Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

Navin Kumar
Faculty of Agriculture
Department of Crop Sciences
M.G.C.G.V Chitrakoot,
Madhya Pradesh, India

SS Singh
Faculty of Agriculture
Department of Crop Sciences
M.G.C.G.V Chitrakoot,
Madhya Pradesh, India

SP Mishra
Faculty of Agriculture
Department of Crop Sciences
M.G.C.G.V Chitrakoot,
Madhya Pradesh, India

Characters associations studies in the genotypes of cowpea [*Vigna unguiculata* (L.) Walp.]

Navin Kumar, SS Singh and SP Mishra

Abstract
Fifteen genotypes of Cowpea [*Vigna unguiculata* (L.)] were evaluated for character association for yield and its components traits. The experiment was conducted at research farm, Department of crop sciences, MGCGVV, Chitrakoot Satna M.P, India and it was laid out in Randomized Block Design with three replications. The observations were recorded on twenty quantitative characters .it was observed that the magnitude of association varied among the genotypes. The traits likes biological yield per plants, pod per plant, terminal leaf width, seeds per pod, cluster per plant, and number of main branches, seed index and terminal leaf length showed the positive and significant correlation with seed yield per plant at genotypic and phenotypic level, character having high heritability and high correlation with the former trait is choose to make selection more effective. So special emphasis should be given on the above traits during selection breeding for cowpea improvement programme.

Keywords: Correlation, cowpea, genotype, yield, traits

Introduction
Cowpea (Vigna unguiculata (L.) Walp) is an annual grain legume. Its nutritional value and biological nitrogen fixation potential coupled with a high plasticity to environmental condition. Cowpea utilized as a pulse, grain vegetable and fodder .Cowpea is considered more tolerant to drought due to its deep tap root. Yield is an intricate character, which is prohibited by involvement of a mixture of characters. Before placing strong accent on breeding for yield improvement trait, the knowledge of the association between yield and yield attributes will enable the breeder in the improvement of yield. The correlation may be attributed due to linkage or pleiotropic effect of genes and development relationship or environmental effect Correlation shows nature and extent of such association between any two characters. For the While selecting a suitable plant type, association studies would provide reliable information on nature, extent and direction of selection, especially when there is a need to combine high yield potential with desirable agronomic traits. A positive correlation between desirable characters is favorable to the plant breeder because it helps in simultaneous improvement of both the characters. A negative correlation will hinder the simultaneous expression of both the characters with high values. Under such situation another character having high heritability and high correlation with the former trait is choose to make selection more effective.

Material and Methods
The present investigation was undertaken to evaluate correlation and character associated studies in fifteen genotypes of Cowpea [Vigna unguiculata (L.)] in Randomized Block Design with three replications during *Kharif 2016*-17 and 2017-2018 at Field Experimentation Centre of Rajoula M.G.C.G.V Chitrakoot. All the recommended cultural practices and packages were applied for growing healthy and good crop, in each entry, five plants are randomly selected from each replication and following observations were recorded for Days to 50% Heading, Days to 50% Flowering, Days to Maturity, Terminal Leaf length(cm), Terminal Leaf width (cm), No. of Main branches, No. of node on Main stem, No. of pods per peduncle, pod/cluster, cluster/plant, peduncle length, pod/plant, pod length, plant height (cm), fresh pod weight (g), seeds /pod, seed index, Biological yield per plant(g), harvest index and Seed yield per plant(g) .Genotypic and phenotypic correlation co-efficient were computed as suggested by Johnson *et al*. (1955) [2].

Results and Discussion
Correlation analysis is an important tool for provides information about yield components and thus helps in the selection of superior genotypes from genetically diverse population. Similar information is provided by Sapara *et al*. (2014) [7] and Patel *et al*. (2016) [3].

Corresponding Author:
Navin Kumar
Faculty of Agriculture
Department of Crop Sciences
M.G.C.G.V Chitrakoot,
Madhya Pradesh, India

In the present studies, The traits likes biological yield per plants, pod per plant, terminal leaf width, seeds per pod, cluster per plant, and number of main branches, seed index and terminal leaf length showed the positive and significant correlation with seed yield per plant These results are supported by Thorat et al. (2013) [11], Sapara et al. (2014) [7] and Patel et al. (2016) [3]. Seed yield per plant recorded positive significant correlation with biological yield per plant (1 rg, 0.99 rp) and pod per plant (0.84 rg, 0.83rp) at both levels of significance. It also showed positive significant correlation with terminal leaf width (0.85 rg, 0. 79rp) seeds per pod ((0.69 rg, 0.68rp) at 5% level of significance only these results are supported by Kumawat and Raje (2005) [12] and Venkatesan et al. (2003) [8] Seed yield per plant exhibited highly significant and negative association with plant height, days to 50% flowering, days to 50% heading and peduncle length Pal et al.(2004) [4] Saini et al. (2007) [5] The magnitude of genotypic correlation was higher than phenotypic correlation for all the traits that indicated inherent association between various characters. The findings were in agreement to Pathak and Jamwal (2002) [9] and Venkatesan et al. (2003) [11]. In the present findings significant positive phenotypic correlation seed yield per plant was observed with biological yield per plant, pod per plant indicating that these characters are the primary yield determinant in cowpea. The earlier findings of Pathak and Jamwal (2002) [6], Kutty et al. (2007) [1] and Lal et al. (2007) [9] for number of pods per plant, Venkatesan et al., (2003) [8] for number of pods per plant by Sharma et al. (2007) [10] for number of pods per plant. While selecting a suitable plant type, association studies would provide reliable information on nature, extent and direction of selection, especially when there is a need to combine high yield potential with desirable agronomic traits. Kalambe et al. (2019) [13] Seed yield recorded positive significant correlation with biological yield and number of pods per plant, and terminal leaf length. It also showed positive significant correlation with seeds per pod, cluster per plant, and number of main branches, seed index and terminal leaf length with at 5% level of significance only. The magnitude of genotypic correlation was higher than phenotypic correlation for all the traits that indicated inherent association between various characters. In the present findings significant positive phenotypic correlation seed yield per plant was observed with number of biological yield per plant and pods per plant indicating that these characters are the yield determinant in cowpea.

Table 1: Phenotypic correlation between seed yield & yield attributing traits in cowpea over environments

Traits	DFH	DFF	DM	TLL	TLW	NMB	NNMS	NPPP	PPC	CPP	PiL	PPP	PL	PH	FPW	SPP	SI	BYPP	HI	SYPP
DFH	1.00	0.99**	0.32*	-0.23	-0.51**	-0.30*	0.17	0.16	-0.03	-0.52**	0.36*	-0.59**	0.08	0.54**	-0.22	-0.03	-0.51**	-0.52**	-0.16	-0.51
DFF		1.00	0.32*	-0.23	-0.50**	-0.30*	0.17	0.16	0.01	-0.53**	0.36*	-0.60**	0.08	0.54**	-0.22	-0.04	-0.50**	-0.52**	-0.17	-0.52
DM			1.00	-0.18	0.14	0.32	0.25	-0.01	-0.24	0.26	0.01	-0.10	0.34*	-0.33*	0.00	-0.15	-0.10	-0.17	0.19	-0.15
TLL				1.0	0.38**	-0.08	-0.34*	-0.21	0.16	0.07	0.36*	0.13	-0.43**	-0.48**	-0.07	0.30*	0.30*	0.34*	-0.06	0.34
TLW					1.00	0.53**	-0.24	-0.12	0.03	0.56**	-0.38**	0.62**	-0.08	-0.64**	-0.17	0.47**	0.66**	0.79**	0.15	0.79
NMB						1.00	0.15	-0.13	-0.19	0.57**	-0.31*	0.38*	0.01	-0.22	0.03	0.64**	0.14	0.57**	-0.07	0.54
NNMS							1.00	0.04	0.05	0.03	-0.11	-0.06	0.30*	0.02	0.15	-0.03	-0.24	-0.10	-0.23	-0.11
NPPP								1.00	0.42**	-0.02	-0.04	0.19	0.45**	0.24	-0.11	-0.12	-0.17	-0.04	0.09	-0.02
PPC									1.00	-0.16	-0.14	0.37*	0.34*	0.09	-0.19	-0.03	-0.02	0.20	0.09	0.22
CPP										1.00	-0.34*	0.64**	0.34*	-0.69**	0.25	0.44**	0.10	0.56**	0.34*	0.59
PiL											1.00	-0.52**	-0.49**	0.08	0.25	-0.13	-0.18	-0.41**	-0.02	-0.40
PPP												1.00	0.41**	-0.52**	0.16	0.34*	0.32*	0.81**	0.36*	0.83
PL													1.00	-0.01	-0.06	-0.05	-0.28	0.10	0.25	0.13
PH														1.00	-0.26	-0.25	-0.42**	-0.57**	-0.36*	-0.58
FPW															1.00	-0.12	0.01	0.01	0.27	0.00
SPP																1.00	0.05	0.69**	0.04	0.68
SI																	1.00	0.56**	0.06	0.54
BYPP																		1.00	0.22	0.99
HI																			1.00	0.28
SYPP																				1.00

* & ** indicate level of significant at 5% and 1%, respectively

Note: DFH- Days to 50% Heading, DFF- Days to 50% Flowering, DM- Days to Maturity, TLL-Terminal Leaf length(cm), TLW-Terminal Leaf width (cm), NMB- No. of Main branches, NNMS- No. of node on Main stem, NPPP- No. of pods per peduncle, PPC- pod/cluster, CPP- cluster/plant, PiL- peduncle length, PPP-pod/plant, PL- pod length, PH-plant height (cm), FPW- fresh pod weight, SPP- seeds /pod, SI- seed index, BYPP- Biological yield per plant, HI- harvest index and SYPP- Seed yield per plant

Table 2: Genotypic Correlation between seed yield & yield attributing traits in cow pea over environments

Traits	DFH	DFF	DM	TLL	TLW	NMB	NNMS	NPPP	PPC	CPP	PiL	PPP	PL	PH	FPW	SPP	SI	BYPP	HI	SYPP
DFH	1.00	1.00	0.33	-0.24	-0.55	-0.33	0.30	0.36	0.00	-0.55	0.37	-0.60	0.09	0.55	-0.24	-0.03	-0.52	-0.53	-0.18	-0.52
DFF		1.00	0.33	-0.24	-0.55	-0.33	0.31	0.35	0.01	-0.56	0.37	-0.61	0.08	0.55	-0.24	-0.04	-0.51	-0.53	-0.20	-0.53
DM			1.00	-0.20	0.15	0.04	0.37	-0.05	-0.39	0.29	0.02	-0.60	0.35	-0.34	-0.01	-0.15	-0.10	-0.18	0.23	-0.16
TLL				1.00	0.43	-0.09	-0.61	-0.32	0.25	0.10	0.39	-0.61	-0.45	-0.51	-0.05	0.33	0.31	0.36	-0.05	0.37
TLW					1.00	0.55	-0.37	-0.23	0.04	0.64	-0.42	-0.10	-0.01	-0.68	-0.19	0.50	0.70	0.85	0.19	0.85
NMB						1.00	0.23	-0.29	-0.31	0.61	-0.34	0.14	0.02	-0.23	0.03	0.69	0.17	0.61	-0.09	0.59
NNMS							1.00	-0.04	-0.18	-0.03	-0.18	0.67	0.48	0.05	0.14	-0.02	-0.38	-0.18	-0.27	-0.19
NPPP								1.00	0.99	-0.03	-0.11	0.40	0.77	0.43	-0.14	-0.21	-0.30	-0.05	0.22	0.00
PPC									1.00	-0.09	-0.20	-0.14	0.51	0.13	-0.42	0.04	-0.09	0.30	0.01	0.33
CPP										1.00	-0.37	0.33	0.36	-0.74	0.29	0.46	0.12	0.62	0.55	0.65
PiL											1.00	0.55	-0.50	0.09	0.29	-0.14	-0.18	-0.41	-0.04	-0.41
PPP												1.00	0.42	-0.53	0.16	0.35	0.33	0.82	0.42	0.84
PL													1.00	-0.02	-0.07	-0.06	-0.29	0.11	0.30	0.14
PH														1.00	-0.29	-0.26	-0.43	-0.58	-0.44	-0.59
FPW															1.00	-0.13	0.00	-0.01	0.32	-0.01

SPP															1.00	0.06	0.70	0.05	0.69
SI																1.00	0.57	0.04	0.55
BYPP																	1.00	0.25	1.00
HI																		1.00	0.29
SYPP																			1.00

* & ** indicate level of significant at 5% and 1%, respectively

Conclusion
The magnitude of genotypic correlation was higher than phenotypic correlation for all the traits that indicated inherent association between various characters. In the present findings significant positive phenotypic correlation seed yield per plant was observed with biological yield number of pods per plant indicating that these characters should be given top priority during selection breeding for improvement in cowpea.

References
1. Kutty CN, Miti R, Jaikumaran U. Correlation and path coefficient analysis vegetable cowpea [*Vigna unguiculata* (L.) Walp.]. Indian Journal of Horticulture. 2003; 60(3):257-261
2. Johnson HW, Robinson HF, Comstock RF. Estimation of genetic environmental variability in soybean. Agronomy Journal. 1955; 47:314-318.
3. Patel UV, Parmar VK, Patel PB, Malviya AV. Correlation and path analysis study in cowpea (*Vigna unguiculata* (L.) Walp). International Journal of Science, Environment and Technology, 2016; 5(6):3897-3904
4. Pal T, Rahim MA. Mia AA, Mahmud F, Afrin KS. Multivariate analysis in some Cowpea (V*igna unguiculata* L. Walp) accessions on the basis of agronomic traits. Int. J of Agri. En. and Biot. 2004; 2(3):230-234.
5. Saini MA, Mia AA, Mahmud F, Afrin KS. Multivariate analysis in some Cowpea (*Vigna unguiculata* L. Walp) accessions on the basis of quantitative traits. Int. J. of Agri. En. and Biot., 2007;2(3):230-234.
6. Pathak S, Jamwal RS. Variability and correlations for economic traits in powdery mildew resistant genotypes of garden pea (*Pisum sativum* L.). Himachal Journal of Agricultural Research. 2002; 28(1, 2):34-39.
7. Sapara GK, Javia RM. Correlation and Path analysis in vegetable cowpea (*Vigna unguiculata* (L.)). International Journal of Plant Sciences. 2014; 9(1):138-141.
8. Venkatesan M, Prakash M, Ganesan J. Correlation and path analysis in cowpea [*Vigna unguiculata* (L.) Walp.]. Legume Research. 2003; 26(2):105-108.
9. Lal H, Rai M, Karan S, Verma A, Ram D. Multivariate hierarchical clustering of cowpea germplasm [*Vigna unguiculata* (L) Walp.]. Acta Horticulture. 2007; 21(2):413-416.
10. Sharma A, Sood M, Rana A, Singh Y. Genetic variability and association studies for green pod yield and component horticultural traits in garden pea under high hill dry temperate conditions. Indian Journal of Horticulture. 2007; 64(4):410-414.
11. Thorat A, Gadewar RD. Variability and correlation studies in cowpea [*Vigna unguiculata* (L.) Walp.] International Journal for Environmental Rehabilitation and conservation. 2013; 4(1):4449 View publication stats
12. Kumawat KC, Raje RS. Association analysis in cowpea [(*Vigna unguiculata* (L.)Walp.] J arid legume.2005; 2(1):47-49,
13. Kalambe AS, Wankhade MP, Deshmukh JD, Chavan BR, Shinde AV. Correlation studies in cowpea (*Vigna unguiculata* L.) Journal of Pharmacognosy and Phytochemistry. 2019; 8(3):321-323.