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Original Research Article

Correlation Analysis on Yield Components of Cowpea Genotypes (*Vigna unguiculata* L. Walp)

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Abstract: Crop enhancement programs mostly depends on the genetic variability and the heritability of desirable traits for a successful breeding program. The degree and type of genetic variability aid the breeder in deciding the selection benchmarks and breeding schemes to be used for improvement purposes. This research was carried out at the Nasarawa State University, Faculty of Agriculture Teaching and Research Farm, to study the inter-relationships among ten (10) designated traits of cowpea comprising, plant height, Plant weight, number leaves per plant, number of branches, no. of pods per plant, number of seeds per plant, number of root noodles, weight of biomass, weight of pod, and 100-seed weight. Results from this study indicated the significance among the studied traits. The study indicates the magnitude of correlation coefficient among the studied traits. The positive correlation among most of the traits indicates the presence of strong relationship among them due to preponderance of genetic variance and genetic factors in the expression of traits. The result of grain yield showed high significant and positive correlation with plant weight, no of leave per plant, number of seeds per pod, weight biomass, seeds weight, and plant height which indicates that the traits are important in the improvement of cowpea yield through direct selection.

Keywords: Correlation, cowpea, genetic, traits, gene.

INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp) is among one of the most important crop grown widely in Africa. It helps in fixing atmospheric nitrogen through its root nodules, and it can be grown in various types of soils including malnourished soils with less than 0.2% organic matter with more than 85% sand with low levels of phosphorus which makes it an important crop for desert areas (Singh *et al.,* 2003; Obatolu V, 2003). Cowpea are mostly grown for its edible beans, the green peas pod, leaves, can also be consumed before harvest of the drier peas (Ehlers and Hall, 1997) (Dadson R *et al.,* 2005; Fabunmi T, *et al.,* 2012). Cowpea is an important source of food for both humans and live stocks. In India the stock of cowpea is fed as forage (Singh *et al.,* 1997). Nigeria and Niger account for 66% of the cowpea produced worldwide (FAO, 2012). Cowpea play an essential role in livestock fodder and subsistence farming, Central and West Africa farmers sees it as a major cash crop, on daily basis 200 million people consume cowpea (Langyhituo A, *et al.,* 2003).

Cowpea is a drought tolerant food legumes that is been grown mostly in the drier region of the world (Dadson R, *et al.,* 2005; Fabunmi T, *et al.,* 2012). Yield is a complex trait that is being influenced by genetic and environmental factor thus making improvement in cowpea traits a slow process (Fana S, *et al*., 2004; Mir R, *et al.,* 2012).

Correlation studies provide reliable information on the nature, extent and direction for the selection of high yielding genotypes. The knowledge of correlation between different yield attribute helps the cowpea breeder to find out the nature and magnitude of the association between these traits which are mostly used to attain better crop yield. (Jogdhande S, *et al.,* 2017)

The objective of the enquiry was to evaluate the nature, extent and direction of correlation among the 10 traits of the nine genotype studied for yield and yield component to enhance selection gain in cowpea.

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MATERIALS AND METHODS

The research was conducted at the Nasarawa State University, Faculty of Agriculture Teaching and Research Farm, Lafia, Nigeria during 2021 and 2022 growing season. Nine genotypes were used for the experiment. The genotypes where sourced from the seed unit of Molecular Biology Laboratory, University of Agriculture, Makurdi. The field was laid out in a Randomized complete block design with three replications in a 5m double rows plot using 0.3 and 0.75 intra and inter row spacing respectively. Three seeds were sown and later thin to two per stand two weeks after sowing. All agronomic best practices were carried out. Observations were carried out for grain yield, days to 50% flowering, Plant height, Number of leaves per plant, Number of root noodles, Number of seeds per pod, Number of branches, plant weight, weight of biomass, 100-seed weight were recorded.

The data were subjected to analysis of variance using GenStat Statistical package (2018) to obtain the genetic variances and correlations among measured traits. Differences between the mean values were tested using F test and separated using LSD at 5% level of probability. Pearson correlation coefficient was used to determine the relationship between the studied traits.

RESULTS AND DISCUSSION

The result indicates significance difference among the trait studied. Number of branches per plant (NB), plant weight (PWT), number of seeds per plant (NSP), number of root noodles (NRN), weight of biomass (WB), one hundred seed weight (SW), grain yield (GY), and plant height recorded significant difference at 5% level of probability while number of leaves per plant (NLP) and days to 50% flowering (DF) shows no significance difference at 5% level of probability as presented in Table 1. Sampea 19 recorded the highest yield value of 2.85 tons per hectare while Sampea 17 recorded the least yield of 1.26 tons per hectare. Correlation coefficients between each trait are presented in Table 2. The positive significant correlation observe among the traits will make selection and improvement of desirable traits easy (Meena H, *et al.,* 2015). Allard R, (1999); Falconer and Mackay (1996) suggest that the genetic association may result from Pleiotropic, linkage, disequilibrium and epistatic effects of different genes or due to influence of environment.

Table 1: Means, Standard Deviation, Coefficient of Variation, Standard Error of Mean of measured parameters of Cowpea

Genotype	DF	PHT	NB	PWT	NLP	NSP	NRN	WB	SW	GY
F-3	42.00	12.25	5.50	1.40	9.05	7.30	50.20	10.00	20.00	283.60
CLS 3911-3	46.00	11.00	12.00	0.80	9.00	6.80	48.10	8.92	18.00	235.40
SAM-14	47.00	13.25	17.50	0.90	10.25	7.00	51.00	7.00	18.50	263.50
U 15118-5	46.00	12.00	5.75	1.00	11.38	7.10	52.00	8.00	17.00	244.80
SAM-18	53.00	8.18	8.75	0.80	8.50	6.00	47.00	6.80	15.00	167.60
SAM-17	47.00	9.38	12.50	0.82	8.50	6.10	46.50	6.90	14.80	125.70
FU-1	50.00	15.50	19.25	0.70	10.00	6.00	40.30	7.00	14.40	151.30
SAM-19	53.00	18.25	11.75	1.50	10.80	7.80	42.40	11.00	21.00	284.90
U 126L27	44.00	10.86	7.00	0.95	9.33	6.50	45.00	8.50	16.00	278.80
MEAN	47.56	12.30	11.11	0.99	9.65	6.73	46.94	8.24	17.19	226.18
SD	3.56	2.90	4.63	0.26	0.96	0.60	3.69	1.42	2.22	58.19
CV	0.08	0.25	0.44	0.28	0.11	0.09	0.08	0.18	0.14	0.27
SEM	1.13	0.92	1.46	0.08	0.30	0.19	1.17	0.45	0.70	18.40
F-test	NS	*	*	*	NS	*	*	*	*	*

KEYS: *; Significance at 5%, **SD**: Standard Deviation, **CV**: Coefficient of Variation, **SEM**: Standard Error of Mean, **DF**: Days to 50% flowering, **PHT**: Plant height, **NB**: Number of branches per plant, **PWT**: Plant weight, **NLP**: Number of leaves per plant, **NSP**: Number of seeds per plant, **NRN**: Number of root noodles, **WB**: weight of biomass, **SW**: one hundred seed weight, **GY**: grain yield.

Table 2: Pearson Correlation Coefficient among 10 (Ten) studied traits of Cowpea

Traits	NB	PWT	NLP	NSP	NRN	WB	SW	DF	GY	PHT
NB	1	-	-	-	-	-	-	-	-	-
PWT	-0.43*	1	-	-	-	-	-	-	-	-
NLP	0.084	0.33	1	-	-	-	-	-	-	-
NSP	-0.28	0.86**	0.59*	1	-	-	-	-	-	-
NRN	-0.44*	0.06	0.06	0.28	1	-	-	-	-	-
WB	-0.40*	0.88**	0.26	0.83**	-0.08	1	-	-	-	-
SW	-0.21	0.85**	0.38*	0.96**	0.26	0.84**	1	-	-	-
DF	0.40*	-0.08	0.13	-0.14	-0.55*	-0.13	-0.14	1	-	-
GY	-0.40*	0.70**	0.44*	0.84**	0.32	0.73**	0.82**	-0.37*	1	-
PHT	0.40*	0.52*	0.69**	0.59*	-0.45*	0.53*	0.54*	0.29	0.38*	1

Key: *: Significant, ****:** Highly Significant, **NB**: Number of branches per plant, **PWT**: Plant weight, **NLP**: Number of leaves per plant, **NSP**: Number of seeds per plant, **NRN**: Number of root noodles, **WB**: weight of biomass, **SW**: one hundred seed weight, **DF**: Days to 50% flowering, **GY**: Grain yield. **PHT**: Plant height.

The result of grain yield showed high significant and positive correlation with plant weight, no of leave per plant, number of seeds per pod, weight biomass, seeds weight, and plant height which indicates that the traits are important in the improvement of cowpea yield through direct selection as these results agrees with the findings of Walle T, *et al.,* (2018) Mahesh S, *et al.,* (2016); Manggoel W, *et al.,* 2012). However, grain yield recorded negative significance correlation with number of branches and days to 50% flowering, this is in agreement with the findings of T. wallet et al. traits like plant weight, number of leaves per plant, number of seed per pod, weight biomass, seed weight and plant height are highly and positively correlated with yield which indicate the extent of which corresponding traits are under the influence of same set of genes having a physiological basis for their expression. This result corroborates with the findings of Walle T, *et al.,* (2018); Sanjay and Anil, (2009); Manggoel W, *et al.,* (2012); Oyiga B, *et al.,* (2010); Thakur N, *et al.,* (2018); Iqbal S, *et al.,* (2003); Dinesh H, *et al.,* (2017); Kaveris B, *et al.,* (2007) who also reported high positive and significant correlation between yield and seed weight, seed per pod, and number of pod per plant. Weight of biomass recorded high and positively significant correlation with plant weight and number of seed per pod this is in agreement with the findings of Manisha R, *et al.,* (2018) who also reported positive correlation with the number of seed per pod. However, weight of biomass is negatively correlated with the number of branches. Plant height recorded high and significant correlation with number of branches, plant weight, number of leave per plant, number of seed per plant, weight biomass, seed weight and grain yield this agrees with the findings of Bhagwati *et al.,* (2017) positive correlation for plant height and number of seeds per plant, and weight biomass. However, plant height is negatively correlated with number of root noodles. Seed weight recorded high and significant correlation with plant weight, number of seeds per pod, number of root noodles and weight biomass.

CONCLUSION

The positive correlation among most of the traits indicates the presence of strong association among the traits due to preponderance of genetic variance and genetic factors in the expression of traits. This indicates that direct selection based on the studied traits can be taken advantage of in cowpea improvement program.

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