	-0.0006	0.1302	-0.1494	-0.0159	-0.0102	-0.0120	0.0140	-0.0009	0.0015	0.0024	-0.0007	-0.1430	-0.0050
X3 O.L.D	-0.0011	0.1242	-0.1565	-0.0190	-0.0082	-0.0203	0.0061	-0.0009	0.0051	0.0090	-0.0006	-0.1304	-0.0058
X4 no of monopodia	0.0036	0.0162	-0.0232	-0.1281	0.0080	-0.0173	-0.0155	0.0176	0.0048	0.0216	-0.0013	0.5557	0.0101
X5 no of sympodia	0.0017	-0.0145	0.0140	-0.0112	0.0922	0.0192	-0.0270	0.0145	-0.0075	-0.0025	-0.0036	0.4454	0.0125
X6 boll weight	0.0039	-0.0246	0.0502	0.0350	0.0280	0.0634	0.1209	0.0390	-0.0200	-0.0414	-0.0017	-0.1204	0.0048
X7 lint/ boll	0.0023	0.0125	-0.0065	0.0136	-0.0170	0.0524	0.1461	0.0298	-0.0167	-0.0453	0.0007	-0.2722	-0.0032
X8 seeds/ boll	0.0004	-0.0018	0.0219	-0.0351	0.0207	0.0384	0.0676	0.0645	-0.0105	-0.0154	-0.0027	0.1908	0.0084
X9 seed index	0.0036	-0.0085	0.0338	0.0264	0.0294	0.0539	0.1037	0.0287	-0.0235	-0.0414	-0.0036	-0.0979	0.0071
X10 lint index	0.0033	-0.0056	0.0253	0.0497	0.0042	0.0473	0.1192	0.0179	-0.0175	-0.0556	0.0013	-0.3944	-0.0058
X11 GP	-0.0014	-0.0106	0.0109	0.0188	-0.0387	-0.0126	0.0115	-0.0202	-0.0097	0.0082	-0.0086	0.4303	-0.0197
X12 no of bolls	-0.0033	-0.0185	0.0206	-0.0724	0.0418	-0.0078	-0.0405	0.0125	0.0023	0.0223	-0.0038	0.9830	0.0228
X13 plant height	-0.0006	-0.0210	0.0299	-0.0418	0.0371	0.0099	-0.0149	0.0174	-0.0054	0.0104	-0.0055	0.7214	0.0310

Residual effect = 0.1236

OBD - Open boll damage, OLD - Open locule damage

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

association of certain characters, their direct contribution of yield and indirect effects through other characters on yield of upland cotton (*G. hirsutum*. L) were assessed.

MATERIALD AND METHODS

Material under study comprised of 45 F1s and their 10 parents, which were crossed in diallel fashion (without reciprocals) during *Kharif* 1992 - '93. The 45 crosses along with their 10 parents were sown in a randomized block design with three replications during *Kharif* 1993 - '94 at R.A.R.S., Lam. Each entry was sown in one row of 10 hills each, spaced at 120 x 60 cm apart. Normal agronomic practices recommended to the region were followed. Data on five randomly selected plants in each genotype were collected for days to 50% flowering, number of monopodia, sympodia, plant height, boll weight, locs per boll, seeds per boll, seed index, lint index, ginning percent, bolls per plant, open boll, locule damage and seed cotton yield per plant. The genotypic correlation coefficient were computed. (Johnson *et al.*, 1955). The path coefficient was done according to the method suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The genotypic correlation coefficients between yield and yield components are presented in Table 1. The present study indicates that seed cotton yield was highly and positively associated with number of bolls per plant followed by plant height, number of monopodia, sympodia and number of seeds per boll. This was in accordance with the results obtained by Gill and Singh (1981), Sangwan and Yadava (1987) and Sumathi and Nadarajan (1995). Increase in number of bolls per plant might be due to increase in plant height which, inturn, produced more number of sympodia and thereby more seed cotton yield. There was positive and significant association of yield with number of bolls per plant. The boll weight had significant positive association with seed index and lint index (Sumathi and Nadarajan, 1995). Seed index showed positive association with lint index (Sangwan and Yadava 1987; Sumathi and Nadarajan, 1995). Ginning percent was found to be negatively associated with seed cotton yield. Boll and loculi damage were strongly and positively interrelated. The study indicates that simultaneous improvement of plant height and number of bolls per plant may result in improvement of seed cotton yield per plant since these two characters are positively correlated with seed cotton yield and are also interrelated.

The path coefficient analysis of yield components and their effect on yield are presented in Table 2. The positive association between bolls per plant and seed cotton yield was mainly due to high positive direct effect of bolls per plant. Sumathi and Nadarajan (1995) also reported similar findings. The direct influence of all other traits was found to be negligible. The traits viz., plant height, number of monopodia, sympodia, seeds per boll and ginning percentage, although had significant association with seed cotton yield, showed low direct effect on seed cotton yield. But all these traits showed considerable indirect effect via number of bolls per plant either positively or negatively. Therefore, it can be concluded that although the traits viz., plant height, number of manopodia, sympodia, seeds per boll and ginning percentage showed significant positive or negative correlations with seed cotton yield, these traits had either positive or negative indirect effect through number of bolls per plant. Hence, due consideration may be given for number of bolls per plant for manipulation of seed cotton yield.

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