# Character association for yield and yield contributing traits in cowpea (Vigna unguiculata L. Walp)

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## Abstract

This study was conducted to assess the correlation coefficient among thirty genotypes for ten yield and yield contributing characters in cowpea using randomized block design with three replications. The present investigation on study of character association for yield and yield contributing traits in cowpea ( *Vigna unguiculata* L.Walp) was carried out in the year 2015-2016. The experiment was executed in the Plant Breeding Farm, Department of Genetics and Plant Breeding, Faculty of Agriculture. The yield and yield attributing traits like days to first flower, plant height (cm), number of branches per plant, number of clusters per plant, number of pods per cluster, pod length (cm), number of seeds per pod, number of pods per plant, hundred seed weight and seed yield per plant were recorded. The result on phenotypic and genotypic correlation coefficient revealed that seed yield per plant has positive correlation with days to first flowering (rg 0.192; rph 0.50), plant height (rg 0.273; rph 0.178), number of branches per plant (rg 0.454; rph 0.223), number of clusters per plant (rg 0.456;rph 0.405), number of pods per cluster (rg 0.594;rph 0.410), pod length (rg 0.045; rph 0.010), number of seeds per pod (rg 0.326; rph 0.295), number of pods per plant (rg 0.605; rph 0.525) and hundred seed weight (rg 0.200; rph 0.194 From the study it was concluded that the genotypic correlation was higher than the phenotypic correlation indicating the preponderance of genetic variance in the expression of different characters. The positive and significant association of yield contributing characters with seed yield per plant revealed the possibilities of simultaneous improvement of these traits by selection. This in turn will improve the seed yield.

**Keywords: correlation co-efficient, cowpea, seasons, genotypic, phenotypic**

## Introduction

According to Vavilov (1951), the cultivated cowpea originated in the Indian sub-continent. However, Faris (1965) assembled evidences which indicates that cowpea is of African origin as about 120 species are cultivated in Africa. Cowpea (*Vigna unguiculata* L. Walp) is an important grain legume which is extensively grown in arid and semiarid regions of the world for human consumption as dry pulse and vegetable. It is also used as a forage for animals in some countries, with its use as cattle feed likely responsible for its name. It is a warm season crop and thrives best between 21-35°C. Cowpea can be grown successfully in spring, summer and rainy seasons in the plains. It cannot withstand heavy rainfall and water logging. Generally, cowpea is one of the most important food legume of great socio-economic, cultural, nutritional importance and a valuable component of the traditional cropping system in the semi-arid tropics. The choice of cowpea specific genotypes adaptable to this kind of unfavorable environmental condition should be determined by a careful breeding program. Cowpea grains contain 23.4 per cent protein, 1.8 per cent fat and 60.3 per cent carbohydrates and also it is a good source of vitamins and phosphorus (Venkatesan*et al.*, 2003). In addition, cowpea plant enriches the soil through nitrogen fixation process (Nielson *et al*., 1997).

Direct selection for the yield is not much effective as quantitative characters are controlled by polygenes. Correlation coefficients explain the degree of association among the characters. The ultimate aim of any breeding program is to improve the yield. Yield improvement of any crop would be achieved by developing new superior varieties which is feasible by altering the genetic make up of the existing varieties. Besides this, for understanding the mode of inheritance of the yield components, the correlation among them and the association between each component and yield is necessary for intelligent choice of breeding procedures for evolving high yield varieties.

The correlation co-efficient gives an idea of the nature and intensity of association between yield and yield contributing traits hence helps in the selection of superior genotype from diverse genetic populations.

## Materials and Methods

The study was under taken on thirty genotypes of cowpea using randomized block design with three replication keeping two rows of each genotype with a spacing of 45 x 10 cm. Recommended and uniform agronomical practices was adopted. The present investigation was carried out at Plant Breeding Farm, Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University during monsoon and summer season of 2015-16. Five plants were tagged from each genotype from each replication for recording observations viz., days to first flower, plant height (cm), number of branches per plant, number of clusters per plant, number of pods per cluster, pod length (cm), number of seeds per pod, number of pods per plant, hundred seed weight(g) and seed yield per plant (g). The correlation coefficients among all possible character combinations were estimated by using the formula given by Al-Jibouri*et al*., 1958.

## Results and Discussion

Yield is the end product of interactions of many factors known as contributing components and hence it is a complex trait. The selection directly based on this complex trait is usually not useful, but the one based on its component traits could be more effective (Mohankumar *et al*., 2016). Grafius (1959) reported that there may not be any single gene for yield as such, but operates only through its components. An attempt has been made to study the character association and correlation coefficient for yield and yield contributing traits is depicted in Table 1. Days to first flower showed positive association with seed yield both at phenotypic and genotypic level (rg = 0.192; rph = 0.150). This is in consonance with Bezerra *et al*. (2001), Rahul *et al*. (2003) and Mittal and Paramjit (2005). Days to first flower also shows positive association with number of branches per plant, number of clusters per plant, number of pods per cluster, number of seeds per pod and hundred seed weight so seed yield can be improved through increasing the days to first flowering. Plant height exhibited positive association with seed yield (rg = 0.273; rph = 0.178). The seed yield can be improved through increasing plant height, because it exhibited a positive association with number of clusters per plant, pod length, number of seeds per pod and number of pods per plant (Kumawat and Raje, 2005; Lingaraj, 2009). Number of branches per plant showed positive and significant association with seed yield (rg = 0.450; rph = 0.223) and also with yield attributing characters like number of pods per cluster, pod length, number seeds per pod, number of pods per plant and hundred seed weight. This is in

accordance with Suganthi and Murugan, 2008; Lingaraj, 2009 and Mohankumar*et al*., 2016. Hence by improving number of branches per plant in turn improve the seed yield. The number of clusters per plant recorded positive and significant correlation with seed yield (rg = 0.456**; rph = 0.405**) (Anbumalarmathi, 2005). The number of pods per cluster showed positive and significant association with seed yield (rg = 0.594** and rph = 0.410). These findings also supported by Bhardwaj *et al*. (2014) and Kamai *et al.* (2014). Pod length and number of seeds per pod shows positive association with seed yield. Number of pods per plant registered positive and significant correlation with seed yield per plant (rg = 0.605**; rph = 0.525**). This trait also shows positive association with yield attributing characters so by improving this character will achieve improvement in seed yield. These findings were in consonance with Nwofia *et al.,* 2012 and MohanKumar *et al*., 2016. Hundred seed weight showed positive correlation with seed yield per plant (rg = 0.200; rph = 0.194). Similar results were observed by Selvakumar and Ushakumari, 2012, Sharma *et al*., 2016; Shanko *et al*., 2014.

From the above studies, it was clear that plant height, number of clusters per plant, number of pods per cluster, number of pods per plant and number of seeds per pod were the important yield attributing characters affecting the seed yield so, simultaneous selection for all these traits would be an appropriate point for selection.

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**Table 1. Genotypic and Phenotypic correlation co-efficient between seed yield per plant and other characters in cowpea**

| Character | D/F | Days to first flower | Plant height (cm) | Number of branches per plant | Number of clusters per plant | Number of pods per cluster | Pod length (cm) | Number of seeds per pod | Number of pods per plant | Hundred seed weight(g) | Seed yield per plant (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Days to first flower | rg | 1.000 | -0.096 | 0.446 | 0.113 | 0.251 | -0.021 | 0.071 | 0.156 | 0.251 | 0.192 |
| | rph | 1.000 | -0.117 | 0.100 | 0.120 | 0.071 | 0.005 | 0.036 | 0.100 | 0.211 | 0.150 |
| Plant height (cm) | rg | | 1.000 | -0.215 | 0.439* | -0.019 | 0.176 | 0.224 | 0.339* | 0.150 | 0.273 |
| | rph | | 1.000 | -0.049 | 0.278 | 0.076 | 0.121 | 0.196 | 0.232 | -0.121 | 0.178 |
| Number of branches per plant | rg | | | 1.000 | 0.452** | 0.494** | 0.086 | 0.477** | 0.482** | 0.489** | 0.450** |
| | rph | | | 1.000 | 0.239 | 0.324 | 0.057 | 0.244 | 0.328 | 0.270 | 0.223 |
| Number of clusters per plant | rg | | | | 1.000 | 0.440* | 0.099 | 0.128 | 0.939** | 0.142 | 0.456** |
| | rph | | | | 1.000 | 0.306 | 0.067 | 0.104 | 0.878** | 0.130 | 0.405* |
| Number of pods per cluster | rg | | | | | 1.000 | -0.218 | 0.234 | 0.730** | 0.328 | 0.594** |
| | rph | | | | | 1.000 | -0.150 | 0.115 | 0.660** | 0.245 | 0.410* |
| Pod length (cm) | rg | | | | | | 1.000 | 0.486** | 0.016 | 0.185 | 0.045 |
| | rph | | | | | | 1.000 | 0.400* | -0.001 | 0.168 | 0.010 |
| Number of seeds per pod | rg | | | | | | | 1.000 | 0.177 | 0.166 | 0.326 |
| | rph | | | | | | | 1.000 | 0.133 | 0.154 | 0.295 |
| Number of pods per plant | rg | | | | | | | | 1.000 | 0.250 | 0.605** |
| | rph | | | | | | | | 1.000 | 0.223 | 0.525** |
| Hundred seed weight(g) | rg | | | | | | | | | 1.000 | 0.200 |
| | rph | | | | | | | | | 1.000 | 0.194 |
| Seed yield per plant (g) | rg | | | | | | | | | | 1.000 |
| | rph | | | | | | | | | | 1.000 |

*significant at 5% level
coefficient
**Significant at 1% level
coefficient

rg = genotypic correlation

rph = phenotypic correlation