Thus, the influence of ploidy level in the size of the pollen grain is evident from the present study in cotton.

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CORRELATION AND PATH ANALYSIS IN COWPEA (*Vigna unguiculata* (L.) Walp)

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ABSTRACT

Correlation and path analysis was carried out using 12 cross combinations of cowpea in F_1 and F_2 generations for nine component characters including seed yield. Number of branches per plant, number of pods per plant and plant height had positive correlation with seed yield both at genotypic and phenotypic levels in F_1 and F_2 generations. Path analysis showed positive direct effects of number of branches per plant, plant height, pod length, hundred seed weight on seed yield in F_1 generation while the traits hundred seed weight and seeds per pods had positive direct effect on seed yield in F_2 generations. These traits should be given more emphasis while selecting for improvement in seed yield per plant.

KEY WORDS : Cowpea, Correlation, Path analysis

The efficiency of selection mainly depends on the direction and magnitude of association between yield and its components. Hence knowledge on correlation and path analysis are necessary for efficient genetic improvement. It is necessary to emphasize that inferences derived from these will be meaningful only when this study is based on individual plant observations in a segregating

Table 1. Genotypic correlation coefficient in F_3 and F_4 generations

Characters		PH	NOB	NOP	PL	SP	HSW	CFC	CPC	SY
PH	F3	1.000	0.442**	-0.063	-0.174	0.570**	-0.436**	-0.039	-0.828**	0.232*
	F4	1.000	0.357**	0.018	-0.152	0.579**	-0.591**	-0.034	-0.625**	0.267**
NOB	F3		1.000	0.682**	0.237**	0.446**	-0.227*	-0.362**	-0.387**	0.719**
	F4		1.000	0.127	0.168**	0.459**	-0.242**	-0.451**	-0.209*	0.700**
NOP	F3			1.000	0.488**	0.312**	0.136	-0.102	0.325**	0.303**
	F4			1.000	-0.096	0.478**	0.210*	-0.138	0.203*	0.423**
PL	F3				1.000	0.625**	0.312**	-0.009	0.683**	0.049
	F4				1.000	0.371**	0.282**	0.243**	0.403**	-0.025
SP	F3					1.000	-0.016	0.030	0.097	0.123
	F4					1.000	-0.235*	-0.281**	0.043	0.467**
HSW	F3						1.000	0.504**	0.973**	0.213*
	F4						1.000	0.388**	0.678**	0.162
CFC	F3							1.000	-0.164	-0.362**
	F4							1.000	0.070	0.392**
CPC	F3								1.000	0.182*
	F4								1.000	0.006
SY	F3									1.000
	F4									1.000

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

PH - Plant height
NOB - Number of branches per plant
NOP - Number of pods per plant
PL - Pod length
SP - Seeds per pod
HSW - Hundred seed weight
CFC - Crude fibre content
CPC - Crude protein content
SY - Seed yield per plant.

generations like F_3 and F_4. Keeping these points in view, the present study was initiated involving 12 cross combinations of cowpea in F_3 and F_4 generations.

MATERIALS AND METHODS

Twelve cross combinations of F_3 generation of cowpea were grown during Rabi 1995, while F_4 generation during Kharif 1996 at a distance of 45 x

Table 2. Estimates of phenotypic correlation coefficient in F_3 and F_4 generations

Characters		PH	NOB	NOP	PL	SP	HSW	CFC	CPC	SY
PH	F3	1.000	0.292**	0.035	-0.011	0.519**	-0.163	0.072	-0.185*	0.244**
	F4	1.000	0.247**	0.139	0.071	0.461**	-0.478**	-0.026	-0.526**	0.239**
NOB	F3		1.000	0.369**	0.191*	0.224**	-0.067	-0.069	0.067	0.420**
	F4		1.000	0.071	0.077	0.342**	-0.151	-0.334**	-0.156	0.532**
NOP	F3			1.000	0.457**	0.310**	0.202*	0.017	0.260**	0.293**
	F4			1.000	0.119	0.432**	0.157	-0.132	0.182*	0.384**
PL	F3				1.000	0.594**	0.285**	0.143	0.431**	0.165
	F4				1.000	0.278**	0.181	0.183*	0.307**	-0.025
SP	F3					1.000	0.150	0.186*	0.170	0.213*
	F4					1.000	-0.187*	-0.264**	0.063	0.455**
HSW	F3						1.000	0.465**	0.477**	0.227*
	F4						1.000	0.367**	0.626**	0.165
CFC	F3							1.000	+0.088	-0.147
	F4							1.000	0.072	-0.378**
CPC	F3								1.000	0.162
	F4								1.000	0.019
SY	F3									1.000
	F4									1.000

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

PH - Plant height
NOB - Number of branches per plant
NOP - Number of pods per plant
PL - Pod length
SP - Seeds per pod
HSW - Hundred seed weight
CFC - Crude fibre content
CPC - Crude protein content
SY - Seed yield per plant.

15cm in a ridge of 4m length. The design adopted was randomised block design with 3 replications. Ten families per cross combination were formed both F_3 and F_4 generations. Observations were recorded on five randomly selected plants per family for nine traits including seed yield. The genotypic and phenotypic correlation coefficients were computed following the method suggested

Table 3. Direct and indirect effects of eight characters over yield in F_3 and F_4 generations

Characters		PH	NOB	NOP	PL	SP	HSW	CFC	CPC	Genotypic correlation with yield
	F3	0.197	0.463	0.029	-0.002	-0.155	-0.433	0.021	0.111	0.232*
PH										
	F4	-0.151	0.223	-0.003	0.080	0.417	-0.477	0.004	0.175	0.267**
	F3	0.087	1.047	-0.316	0.002	-0.121	-0.226	0.194	0.052	0.719**
NOB										
	F4	-0.054	0.625	-0.022	-0.089	0.331	-0.195	0.046	0.058	0.700**
	F3	-0.012	0.714	-0.464	0.004	-0.085	0.135	0.055	-0.044	0.303**
NOP										
	F4	-0.003	0.079	-0.176	0.051	0.345	0.169	0.014	-0.057	0.423**
	F3	-0.034	0.248	-0.227	0.009	-0.170	-0.310	0.005	-0.092	0.049
PL										
	F4	0.023	0.105	0.017	-0.528	0.267	0.228	-0.025	-0.113	-0.025
	F3	0.112	0.466	-0.145	0.005	-0.271	-0.016	-0.016	-0.013	0.123
SP										
	F4	0.088	0.287	-0.084	-0.196	0.720	-0.190	0.029	-0.012	0.467**
	F3	-0.086	-0.238	-0.063	0.003	0.004	0.995	-0.271	-0.131	0.213*
HSW										
	F4	0.089	-0.151	-0.037	-0.149	-0.169	0.808	-0 040	-0.190	0.162
	F3	-0.008	-0.378	0.047	0.000	-0.008	0.501	-0.538	0.022	-0.362**
CFC										
	F4	0.005	-0.282	0.024	-0.128	-0.203	0.313	-0.102	-0.020	-0.392**
	F3	-0.163	-0.406	-0.151	0.006	-0.026	0.968	0.088	-0.135	0.182*
CPC										
	F4	0.095	-0.131	-0.036	-0.213	0.031	0.547	-0.007	-0.280	0 006

** Significant at 1% level

* Significant at 5% level

	F3	F4
Residual effect	0.0069	0.1584

PH - Plant height
NOB - Number of branches per plant
NOP - Number of pods per plant
PL - Pod length
SP - Seeds per pod
HSW - Hundred seed weight
CFC - Crude fibre content
CPC - Crude protein content
SY - Seed yield per plant

by Goulden (1952). The path analysis was done according to the method by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The values of genotypic correlation coefficients were higher when compared to phenotypic correlation coefficients for all the yield parameters (Table 1 and 2). This indicated the less influence of the environment on the genetic constitution of each trait. Seed yield was correlated with number of branches per plant, number of pods per plant, number of seeds per pod and plant height, the association being positive and significant at both the phenotypic and genotypic levels in F_3 and F_4 generations. (Table 1 and 2). This was in accordance with the results obtained by Damarany (1994) and Sawant (1994). Negative and highly significant association of crude fibre content with seed yield was observed in both generations.

Among the seed yield components, plant height was correlated with number of branches per plant, and number of seeds per pod, the coefficient of correlation being positive and significant at both genotypic and phenotypic levels. This is similar to the results of Biradar et al., (1996). Number of brances per plant with number of seeds per pod; number of pods per plant with seeds per pod and crude fibre content; pod length with seeds per pod, hundred seed weight and crude protein content; Hundred seed weight with crude protein and fibre content showed positive and significant associations at both genotypic and phenotypic levels in both F_3 and F_4 generations. It may be concluded that plant height, number of pods per plant, pod length and hundred seed weight would result simultaneous improvement of the seed yield.

In the path analysis of genotypic correlations (Table 3) number of branches per plant and hundred seed weight exerted direct influence on seed yield in both F_3 and F_4 generations. Other characters like plant height and pod length showed an appreciable level of direct influence on the seed yield in F_3 generation. This result is in accordance with the findings of Sawant (1994). Crude fibre content and crude protein content showed negative direct effect on seed yield in both F_3 and F_4 generations, while pod length had negative direct influence on seed in F_4 generation. This result is in accordance with the result of Biradar *et al* (1991). The indirect effect of number of branches per plant was much more pronounced in the association of number of pods per plant, plant height, seeds per pod with seed yield. Hence preference may be given to branches per plant crude protein content and crude fibre content had positive indirect effect through hundred seed weight in both the F_3 and F_4 generations.

Based on the information on phenotypic and genotypic correlations and direct indirect effects of various characters on seed yield, preference may be given to number of branches per plant, hundred seed weight, seeds per plant and plant height in the selection programme to isolate superior genotypes.

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