Character Association Studies in Yard Long Bean (*Vigna unguiculata* ssp. *sesquipedalis* L. Verdc.)

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Fifty genotypes of yard long bean collected from various agro-climatic regions of Kerala were characterized during 2001-2005. Yield per plant showed strong positive genotypic correlation with pods per cluster, pods per plant, pod weight, pod length, pod breadth and seeds per pod. The present investigation revealed high positive direct effects of pods per plant on yield per plant.

Key words: Yard long bean, Genotypic correlation, Direct and indirect effects

Vigna unguiculata sp. *sesquipedalis* (L.) Verdc. (yard long bean) is a distinct form of cowpea grown as a vegetable crop in southern Asia and Far East for its immature pods. The crop is grown throughout India and most extensive cultivation in Kerala. A knowledge on the degree of association among quantitative characters would help the breeder to pinpoint character(s) whose selection would automatically result in an overall progress of correlated characters and elimination of negatively correlated characters with the yield. Hence the present study was undertaken to estimate the character association of various yield contributing characters in yard long bean.

Materials and Methods

The investigation was conducted in the Department of Plant Breeding and Genetics, College of Agriculture, Vellayani during 2001-2005. Fifty genotypes of yard long bean collected from various agro-climatic regions of Kerala were used as study material. Observations were recorded on days to 50 per cent flowering, days to first harvest, clusters per plant, pods per cluster, pods per plant, primary branches per plant, pod yield per plant, pod weight, pod length, pod breadth, seeds per pod, length of harvest period, crop duration and main stem length. Analysis of Variance (ANOVA) and Covariance (ANCOVA) for randomised block design (RBD) in respect of the various characters was done. The correlation coefficient (phenotypic, genotypic and environmental) was worked out. The direct and indirect effects of component characters on yield were estimated through path analysis technique (Wright, 1954).

Results and Discussion

A knowledge on the degree of association among quantitative characters would help the breeder to pinpoint a character or characters whose selection would automatically result in an overall progress of positively correlated characters and elimination of negatively correlated characters with the yield.

The genotypic correlation coefficients of various characters are presented in Table 1. In the present study yield per plant showed strong positive genotypic correlation with pods per cluster, pods per plant, pod weight, pod length, pod breadth and seeds per pod. A negative correlation was noted for days to 50 per cent flowering, days to first harvest and primary branches per plant.

A positive correlation of pods per plant with yield per plant was noticed in the present study. Similar results were reported by Ajith (2001) and Philip (2004) in cowpea negative correlation for days to 50 per cent flowering with yield per plant was noticed in the present investigation, which was supported by the findings of Oseni *et al.* (1992) and Tyagi *et al.* (2000) in cowpea.

Various direct and indirect effects of the characters on yield per plant has been depicted Table 2. The characters pods per cluster, pods per plant, pod weight, pod length, pod breadth, seeds per pod and main stem length had positive direct effects while length of harvest period had negative direct effect. For selection of genotypes those characters with positive direct effects are useful. The maximum direct effect was observed for pods per plant followed by pod weight, pods per cluster, pod length, seeds per pod, length of harvest period, main stem length and pod breadth.

The present investigation revealed high positive direct effects of pods per plant on yield per plant. Similar observations have been reported by Vidya (2000), Parmer *et al.* (2003) and Philip (2004) in cowpea.

Table 1. Estimates of genotypic correlation coefficients

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}
x_1	1.0000**													
x_2	0.8897**	1.0000**												
x_3	-0.0373	0.0547	1.0000**											
x_4	-0.4121**	-0.3636**	-0.3597*	1.0000**										
x_5	-0.5458**	-0.3255*	0.5145**	0.4689**	1.0000**									
x_6	-0.0654	-0.0514	0.1051	-0.1283	-0.0741	1.0000**								
x_7	-0.1528	-0.1296	0.0513	0.4671**	0.4798**	-0.0610	1.0000**							
x_8	0.4116**	0.2913*	-0.4363**	-0.0713	-0.4613**	-0.1433	0.3927**	1.0000**						
x_9	0.5618**	0.4936**	-0.3736**	-0.0867	-0.4924**	-0.2684	0.3399*	0.8948**	1.0000**					
x_{10}	0.2692	0.1768	-0.1630	0.0637	-0.0438	-0.2253	0.5338**	0.7124**	0.6120**	1.0000**				
x_{11}	0.2536	0.3665**	0.1592	0.0007	0.2165	0.1822	0.3992**	0.1098	0.1583	0.2556	1.0000**			
x_{12}	-0.3262*	-0.2918*	0.0786	0.4678**	-0.45338**	-0.3751**	0.2422	-0.1038	-0.0814	-0.0397	-0.2312	1.0000**		
x_{13}	0.4187**	0.6793**	0.0668	0.1144	0.0659	-0.3043*	0.1055	0.1552	0.3118*	0.0678	0.0768	0.7638**	1.0000**	
x_{14}	0.0244	-0.0598	0.1281	-0.1186	0.1110	-0.2169	0.02330	0.1346	0.1051	0.0524	0.2005	-0.0303	-0.1100	1.0000**

** significant at 1 per cent level; * significant at 5 per cent level

x_1 - Days to 50% flowering; x_2 - Days to first harvest; x_3 - Clusters per plants; x_4 - Pods per cluster; x_5 - Pods per plant; x_6 - Primary branches per plant; x_7 - Pods yield per plant; x_8 - Pod weight; x_9 - Pod length; x_{10} - Pod breadth; x_{11} - Seeds per pod; x_{12} - Length of harvest period; x_{13} - Crop duration; x_{14} - Main stem length

Table 2. Direct and indirect effects of component characters on yield

Characters	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	Total correlation
Pods per cluster - X_1	0.2306	0.3287	-0.0338	-0.0197	0.0023	0.0001	-0.0331	-0.0079	0.4672
Pods per plant - X_2	0.1081	0.7010	-0.2189	-0.1160	-0.0016	0.0261	-0.0307	0.0074	0.4754
Pod weight - X_3	-0.0164	-0.3234	0.4745	0.2028	0.0256	0.0132	0.0073	0.0090	0.3926
Pod length - X_4	-0.0200	-0.3452	0.4246	0.2267	0.0220	0.0191	0.0058	0.0070	0.3400
Pod breadth - X_5	0.0147	-0.0307	0.3381	0.1387	0.0360	0.0308	0.0028	0.0035	0.5339
Seeds per pod - X_6	0.0002	0.1518	0.0521	0.0359	0.0092	0.1204	0.0164	0.0134	0.3994
Length of harvest period - X_7	0.1079	0.3041	-0.0493	-0.0185	-0.0014	-0.0278	-0.0708	-0.0020	0.2422
Main stem length - X_8	-0.0273	0.0778	0.0639	0.0238	0.0019	0.0241	0.0021	0.0667	0.2330

Residue = 0.2269

Direct effects - diagonal elements

Indirect effects - off diagonal elements

The positive direct effect of pod length on yield as observed in the study was supported by Panicker (2000), Bastian *et al.* (2001) and Neema and Palanisamy (2001).

From the present study it was evident that selection of genotypes based on pods per plant, pod length and pod weight can be effective for improving yield of the crop.

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References

Ajith PM (2001) Variability and path analysis in bush types vegetable cowpea (*Vigna unguiculata* L. Walp.) MSc (Ag) Thesis. Kerala Agricultural University, Thrissur, p. 64.

Bastian D Das, LDVG Kandasamy and M Sakila M (2001) Path analysis in cowpea (*Vigna unguiculata* L. Walp). *Madras agric. J.* **88**: 526-527.

Kutty CN, Mili R and Jaikumaran U (2003) Correlation and path coefficient analysis in vegetable cowpa (*Vigna unguiculata* L. Walp.). *Indian J. Hort.* **60**: 257-261.

Neema VP and Palanisamy GA (2001). Path analysis of F_2 generation in cowpea. *Ann. Agric. Res.* **22**: 535-538.

Oseni TO, Lenge DD and Pal UR (1992) Correlation and path coefficient analysis of yield attributes in diverse lines of cowpea (*Vigna unguiculata*). *Indian J. Agric. Sci.* **62**: 365-368.

Panicker PR (2000) Evaluatiuon of vegetable cowpea (*Vigna unguiculata* subsp. *Sesquipedalis* (L.) Verdcourt) for legume pod borer, *Maruca vitrata* (Fab.) resistance and yield. MSc (Ag.) Thesis, Kerala Agricultural University, Thrissur, p.92

Parmar LD, RM Chauhan and SBS Tikka, A Henry, D Kumar and NB Singh (2003) Association analysis for grain yield and contributing characters in cowpea.

In Proc. of the National Symposium on Arid Legumes for Food Nutrition security and promotion of trade, Hisar, India, 15-16 May 2002. Advances of Arid Legume Research. 50-53.

Philip AMC (2004). Genetic analysis of legume pod borer (*Maruca vitrata* Fab.) resistance and yield in cowpea (*Vigna unguiculata*

L. Walp.) PhD Thesis. Kerala Agricultural University, Thrissur, p. 163.

Tyagi PC, N Kumar, MC Agarwal and N Kumar (2000) Genetic variability and association of component characters for seed yield in cowpea (*Vigna unguiculata* L. Walp). *Legume Res.* **23**: 92-96.

Vidya C (2000) Legume pod borer resistance and genetic divergence in domestic germplasm of yard long bean (*Vigna unguiculata* ssp. *Sesquipedalis* L. Verdc.) MSc (Ag.) Thesis. Kerala Agricultural University, Thrissur, p. 117.

Wright S (1954) The interpretation of multivariate systems. In *Statistics and mathematics in biology* (Eds. O Kempthorne, TA Bancroft, JW Gowen and JL Lush) pp. 11-33. State University Press, Lowa.