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Heritable relationship and variability of yield and yield determinants in cow pea

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Abstract
The legume crop, cowpea is grown as one of the most important multipurpose grain legume extensively cultivated in arid, semi-arid and subtropics. This study was carried out with 22 diverse varieties / Genotypes of cowpea [*Vigna unguiculata* (L.) Walp], grown during *Kharif* season. These genotypes were obtained from the Director, Indian Institute of Vegetable Research, Varanasi (U.P.). Maximum phenotypic and genotypic coefficients of variation were observed for seed yield per plant followed by number of clusters per plant, pods per plant, pod length, number of seeds per pod, green pod weight plant and plant height, This indicated the presence of high magnitude of genetic variability in the material for these characters. High heritability coupled with high genetic advance were recorded in character viz-seed yield per plant, plant height, days to 80% maturity, green pod weight, days to 50% flowering and pods per plant indicated that these traits were mostly controlled by additive gene action. The seed yield per plant showed positive correlation with pod length, number of cluster per plant and pods per plant while exhibited negative correlation with no. of primary branches, days to 50% flowering and days to 80% maturity exhibited negative correlation with seed yield per plant at genotypic and phenotypic level. Using the characters having high heritability coupled with high genetic advance has low influence to environment where as positive correlation of those characters with yield directly enhance yield of cowpea.

Keywords: Cowpea, variation, heritability, genetic advance and correlation

Introduction
Among all the legume crops, cowpea [*Vigna unguiculata* (L.) Walp. Fabaceae (2n=2x=22)] is grown as one of the most important multipurpose grain legume extensively cultivated in arid, semi-arid and subtropics. India and Ethiopia are recognized as primary and China as a secondary centre of origin. Cowpea is photo insensitive in nature and can be cultivated throughout the year. In India, cowpea is mostly grown as *Kharif* crop, but can be grown as a *Rabi* crop in peninsular India. It may be suitable for rice fallows in Odisha, Madhya Pradesh, Chhattisgarh, Maharastra, Andhra Pradesh, Karnataka and Tamil Nadu. According Aykroyd (1941) fresh pods of cowpea contain moisture 82.5%, protein 24.6%, fat 0.2 mg, carbohydrate 0.9g, ash 1.4g, calcium 0.13 mg, phosphorus 0.13mg, iron 5.8mg, vitamin A 330 IU, Vitamin C 49 mg per 100g.

Cultivated cowpeas are annual herb with a great range of growth habit, pod colour and size, seed colour and size and response to photoperiod and temperature. Mostly plant of cowpeas are erect, determinate and day neutral types are grown as sole crop while prostrate, indeterminate and short day types grown both as sole and companion crop for different purposes. The crop is tolerant to drought, yield stability and ability to fix nitrogen makes it an ideal crop for small holder farmer. Being a short duration crop it fits well in various multiple and inter-cropping system. After picking of pods, cowpea plants may be used as green fodder or as a green manure.

The current average yield level is deplorable low. One of the main reasons for the low yield in the country is that it has been a neglected crop. It is surprising that inspite of large variation present in indigenous material it could not catch appreciable attention of the plant breeder till recent period. The Berbatties of Godda Santhal pargana of Bihar state, black seeded Barbatti of Varanasi and red seeded lobia of Faizabad are the familiar examples of land races selected by the farmers for cultivation. Except a few most of the varieties have been selected and adopted by small vegetable growing farmers of the different regions of the country. The existing genotypes present in India need testing for adaptation to isolate the most suitable genotypes of

different maturity durations for different agro-climatic conditions and simultaneously identification of elite genotypes for further use in the varietal improvement programme. There is an urgent need to make efforts for increasing the vegetable cowpea production to meet the minimum requirements as well as for ensuring the national security of fast growing population. Genetic variability for economic traits is pre-requisite for any successful breeding programme. Systemic collections of natural variability have not been made and therefore, limited genetic variability is available in cowpea. In India, cowpea improvement has been restricted only in assembling of limited numbers of germplasm and hybridization between randomly chosen parental lines with narrow genetic base.

Direct selection for higher yield might provide misleading results because many factors interact to determine cowpea yield. Because individual yield components are less influenced by environmental effects than yield itself, selection for such yield components may be useful in acquiring genotypes with better yield potential (Premsekar and Raman, 1972; Bordia *et al.* 1973; Jagadish, 1986) [21, 2]. The breeding procedure for cowpea improvement should not only base on desirable variability available the breeding programme and the efficiency of selection techniques. In this context knowledge of the magnitude and type of association between yield and its components themselves greatly help in evaluating the contribution of different yield components towards yield. Therefore, the present study was undertaken to establish correlation among the economic parameters in twenty two cowpea varieties.

Material and methods

Experimental material and their management

This study was carried out with 22 diverse varieties / Genotypes of cowpea [*Vigna unguiculata* (L.) Walp] (table 1). These varieties were grown during *Kharif* season 2017. These genotypes were obtained from the Director, Indian Institute of Vegetable Research, Varanasi (U.P.).

Table 1. Name of varieties/ germplasm used during experimentation

S. N.	Genotypes/Varieties	S.N.	Genotypes/Varieties
1	Pusa komal (Lobia)	12	Mitali (Lobia)
2	PL-5	13	KBC-9
3	PTB-I	14	PL-3
4	PL-4	15	DC-16
5	KBC-8	16	RC-19
6	Karishma (Lobia)	17	CO CP-1
7	Gomti VU-99 (Lobia)	18	RC-101
8	Super Ujjwala (Lobia)	19	Local-3
9	Gomti VU-89	20	PL-2
10	Gomti GS-120 (Lobia)	21	Godawari (Lobia)
11	Suchitra	22	Ratna Lal (Lobia)

Observations recorded

The data recorded on yield and its contributing characters *viz.*, days to 50% flowering, number of primary branches per plant, pod length (cm.), number of clusters per plant, number of pods per plant, number of seeds per pod, plant height, days to 80% maturity, green pod wt. per plant (g), 100-seed weight and seed yield per plant.

Statistical procedures

The data collected on the quantitative characters were subjected for statistical analysis and following different statistical parameters were worked out.

Estimation of genotypic and phenotypic coefficient of variation

Genotypic and phenotypic coefficients of variation were estimated according to Burton and de Vane (1953) based on estimate of genotypic and phenotypic variance.

Genotypic co-efficient of variation (GCV): $GCV(\%) = \frac{\sigma g}{\bar{X}} \times 100$

Phenotypic co-efficient of variation (PCV): $PCV(\%) = \frac{\sigma p}{\bar{X}} \times 100$

Where,

$\overline{X}$ = General mean

σg = Genotypic standard deviation

σp = Phenotypic standard deviation

The GCV and PCV are categorized as low (10%>), moderate (10-20%) and high (20%<) as suggested by Burton and de Vane (1953). The estimated GCV and PCV helped in getting a clear understanding of the variability present among various genotypes.

Heritability and genetic advance

Heritability in broad sense (h^2) was calculated using the formula suggested by Burton and de Vane (1953). Similarly, genetic advance was calculated by the method suggested by Johnson *et al.* (1955).

Correlation coefficient analysis

Phenotypic, genotypic and environmental correlation coefficient between characters were computed utilizing respective components of variance and co-variance, by following formula suggested by Miller *et al.* (1958) [11].

To test the significance of phenotypic and environmental correlation coefficient, the estimated values were compared with the tabulated values of Fisher and Yates (1938) at t-2 d.f. at two levels of probability, *viz.*, 5% and 1%.

Result and Discussion

The vegetable improvement work was initiated few decades ago in India and has resulted in the development of a large numbers of improved varieties. There are still some vegetables, which are left unexploited though they have great potential in the Indian vegetable scenario; Cowpea is the one of them. This is possible only when diverse parents are available for breeding programme. The basic rational in crop improvement programme is the selection of parents. It is well known that there is a likelihood of getting better segregants, when the parents used in crossing are genetically diverse.

To keep all the above points in view, the present study was under taken and the experimental findings obtained are discussed as follows:

Analysis of variance

In this study, the extent of variability was estimated in the 22 genotypes/ varieties of cowpea for 11 characters. Analysis of variance for design of the experiment indicated highly significant differences among the genotypes for all the eleven characters under experimentation, which indicating the presence of high genetic variability in the materials. Wide range of variation was found for number of clusters per plant, number of pods per plant, green pod weight, pod length, 100-seed weight, number of primary branches per plant and days to 50% flowering while lowered was showed by plant height and seed yield per plant indicated good scope for improvement. Variability in quantitative characters of cowpea was also reported by Venkatesan *et al*. (2003) [29] and Shanko *et al*. (2014) [24].

The phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all the characters studied, indicating the role of environmental variance in the total variance which is in agreement of Pal *et al*. (2003) [17], Nigude *et al*. (2004) [15], Suganthi and Murugan (2008) [26], Nehru *et al*. (2009) [14] and Manggoe *et al*. (2012) [9]. Maximum phenotypic and genotypic coefficients of variation were observed for seed yield per plant followed by number of clusters per plant, pods per plant, pod length, number of seeds per pod, green pod weight plant and plant height, This indicated the presence of high magnitude of genetic variability in the material for these characters. This suggested that possibility for improvement by selection breeding (table 2 and figure 1). These results were in accordance with the findings reported by Selvam *et al*. (2000) [23] for plant height, number of pods, seed yield per plant and number of branches per plant, Rangaiah (2000) [22] for number of clusters per plant, number of pods per plant, pod weight and total seed weight, Tyagi *et al.* (2000) [27] for plant height, days to maturity and seed yield, Nehru and Manjunath (2001) [13] for pods per plant followed by cluster per plant, number of primary branches per plant and yield per plant, Venkatesan *et al.* (2003) [29] for plant height, Pal *et al*. (2003) [17] for plant height, number of primary branches per plant, number of pods per plant and green pod yield per plant, Nigude *et al*. (2004) [15] for plant height followed by grain yield and number of pods per plant, Prasanthi (2004) [20] for plant height, pods per plant, 100-seed weight, seed yield, Eswaran *et al*. (2007) [5] for plant height at the time of first flowering, plant height at the time of 50% flowering, seed yield per plant, Suganthi and Murugan (2008) [26] for seed yield per plant, Nehru *et al*. (2009) [14] for plant height, number of branches per plant, number of clusters per plant, number of pods per plant and seed yield per plant, Manggoe *et al.* (2012) [9] for grain yield and number of pods per plant, Shanko *et al*. (2014) [24], Verma *et al*. (2015) [30] for plant height, no. of branches per plant, seed yield per plant, number of clusters per plant, number of pods per plant and pod length, Dinesh *et al.* (2017) [4] for plant height and number pods per plant.

The moderate genotypic and phenotypic coefficients of variation were observed for number of primary branches per plant, 100-seed weight, and days to 50% flowering. These findings were similar with Prasanthi (2004) [20] for number of seeds per pod, Eswaran *et al*. (2007) [5] and Suganthi and Murugan (2008) [26] for 100-seed weight.

The estimates of GCV and PCV for Seed yield per plant, plant height, green pod weight, number of seeds per pod and 100-seed weight showed little differences indicating the greater role of genetic factors in the expression of these traits and ample scope for improvement.

Table 2. Mean, range, genotypic and phenotypic coefficient of variation and heritability and genetic advance for 11 quantitative characters in Cowpea.

S. No.	Characters	Mean Sum of Square			Range		Coefficient of Variation		Heritability (broad sense)	Genetic advance	Genetic advance in percent of mean
		Replication	Treatments	Error			Genotypic	Phenotypic			
		2 df	21 df	42 df	Min.	Max.					
1	Days to 50 % flowering	2.56	109.11**	4.62	28.00	45.67	16.24	17.29	88.28	11.42	31.44
2	No. of primary branches	0.07	8.47**	0.26	5.40	12.07	19.61	20.51	91.37	3.26	38.61
3	Pod length(cm.)	19.29	44.62**	8.74	9.87	23.50	21.48	28.26	57.78	5.42	33.63
4	No. of clusters / plant	1.16	15.88**	1.11	2.33	11.80	36.91	40.87	81.54	4.13	68.66
5	No. of pods / plant	3	92.29**	8.2	7.93	33.73	31.49	35.80	77.36	9.59	57.06
6	No. of seeds/ pod	5.67	43.91**	1.96	6.13	19.07	32.66	34.88	87.68	7.21	63.00
7	Plant height(cm.)	0.92	782.90**	9.43	34.47	100.72	29.03	29.55	96.47	32.49	58.73
8	Days to 80% maturity	10.74	400.72**	20.77	65.33	104.00	12.82	13.83	85.91	21.49	24.48
9	Green Pod weight(g)	10.81	128.36**	11.46	7.00	33.00	27.05	30.77	77.27	11.30	48.98
10	100- Seed weight(g)	0.15	7.19**	0.71	5.88	11.73	15.68	18.06	75.33	2.63	28.03
11	Seed yield / plant(g)	3.29	3054.38**	12.85	17.33	136.67	42.22	42.49	98.75	65.18	86.43

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

Heritability and Genetic Advance Studies

Heritability in broad sense was computed for all the characters and has been presented in Table 2. In general, higher estimates of broad sense heritability were observed for all the characters. The heritability values ranged from 57.78 % (Pod length) to 98.75 % (Seed yield per plant). High heritability estimates were found for Seed yield per plant (98.75), plant height (96.47%), primary branches per plant (91.37%), days to 50% flowering (88.28%), number of seeds per pod (87.68%), days to 80% maturity (85.91%), no. of cluster per plant (81.54%), pods per plant (77.36%), green pod weight (77.27%) and 100-seed weight (75.33%) while moderate heritability estimate were found only for pod length (57.78%). This results were in conformity with the findings reported by Mehta and Zaveri (1998) [10], Selvam *et al*. (2000) [23], Nehru and Manjunath (2001) [13], Venkatesan *et al*. (2003) [29], Pal *et al*. (2003) [17], Nigude *et al*. (2004) [15], Prasanthi (2004) [20], Eswaran *et al*. (2007) [5], Suganthi and Murugan (2008) [26], Nehru *et al*. (2009) [14] and Manggoe *et al*. (2012) [9] for days to 50% flowering, number of peduncles per plant, number of flowers per plant, number of pods per plant, pod length, number of seeds per pod, 100-seed weight and grain yield. Burton (1952) [3], indicated less environmental influence on the characters and recorded high transmission index. The high heritability indicates that these traits are generally governed by the additive gene action and

that the genotypes of the traits strongly reflect the phenotypes. The expected genetic advance in per cent of mean ranged from 24.48 % (days to 80% maturity) to 86.43% (seed yield per plant) (Table 2). High estimates of expected genetic advance were showed by all characters *viz*- seed yield per plant, no. of cluster per plant, number of seeds per pod, plant height, number of pods per plant, Green pod weight per plant, number of primary branches per plant, pod length, days to 50% flowering, 100-seed weight and days to 80% maturity exhibited high expected genetic advance in per cent of mean. These findings were found in accordance with Pal *et al*. (2003) [17], Nigude *et al*. (2004) [15], Eswaran *et al*. (2007) [5], Suganthi and Murugan (2008) [26] and Nehru *et al*. (2009) [14] and Nwofia *et al*. (2013) [16].

High heritability coupled with high genetic advance were recorded in character viz- seed yield per plant, plant height, days to 80% maturity, green pod weight, days to 50% flowering and pods per plant indicated that these traits were mostly controlled by additive gene action (figure 1). Phenotypic selection for these characters would be highly effective as also reported earlier by Mehta and Zaveri (1998) [10], Selvam *et al*. (2000) [23], Nehru and Manjunath (2001) [13], Venkatesan *et al*. (2003) [29], Pal *et al*. (2003) [17], Nigude *et al*. (2004) [15], Prasanthi (2004) [20], Eswaran *et al*. (2007) [5], Suganthi and Murugan (2008) [26], Nehru *et al*. (2009) [14] and Manggoe *et al*. (2012) [9], Nwofia *et al*. (2013) [16], Verma *et al*. (2015) [30] and Dinesh *et al* (2017) [4] for plant height and number of pods per plant.

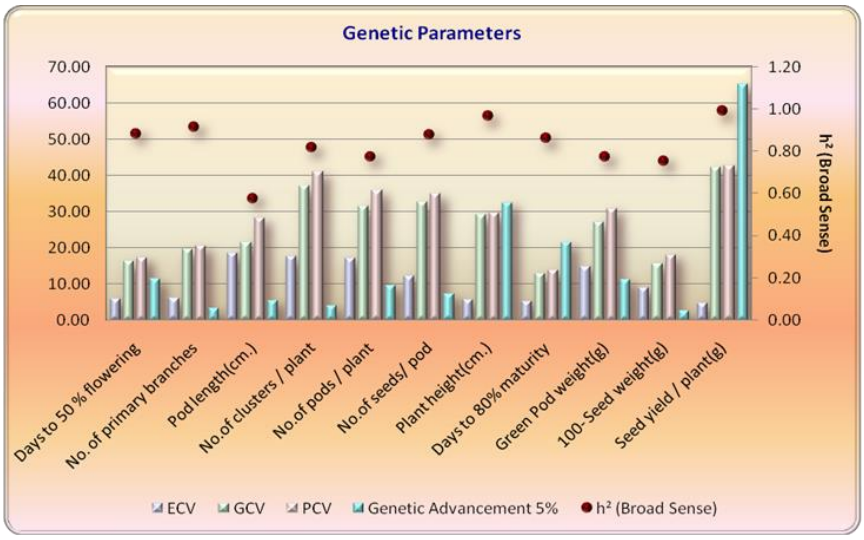

Fig 1: Genetic variability and heritability

Correlation coefficients studies

The grain yield or economic yield, in almost all the crops, is complex character, which manifests from multiplicative interactions of several characters that are termed as yield components. Thus, identification of important components and information about their association with yield among each other are very useful for developing effective breeding strategy for evolving high yielding varieties. The correlation coefficient is measure of degree of symmetrical association between two variables or character, which helps us in understanding the nature and magnitude of association between yield and its component traits.

In this study, phenotypic and genotypic correlations were estimated. The direction of phenotypic and genotypic correlations was similar for almost all the characters. In general, genotypic correlations were higher than phenotypic ones in magnitude for all the characters indicating the existence of strong inherent associations between various traits (Table 3 & 4). This is in agreement with the earlier reports of Neema and Palanisamy (2003) [12], Nigude *et al*. (2004) [15] Eswaran *et al*. (2007) [5], Verma *et al*. (2015) [30] for no. of cluster per plant, no. of pods per plant and 100-seed weight, Patel, *et al*. (2016) [18] for pod length and sugar content Srinivas *et al*. (2017) [25] for number of branches per plant, number of nodes, pod length, number of seeds per pod and Dinesh *et al* (2017) [4] for number of pods per plant and 100 seed weight.

The seed yield per plant showed positive correlation with pod length (0.261and 0.189), number of cluster per plant (0.199 and 0.184) and pods per plant (0.178 and 0.162) while exhibited negative correlation with no. of primary branches (-0.265 and -0.255), days to 50% flowering (-0.261and -0.247) and days to 80% maturity (-0.241 and -0.228) exhibited negative correlation with seed yield per plant at genotypic and phenotypic level.

The 100-seed weight showed highly significant and positive correlation with green pod weight per plant (0.314 and 0.315), days to 80% maturity (0.3.00 and 0.277) while highly significant and negative correlation was exhibited with no. of pods per plant (-0.660 and -0.514), days to 50% flowering (-0.507 and -0.397) and number of primary branches per plant (-0.454 and -0.391) at genotypic and phenotypic level.

Green pod weight exhibited highly significant and positive correlation with pod length (0.499 and 0.311) and days to 80% maturity (0.359 and 0.320) while highly negative correlation was exerted substantial negative effect with No. of cluster per plant (-0.584 and -513), no. of pods per plant (-0.569 and -0.475) and days to 50% flowering i.e. (-0.540 and -0.439) at genotypic and phenotypic level.

Days to 80% maturity were exhibited highly significant and positive correlation with plant height (0.399 and 0.376) and pod length (0.404 and 0.316) while negative correlation with number of pods per plant (-0.465 and -0.429) at genotypic and phenotypic level both.

The correlation coefficient of plant height showed highly significant and positive correlation with pod length (0.406) and (0.321); No. of pods per plant with no. of cluster per plant (0.739 and 0.633) and No. of cluster per plant with days to 50% flowering (0.363 and 0.279) while negative correlation effect was showed by no. of seeds per pod with no. of pods

per plant (-0.415 and -0.356), days to 50% flowering (-0.325) and (-0.253) and pod length with days to 50% flowering (-0.426 and -0.288) at both genotypic and phenotypic level, respectively (figure 2 and 3). These results were similar reported by the findings of Kumar *et al.* (1996) [7], Ushakumari *et al.* (2001) [28], Kutty *et al.* (2003) [8] for number of pods per plant, Venkatesan *et al.* (2003) [29] for number of pods per plant and number of clusters per plant, Peksen and Artik (2004) [19] for 100-seed weight Nwofia *et al.* (2013) [16], Shanko *et al.* (2014) [24] for number of primary branches per plant, number of secondary branches per plant, days to 50% flowering, number of pods per plant, number of seeds per pod and plant height, Verma *et al.* (2015) [30] for no. of cluster per plant, no. of pods per plant and 100-seed weight, Patel *et al.* (2016) [18] for pod length and sugar content and Srinivas *et al.* (2017) [25] for number of branches per plant, pod length, number of seeds per pod, number of cluster per plant, number of pods per plant, number of pods per cluster and plant height.

Table 3: Estimates of Phenotypic Correlations for different Eleven quantitative characters in Cowpea

S. No	Character	Days to 50 % flowering	No. of primary branches	Pod Length (cm.)	No. of clusters/plant	No. of pods/plant	No. of seeds/pod	Plant Height (cm.)	Days to 80% maturity	Green Pod weight(g)	100- Seed weight(g)	Seed yield / plant (g)
1	Days to 50 % flowering	1.000	0.137	-0.288*	0.279*	0.382**	-0.253*	-0.058	-0.010	-0.439***	-0.397***	-0.247*
2	No. of primary branches	0.137	1.000	-0.143	0.107	0.186	-0.121	0.091	-0.069	-0.160	-0.391**	-0.255*
3	Pod length (cm.)	-0.288	-0.143	1.000	-0.212	-0.163	0.153	0.321**	0.316**	0.311*	0.229	0.189
4	No. of clusters / plant	0.279	0.107	-0.212	1.000	0.633***	-0.254*	-0.033	-0.204	-0.513***	-0.260*	0.184
5	No. of pods / plant	0.382	0.186	-0.163	0.633	1.000	-0.356**	0.012	-0.429***	-0.475***	-0.514***	0.164
6	No. of seeds/ pod	-0.253	-0.121	0.153	-0.254	-0.356	1.000	-0.015	-0.060	0.089	0.146	-0.098
7	Plant height (cm.)	-0.058	0.091	0.321	-0.033	0.012	-0.015	1.000	0.376**	0.154	-0.210	-0.104
8	Days to 80% maturity	-0.010	-0.069	0.316	-0.204	-0.429	-0.060	0.376**	1.000	0.320**	0.277*	-0.228
9	Green Pod weight (g)	-0.439	-0.160	0.311	-0.513	-0.475	0.089	0.154	0.320**	1.000	0.315**	-0.134
10	100- Seed weight (g)	-0.397	-0.391	0.229	-0.260	-0.514	0.146	-0.210	0.277*	0.315**	1.000	0.145
11	Seed yield / plant (g)	-0.247	-0.255	0.189	0.184	0.164	-0.098	-0.104	-0.228	-0.134	0.145	1.000

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

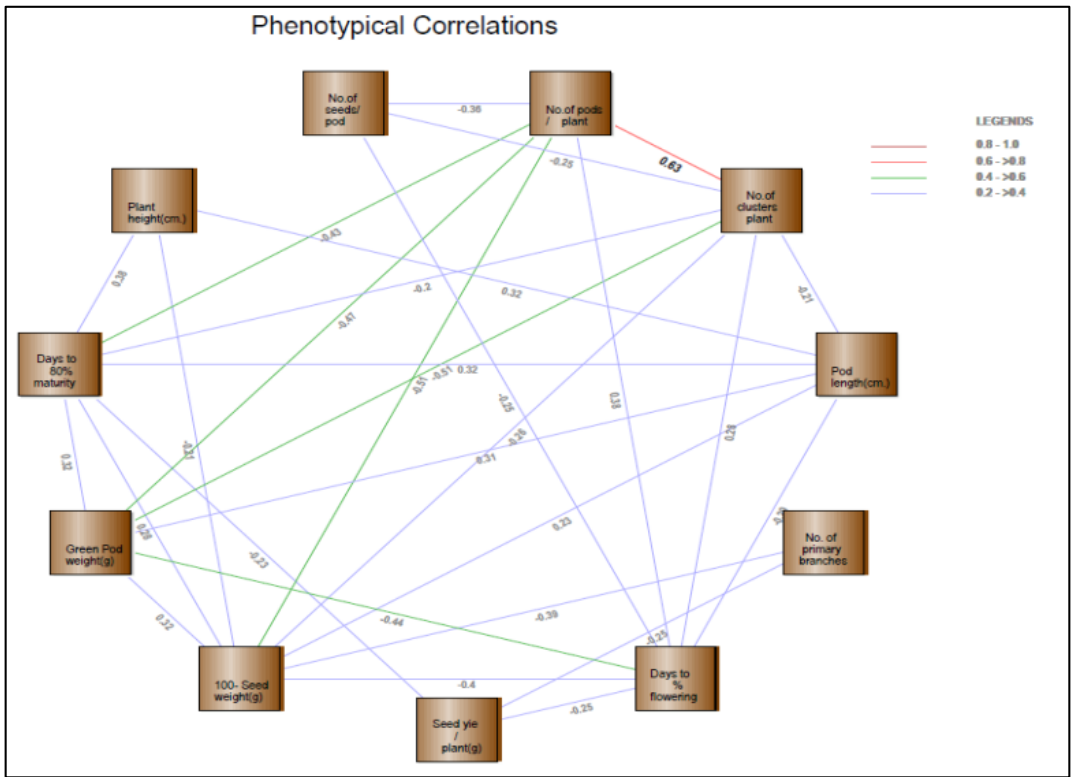

Fig 2. Phenotypic correlation diagram

Table 4: Estimates of Genotypic Correlations for Eleven different quantitative characters in Cowpea.

S. No	Characters	Days to 50 % flowering	No. of Primary branches	Pod length (cm.)	No. of clusters / plant	No. of pods / plant	No. of seeds/pod	Plant Height (cm.)	Days to 80% maturity	Green Pod weight(g)	100- Seed weight(g)	Seed yield / plant(g)
1	Days to 50 % flowering	1.000	0.166	-0.426	0.363	0.468	-0.325	-0.079	0.017	-0.540	-0.507	-0.261
2	No. of primary branches	0.166	1.000	-0.288	0.090	0.185	-0.137	0.094	-0.088	-0.180	-0.454	-0.265
3	Pod length (cm.)	-0.426	-0.288	1.000	-0.290	-0.233	0.197	0.406	0.404	0.499	0.397	0.261
4	No. of clusters / plant	0.363	0.090	-0.290	1.000	0.739	-0.247	-0.037	-0.270	-0.584	-0.281	0.199
5	No. of pods / plant	0.468	0.185	-0.233	0.739	1.000	-0.415	0.024	-0.465	-0.569	-0.660	0.178
6	No. of seeds/ pod	-0.325	-0.137	0.197	-0.247	-0.415	1.000	-0.017	-0.071	0.113	0.180	-0.097
7	Plant height (cm.)	-0.079	0.094	0.406	-0.037	0.024	-0.017	1.000	0.399	0.185	-0.237	-0.105
8	Days to 80% maturity	0.017	-0.088	0.404	-0.270	-0.465	-0.071	0.399	1.000	0.359	0.300	-0.241
9	Green Pod weight (g)	-0.540	-0.180	0.499	-0.584	-0.569	0.113	0.185	0.359	1.000	0.314	-0.153
10	100- Seed weight (g)	-0.507	-0.454	0.397	-0.281	-0.660	0.180	-0.237	0.300	0.314	1.000	0.167
11	Seed yield / plant (g)	-0.261	-0.265	0.261	0.199	0.178	-0.097	-0.105	-0.241	-0.153	0.167	1.000

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

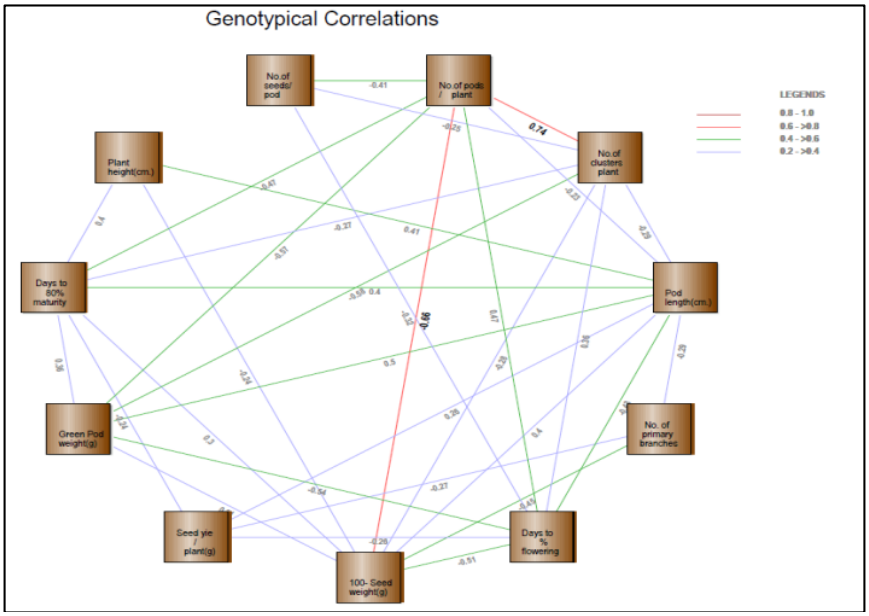

Fig 3: Genotypic correlation diagram

Conclusion

Over all it is concluded that maximum phenotypic and genotypic coefficients of variation were observed for seed yield per plant followed by number of clusters per plant, pods per plant, pod length, number of seeds per pod, green pod weight plant and plant height, This indicated the presence of high magnitude of genetic variability in the material for these characters. High heritability coupled with high genetic advance were recorded in character viz- seed yield per plant, plant height, days to 80% maturity, green pod weight, days to 50% flowering and pods per plant indicated that these traits were mostly controlled by additive gene action. The seed yield per plant showed positive correlation with pod length, number of cluster per plant and pods per plant while exhibited negative correlation with no. of primary branches, days to 50% flowering and days to 80% maturity exhibited negative correlation with seed yield per plant at genotypic and phenotypic level. Using the characters having high heritability coupled with high genetic advance has low influence to environment where as positive correlation of those characters with yield directly enhance yield of cowpea.

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