

Correlation Studies for Pod Yield in Vegetable Cowpea (*Vigna unguiculata* (L.) Walp)

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ABSTRACT

Nine varieties of vegetable cowpea (*Vigna unguiculata* (L.) Walp.) were evaluated for correlation study. Pod yield per plant was found significantly and positively correlated with Plant height, number of primary branches, number of leaves, crop duration, pod length, pod girth, mean pod weight, pods per plant, seeds per pod and test weight and negatively correlated with days to first picking at both phenotypic and genotypic level.

Key words Cowpea, genotypic correlation, pod yield.

Cowpea [*Vigna unguiculata* (L.) Walp] is an important leguminous vegetable crop mainly grown both in *kharif* and spring summer season crop in most parts of India. Cowpea is diploid with chromosome number of $2n = 22$. Cowpea belongs to family Leguminaceae. Cowpea contains three cultivated species viz., *V. unguiculata*, *V. cylindrica*, *V. sequipedalis*. It is early, multiseasonal and multipurpose crop.

It is a plant of great socioeconomic, cultural and nutritional importance. It is an excellent source of proteins, carbohydrates, vitamins and minerals as well as of dietary fibers, while the fat quantity is low and cholesterol content zero.

Yield is a complex entity and is associated with a number of component character. These characters are themselves interrelated. Such an interdependence of the contributory factors often affect their direct relationship with yield thereby making correlation coefficient unreliable as selection indices. It is however, desirable to know the degree to which different component characters are correlated among themselves as well as with the both at genotypic and phenotypic levels. The present investigation was, therefore undertaken to determine correlation coefficients both at genotypic and phenotypic levels in cowpea.

MATERIALS AND METHODS

A field experiment entitled Correlation Studies for pod yield In Vegetable Cowpea (*Vigna Unguiculata* (L.) Walp) was carried out during 2011 at Horticultural college and Research Institute, Dr.Y.S.R.Horticultural University,

Venkataramannagudem, West Godavari District. The experiment was arranged in a randomized block design (RBD) with 3 replications.

Experimental site details:

Venkataramannagudem comes under coastal belt and it is situated at an altitude of 34 meters (112 feet) above mean sea level. The geographical situation is 16.83 °N latitude and 81.50 °E longitude. The location falls under Agro-climatic zone-10 of humid, East Coast Plain and Hills (Krishna-Godavari zone) with an average rainfall of 900 mm. It experiences hot humid summers and mild winters. The soil is of red sandy loam with good drainage.

The land was prepared into plots of size 3.0 m x 2.7 m and the seeds were directly dibbled 5 cm deep on ridges adopting a uniform spacing of 60 cm between the rows and 30 cm within the row. Before sowing, farm yard manure was applied to the soil as a basal dose as per the recommendation. Nitrogen was applied in the form of urea (46% N) @ 25 kg ha⁻¹ in two equal splits. Phosphorous was applied in the form of single superphosphate (16 % P₂O₅) and Potassium was in the form of Muriate of potash (MOP) (58-62%K₂O), both as a basal dressing @ 50 kg ha⁻¹. Hand weeding was done at 15 and 30 days after germination. The crop was duly protected from pests by fortnightly spraying of Carbaryl (3g l⁻¹) for controlling of sucking pests, Endosulphon (2 ml l⁻¹) and Malathion (2 ml l⁻¹) were used for the control of pod borers. Five plants in each plot were tagged from the net plot of each treatment in each replication for recording the observations. The observations on plant height, number of primary branches, number of leaves, dry matter accumulation per plant, days to first flowering, days to 50 per cent flowering, crop duration, pod length, pod girth, seeds per pod, pods per plant, individual pod weight, test weight and pod yield per plant were recorded. Five plants in each plot were tagged from the net plot of each treatment in each replication for recording the observations. The observations on plant height, number of primary branches, number of leaves, dry matter accumulation per plant, days to first flowering, days to 50 per cent flowering, crop duration, pod length, pod girth, seeds per pod, pods per plant, individual pod weight, test weight and pod yield per plant were recorded.

Table 1. Genotypic correlation coefficients among growth and yield components

	Plant height	Primary branches	Dry matter accumulated	No. of leaves	Days to 1 st flower-ring	Days to 50 % flower-ring	Days to 1 st picking	Crop duration	Pod length	Pod girth	Pods/plant	Mean pod weight	Seeds/pod	Test weight	Pod yield/plant
Plant height	1.0000														
Primary branches	0.7581**	1.0000													
Dry matter accumulated	0.8257**	0.8898**	1.0000												
No. of leaves	0.9310**	0.9349**	0.8127**	1.0000											
Days to 1 st flowering	-0.3428	-0.8148**	-0.3640	-0.6152**	1.0000										
Days to 50 % flowering	-0.3104	-0.6116**	-0.3563	-0.4633*	0.5316**	1.0000									
Days to 1 st picking	-0.7422**	-0.9892**	-0.6473**	-0.8454**	0.9537**	0.3113	1.0000								
Crop duration	0.9008**	0.9092**	0.9597**	0.8877**	-0.4341	-0.1274	-0.8117**	1.0000							
Pod length	0.6108**	0.9083**	0.6585**	0.7802**	-0.8184**	-0.7480**	-0.8394**	0.6683**	1.0000						
Pod girth	0.3568	0.5845*	0.5071*	0.3693	-0.6289**	-0.4472*	-0.8205**	0.4046	0.6214**	1.0000					
Pods/plant	0.8372**	0.8972**	0.7518**	0.8903**	-0.4526*	-0.2051	-0.6957*	0.8829**	0.4924*	0.1813	1.0000				
Mean pod weight	0.4613*	0.5691*	0.4146*	0.4434*	-0.6409**	-0.5398**	-0.8314**	0.4015	0.6987**	0.9108**	0.2406	1.0000			
Seeds/pod	0.7320**	0.8725**	0.6732**	0.7796**	-0.7445**	-0.6502**	-0.9425**	0.7321**	0.9247**	0.7826**	0.5287**	0.8996**	1.0000		
Test weight	0.4001*	0.5934**	0.5533**	0.4300*	-0.4320*	-0.8557**	-0.4202	0.3641	0.7844**	0.6789**	0.1285	0.7269**	0.7854**	1.0000	
Pod yield/plant	0.8554**	0.9261**	0.8262**	0.8674**	-0.6563**	-0.5411**	-0.9163**	0.8267**	0.8070**	0.7338**	0.7688**	0.7861**	0.9439**	0.6582**	1.0000

*- Significant at 5 per cent level of probability **- Significant at 1 per cent level of probability

To determine the degree of association of characters with yield and also among the yield components, the correlation coefficients were calculated.

Both genotypic and phenotypic coefficients of correlation between two characters were determined by using the variance and covariance components as suggested by Al-Jibouri, *et al.*, 1958.

$$r_g(xy) = \frac{\text{Cov}_g(xy)}{\sqrt{\sigma_g^2(x) \cdot \sigma_g^2(y)}} \quad r_p(xy) = \frac{\text{Cov}_p(xy)}{\sqrt{\sigma_p^2(x) \cdot \sigma_p^2(y)}}$$

Where,

$r_g(xy)$, $r_p(xy)$ are the genotypic and phenotypic correlation coefficients respectively. Cov_g , Cov_p are the genotypic and phenotypic covariance of xy , respectively. σ_g^2 and σ_p^2 are the genotypic and phenotypic variance of x and y , respectively. The calculated value of 'r' was compared with table 'r' value with $n-2$ degree of freedom at 5% and 1% level of significance, where, n refers to number of pairs of observation.

RESULTS AND DISCUSSION

The genotypic correlation coefficients were worked out for all the characters and presented in Table 1. In general genotypic correlation coefficients were higher in magnitude over the respective phenotypic correlation coefficients except for the association in few pairs of characters.

Plant height showed significant positive correlation with primary branches, number of leaves, dry matter accumulation, crop duration, pod length, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant. Plant height had non-significant negative correlation with days to first flowering, days to 50 per cent flowering, and days to first picking. It showed non-significant positive correlation with pod girth. Similar results of positive correlation of plant height with pod yield reported by Harshal, 2002 and Nehru, *et al.*, 2009 in cowpea.

Number of primary branches showed significant positive correlation with dry matter accumulation, number of leaves, crop duration, pod length, pod girth, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant. It exhibited significant negative correlation with days to first flowering, days to 50 per cent flowering and days to first picking.

Dry matter accumulation showed significant positive correlation with number of leaves, crop duration, pod length, pod girth, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant. It exhibited significant negative correlation with days to first picking. It showed non-significant negative correlation with days to first flowering and days to 50 per cent flowering. Similar positive correlation for number of seeds per pod, number of primary branches and plant height was reported by Eswaran, *et al.*, 2007 in cowpea, Karasu and Oz, 2010 in dry bean (*Phaseolus vulgaris* L.).

Significant positive correlation was observed in crop duration, pod length, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant by number of leaves. Number of leaves exhibited significant negative correlation with days to first flowering, days to 50 per cent flowering and days to first picking and non-significant positive correlation with pod girth.

Days to first flowering showed significant positive correlation with days to 50 per cent flowering and days to first pickings. It exhibited significant negative correlation with pod length, pod girth, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant. Non-significant negative correlation exhibited with crop duration.

Days to 50 per cent flowering showed significant negative correlation with pod length, pod girth, mean pod weight, seeds per pod, test weight and pod yield per plant. It exhibited non-significant negative correlation with crop duration and pods per plant. It showed non-significant positive correlation with days to first picking.

Days to first picking exhibited significant negative correlation with crop duration, pod length, pod girth, mean pod weight, seeds per pod and pod yield per plant. It showed non-significant negative correlation with test weight.

Significant positive correlation was shown with pod length, pods per plant, seeds per pod and pod yield per plant by crop duration. It exhibited non significant positive correlation with pod girth, mean pod weight and test weight.

Pod length showed significant positive correlation with pod girth, pods per plant, mean pod weight, seeds per pod, test weight and pod yield per plant. Similar results of significant positive correlation between pod length and pod yield was reported by Harshal, 2002 in cowpea, Vidya and Sunny, 2002 and by Ullah, *et al.*, 2011 in yard long bean.

Pod girth had significant positive correlation with mean pod weight, seeds per pod, test weight and pod yield per plant. It exhibited non significant positive correlation with pods per plant.

Significant positive correlation with seeds per pod

and pod yield per plant was showed by pods per plant and non significant positive correlation with mean pod weight and test weight. Similar results were reported by Narayanan Kutty, *et al.*, 2003 in cowpea, Vidya and Sunny, 2002 in yard long bean.

Mean pod weight had significant positive correlation with seeds per pod, test weight and pod yield per plant. Seeds per pod showed significant positive correlation with test weight and pod yield per plant. Test weight exhibited significant positive correlation with pod yield per plant.

Based on the results obtained in the present study, all the characters evaluated except days to first flowering, days to 50 per cent flowering and days to first picking had significant positive correlation with pod yield per plant at both phenotypic and genotypic level and so needed to be considered while selecting a variety for high yield.

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