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Character association in F_4 generation of cowpea

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Abstract : Association study in F_4 populations of four crosses was studied. Seed yield was positively correlated with all the eight yield components except number of pods per plant and crude fibre content in two F_4 crosses. Strong positive correlation was observed for pod length with seed yield in two crosses, number of seeds per pod, hundred seed weight, crude protein content with seed yield in one cross combination. Significant and negative correlation of crude fibre content with seed yield was observed in all the four crosses indicated the possibility of improving yield in positive direction with crude fibre content in negative direction. A positive association among pod length with number of seeds per pod, number of seeds per pod with hundred seed weight and hundred seed weight with crude protein content revealed the possibility of developing cultivar with an acceptable pod length with high number of seeds per pod.
(Key words : Correlation, Cowpea, Seed yield, Yield components).

The correlation studies are of great help in formulating efficient schemes of multiple trait selection. Hence knowledge of correlation is necessary for efficient genetic improvement. The characters are associated either positive or negative in nature. Therefore, selection for a component may bring about simultaneous change in the other in favourable direction or otherwise. In cowpea, majority of the reports on correlation are based on variability existing between homozygous cultivars. However, inference derived from these will be meaningful only when the study is based on individual plant observations in a segregating generation like F_4. Considering the points in view the present study was initiated by involving four crosses of F_4 population of cowpea.

Materials and Methods

Four cross cominations of F_4 generation of cowpea (Co6 x Co4, Co6 x Co-2-1, CoVu 358 x Co 2 and CoVu 358 x CoVu 95) were grown during *kharif* 1996 with a spacing of 45 x 15cm in a ridge of 4m length. These were raised in a randomised block design with three replications. Ten families per cross combination were recorded on five randomly selected plants per family for nine traits, *viz.*, plant height, number of branches per plant, pod length, number of seeds per pod, hundred seed weight, crude fibre content, crude protein content and seed yield per plant. The genotypic correlation coefficient was computed following the method suggested by Goulden (1952).

Results and Discussion

The estimates of genotypic correlation coefficients among nine traits are presented Table 1. All the eight yield components except number of pods per plant and crude fibre content in crosses Co6 x Co4 and Co6 x Co2 exhibited positive correlation with seed yield. The degree of association was highest between hundred seed weight and seed yield per plant followed by crude protein content, number of seeds per pod in cross Co6 x Co4. This clearly indicated that hundred seed weight and number of seeds per pod were yield indicators in yield traits. Similar strong association was observed by Sawant (1994), Singh *et al.* (1982), Dumbre *et al.* (1982) and Patil and Bhapkar (1987). In addition to this number of branches per plant in cross CoVu 358 x CoVu 95, plant height in cross Co6 x Co2-1, pod length in crosses Co6 x Co2-1 and CoVu 358 x Co2 exhibited significant positive association with seed yield per plant. Earlier, Tamilselvam and Das (1994) also noticed significant association of plant height and pod length with seed yield, while Ram *et al.* (1994) observed high correlation between number of branches per plant and seed yield per plant.

The traits, number of seeds per pod in three crosses (Co6 x Co4, Co6 x Co-2-1, CoVu 358 x CoVu 95) and hundred seed weight in cross Co6 x Co2 showed significant and positive association with pod length indicating that long pods can accomodate more number of bold seeds. These findings are in accordance with earlier report of Areetey and Liang (1973). The trait number of seeds per pod had positive and significant association with hundred seed weight in cross Co6 x Co2. This result is in accordance with the findings of Sawant (1994). The trait hundred seed weight had significant and negative association with crude fibre content in crosses Co6 x Co4 and CoVu 358 x CoVu 95. Positive and significant association of hundred seed weight and crude protein content was observed in Co6 x Co4. Similar results are already reported by Biradar *et al.* (1996).

Breeders immediate objectives extended from attempts to find remedies for specific defects to a complex aim of maximizing the yield potential. Many component traits contributed in varying magnitude to a complex character seed yield. The characters with significant positive association with yield will contribute greatly if selection for them is imposed to bring about

Table 1. Genotypic correlation coefficients in F_4's of four crosses in cowpea

		PH	NOB	NOP	PL	SP	HSW	CFC	CPC	SY
PH	1	1.000	-0.070	-0.640*	0.586	0.264	0.262	-0.697*	-0.027	0.584
	2	1.000	-0.310	0.101	0.121	0.496	0.150	-0.735*	-0.229	0.739*
	3	1.000	-0.417	0.014	-0.045	-0.183	0.938**	0.164	-0.206	0.455
	4	1.000	-0.681*	0.488	-0.093	0.093	0.051	0.185	-0.490	-0.865**
NOB	1		1.000	-0.578	0.218	0.272	0.319	-0.526	0.368	0.501
	2		1.000	-0.023	-0.005	-0.096	-0.444	-0.028	0.332	0.088
	3		1.000	-0.771**	0.683*	-0.256	-0.942**	-0.482	-0.097	0.244
	4		1.000	-0.235	0.602	0.675*	0.376	-0.334	0.575	0.745*
NOP	1			1.000	0.457	0.422	-0.844**	0.527	-0.270	0.748*
	2			1.000	-0.235	-0.347	-0.877**	0.488	0.444	-0.173
	3			1.000	-0.202	0.267	0.221	0.004	0.363	0.191
	4			1.000	0.488	0.416	-0.383	-0.007	-0.219	0.761*
PL	1				1.000	0.919**	-0.756*	0.395	-0.478	-0.277
	2				1.000	0.810**	0.830	-0.460	0.374	0.632*
	3				1.000	-0.129	-0.456	-0.204	0.244	0.649*
	4				1.000	0.956**	0.041	0.284	0.137	-0.116
SP	1					1.000	-0.625	0.267	-0.078	0.247
	2					1.000	0.680*	-0.526	0.241	0.795**
	3					1.000	-0.345	0.353	-0.205	-0.221
	4					1.000	0.462	0.006	-0.139	-0.605
HSW	1						1.000	-0.860**	0.967**	0.870**
	2						1.000	-0.206	0.031	0.082
	3					1.000	-0.498	0.191	0.233	
	4						1.000	-0.897**	-0.193	0.053
CFC	1							1.000	-0.715*	-0.857**
	2							1.000	0.011	-0.769**
	3							1.000	-0.111	-0.721*
	4							1.000	0.977**	-0.648**
CPC	1								1.000	0.844**
	2								1.000	0.527
	3								1.000	0.179
	4								1.000	-0.172
SY	1									1.000
	2									1.000
	3									1.000
	4									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.

1 = Co6 x Co4 2 = Co6 x Co-2-1 3 = CoVu 358 x Co2 4 = CoVu 358 x CoVu 95.

improvement. Seed yield showed positive and significant association with number of seeds per pod, hundred seed weight, pod length and crude protein content. However, correlation between crude fibre content and seed yield was significant and negative in all four crosses indicated the possibility of impoving seed yield in positive direction with crude fibre content in negative direction simultaneously.

The other observations of interest was negative association between protein content and seed yield in cross CoVu 358 x CoVu 95, while the same association was positively significant in cross Co6 x Co-2-1. The association between hundred seed weight and crude protein content was either negative (CoVu 358 x CoVu 95) or non-significant (Co6 x Co-2-1 and CoVu 358 x Co2). Where as in the cross Co6 x Co4 the same association was positive and highly significant. These results indicate, possibility of improving the levels of both seed yield and crude protein content via., hundred seed weight in cross Co6 x Co4.

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Mechanisms of resistance in rice, *Oryza sativa* L. against the brown planthopper, *Nilaparvata lugens Stal.* (Homoptera: Delphacidae)

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Abstract : The levels of mechanism of resistance such as antixenosis (host preference) and antibiosis against brown planthopper, *Nilaparvata lugens* Stal was studied in certain resistant accessions under laboratory conditions. The levels of resistance were found to be varying in different resistance parameters in the tested accessions. However comparatively less honey dew excretion, low food ingestion and assimilation, decreased nymphal survival, increased nymphal duration, high growth index and reduction life span were recorded in all resistant accessions than the susceptible TN1. *(Key words : Rice, Nilaparvata lugens, Resistance mechanism, Antixenosis, Antibiosis, Resistance accessions).*

The brown planthopper (BPH) *Nilaparvata lugens* (Stal) (Homoptera : Delphacidae) has been a severe threat to rice production in tropical Asia. Though insecticide application is providing immediate control ill effects like resurgence, secondary out break, and development of resistance to insecticides are met with. Hence grwoing of resistant varieties has been a major tactic to manage the BPH.

International Rice Research Institute (IRRI), Philippines is being engaged in developing varieties resistance to BPH and more than 300 varieties have been identified with high levels of resistance. Mechanisms such as non-preference and antibiosis are the basis of resistance in rice varieties against BPH. Antibiosis was expressed in terms of low population levels (Reddy and Kalode, 1985) reduced feeding and oviposition slower growth rates (Bharathi, 1982) and low food ingestion and assimilation (Khan and Saxena, 1985).

The study was conducted to ascertain the levels of resistance in some of the resistant accessions.

Materials and Methods

Green house studies were conducted at the Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, India during 1995 with rice accessions. Ansphal, TC20/A, Sonasali, Nagurjuna, Chandan, IR 72, with Ptb and TN1 as resistant and susceptible checks. BPH reared on the susceptible TN1 plants were used for the studies.