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).

Table 1. Analysis of variance for phenotypic stability in cowpea

Source	df	Sum of squares	Mean squares
Varieties	12	0.72	0.06*
Season	2	1.18	0.59**
Variety X season	24	0.85	0.03
Season (linear)	1	1.28	1.28**
Variety X season (linear)	12	14.07	1.17**
Pooled deviation	13	4.05	0.31**
Pooled error	36	0.90	0.02

*, ** : Significant at 5 % and 1 % levels respectively.

these varieties were not high yielders. The varieties VCP-4 and Co-4 recorded higher yield as against the population mean. The variety VCP-4 found responsive only to better environment with less stability as reflected by less regression co-efficient value and high deviation from regression. The varieties IT 85 F-2020 and IT-836-990 were found to perform better especially under favourable growing season as reflected by regression co-efficient value (bi 1) and less deviation from regression.

Table 2. Phenotypic stability parameters (bi and s^2d) of varieties of cowpea

Varieties	Grain yield (kg/plot)			Mean	bi	s^2d
	Summer '94	*Kharif* '94	*Rabi* '94			
IT 860-1048	0.285	0.325	0.580	0.388	0.76*	-0.0032
IT 85F-1517	0.210	0.277	0.492	0.328	0.66*	-0.0045
IT 84S-2246-4	0.262	0.435	0.747	0.482	1.03*	0.0158**
IT 85F-2020	0.447	0.730	1.030	0.736	2.16	-0.2594**
IT 83D-219	0.540	0.287	0.967	0.598	1.56*	0.0085*
IT 85F-2085	0.452	0.732	0.920	0.702	0.82	0.0421**
IT 85S-990	0.482	0.460	1.100	0.681	1.71*	0.0069
IT 86D-1056	0.500	0.755	0.622	0.626	1.03	0.0716**
IT 83S-340-5	0.287	0.532	0.892	0.571	1.25	0.4425**
VCP 5	0.952	0.297	0.852	0.701	0.77	0.9575**
VCP 4	0.862	0.532	0.967	0.789	0.91	1.1065**
Co 4	0.922	0.385	0.977	0.762	1.01	1.0919**
Paiyur 1	0.527	0.392	1.047	0.656	1.62	0.6266
Mean	0.517	0.472	0.861	0.616		
Ii	-0.517	-0.144	0.244			

* Significant at 5% level; ** Significant at 1% level.

RESULTS AND DISCUSSION

Analysis of variance for grain yield revealed that the mean squares due to varieties, season, variety X season (linear) and season (linear) were significant when tested against pooled error (Table 1). The linear component of genotype X season interaction was not significant for grain yield. Therefore, prediction of grain yield for most of the varieties appeared dependable to the environmental conditions that existed in different seasons of testing. Mean grain-yield and the two stability parameters viz., regression co- efficient (bi) and deviation from regression (S^2 d) for the thirteen varieties studied are given in Table-2. The varieties IT 84-S-2246-4, IT-86-D-1056 and Co-4 had average response to changes in environmental conditions, as they had regression co-efficient value (bi) approaching unity, and IT 84-S-2246-4, IT 86-D-1056 had less deviation from S 2d. However

The present study revealed that VCP-4 had the highest mean seed yield among the materials studied and was found specially suited for unfavourable growing season. The varieties IT-86-D-1056 and Co- 4 are stable since having average response to changes in environmental conditions. The varieties IT-85-F-2020 and IT-836-990 performed well especially under favourable environments and had high mean yield.

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