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Study on genetic variability heritability and correlation studies in cowpea (*Vigna unguiculata* L. Walp.)

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Abstract

The present investigation entitled “Study on genetic variability heritability and correlation studies in cowpea (*Vigna unguiculata* L. Walp.)” was conducted at Research field, Department of Horticulture, SHUATS, Prayagraj. (U.P) during Rabi season of 2020-2021. The soil of experimental plot was sandy loam in texture nearly neutral in soil reaction (pH6.7). The experiment was conducted in randomized block design (RBD), consisting of 33 treatments combinations with 3 replications and was allocated randomly in each replication which consists of 33 genotypes. The result concluded that out of tested thirty-three genotypes. The IC257407 was recorded maximum plant height (At flowering) (165.98 cm), plant height (Maturity) (181.94), number of nodes on main stem (20.42), minimum days to first pod formation, minimum days to first flowering, minimum days to 50% flowering and minimum days to 50% maturity was recorded in IC243501. Maximum number of peduncles per plant (31.72), number of pods per peduncle (6.64), number of pods per plant (76.53), Dry pod weight (3.44 g), pod length (22.40 cm), number of seeds per pod (16.98), number of seeds per plant (1002.61), seed weight per plant (152.29g), test weight (176.83g), TSS (15.44%), protein content (28.51%), pod yield (9836.44 kg/ha) was also recorded in IC253276.

Keywords: Genotypes, growth, yield, genetic variability, heritability, correlation

Introduction

Cowpea (*Vigna unguiculata* (L.) Walp.) Has great genetic variability that makes it versatile; hence, it is used for several purposes and production systems. The sub species *sesquipedalis* widespread in the humid tropics of India (Verdcourt, 1970). Seed is widely traded out of the major production areas, it provides a cheap and nutritious food for relatively poor urban communities (Singh and Sharma, 1997) [35].

Material and Methods

The present research work was undertaken to study the variability, heritability, genetic advance, and correlation and their effect on yield and yield contributing traits on 33 genotypes of Cowpea was conducted in the Department of Horticulture, SHUATS.

Details & Design of experiment

The experiment was laid out in Randomized Block Design (RBD) with three replications and the data were analyzed accordingly.

Results

The mean squares and genetic parameters estimates of the 10 cowpea accessions averaged over two growing seasons are presented in Table 1. The analysis of variance showed that the mean squares for the accessions were highly significant for all traits measured. The phenotypic variance was partitioned into heritable (genotypic variance) and non heritable (environmental variance) components. Generally, the phenotypic variance was higher than the genotypic variance in all the traits studied. The magnitude of the genotypic variance for all the yield traits were however higher than the environmental variance (Table1).

The maximum plant height at flowering was observed in the genotype IC257407 (165.98cm) followed by IC 202709 (155.89cm) whereas the minimum plant height was observed in IC 253276 (50.14cm) genotype. The tallest plant genotype at maturity was IC 202707(181.91 cm) followed by the genotype IC 202709 (173.43 cm).

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Where as IC 253276 (69.93 cm) genotype was the shortest plant genotype among 33 cowpea genotypes under study. The maximum number of nods on main stem was found in the genotype IC 202709 (20) followed by IC 259063 (20) and the minimum number of nods on main stem was found in the genotype IC 20561 (11) with the mean value of 16 nods on main stem. It ranged from 11 to 20 nods on main stem.

The minimum days to first pod formation was observed in the genotype IC 259104 (33 days) followed by IC 243501 (34 days) with the mean of 39 days among 33 genotypes studied. Whereas, maximum number of days to first pod formation was observed in the genotype IC 20514 (44 days). Among 33 genotypes studied the minimum days to first flowering was observed in the genotype IC 259104 (30 days) followed by IC 333208, IC 58905 (31 days) with the mean of 39 days among 33 genotypes studied. Whereas, the maximum number of days to first flowering was observed in the genotype IC 219594 (41 days).

At phenotypic level, plant height at flowering was found to be highly positive and significant correlation with plant

height at maturity (0.953) followed by pod yield (0.319), protein (0.251).

Correlation studies

The study of the interrelation between several characters in the form of correlation is one of the very important aspects in the genetic improvement of plants, so that the breeder is very efficient in selections based on correlation and uncorrelated responses (Agrawal *et al.*, 2018). The values of the genotypic correlations (rG) (Table 3(b)) had the same tendency and superior to the phenotypic correlations (rF) (Table 3(a)), which indicated that the relationship between the variables was based on additive genetic effects. Preliminary results have been reported by Andrade *et al.* (2010) and Silva *et al.* (2014) in cowpea beans and by Agrawal *et al.* (2018) in chickpeas, who argued that phenotypic selection can be efficient. Phenotypic and genotypic associations were carried out for all traits under study to reveal the association of pod yield/hectare with other yield causative traits and displayed in table 3(a and b) respectively.

Table 1(a): Mean performance of various genotypes under study in cowpea

12	Genotypes	Plant height (At flowering)	Plant height (Maturity)	Number of nodes on main stem	Days to first Pod formation	Days to first flowering	Days to 50% flowering	Days to 50% maturity	Number of peduncles per plant	Number of pods per peduncle	Number of pods per plant
1	IC 202835	123.48	140.04	16.51	39.35	34.43	41.53	58.76	16.08	3.57	36.91
2	IC 202791	110.19	128.36	13.88	41.09	37.03	46.51	65.32	19.43	3.17	44.55
3	IC 202881	85.29	101.76	18.79	36.52	32.16	51.92	67.84	22.53	3.37	51.73
4	IC 202799	64.25	80.00	11.49	41.86	39.18	41.72	60.09	15.29	3.97	35.72
5	IC 257446	131.67	150.13	14.06	36.85	33.25	40.86	59.19	26.10	4.37	57.59
6	IC 259063	88.62	105.72	20.31	36.08	34.36	47.26	62.89	28.44	3.10	39.60
7	IC 39853	79.82	96.77	15.84	38.33	35.92	52.65	69.39	13.66	5.37	63.11
8	IC 259106	100.50	118.37	11.88	34.46	33.25	45.73	64.68	17.09	4.96	69.44
9	IC 199701	142.96	141.90	16.94	42.31	37.18	48.82	63.94	24.38	5.30	30.86
10	IC 20561	96.58	113.20	11.05	41.70	37.47	40.97	59.35	20.66	4.70	37.63
11	IC 259071	133.88	150.69	15.47	40.57	38.78	45.37	62.51	16.53	4.30	65.82
12	IC 39911	95.54	114.75	19.53	43.74	39.19	49.23	67.39	29.33	5.23	76.53
13	IC 202827	152.32	170.58	13.79	41.60	37.46	44.75	66.25	15.45	3.30	46.66
14	IC 333208	64.26	83.58	13.39	35.67	31.88	51.36	69.35	22.61	6.64	72.29
15	IC 219574	123.17	140.41	20.22	42.64	37.68	46.07	65.66	19.62	3.96	35.63
16	IC 202707	87.14	106.74	12.14	35.85	34.06	52.37	70.33	25.77	5.10	39.81
17	IC 253277	69.30	89.69	17.89	41.12	39.59	44.89	61.29	29.86	3.83	38.90
18	IC 243501	113.03	130.49	19.58	33.79	32.38	41.82	56.51	30.92	5.30	70.63
19	IC 202709	155.89	173.43	20.42	36.95	32.99	52.28	70.62	14.84	5.17	52.99
20	IC 202854	107.66	123.54	11.36	38.39	36.27	46.03	63.31	28.90	4.83	49.85
21	IC 259104	94.90	112.64	16.93	33.30	30.07	40.79	56.96	23.58	5.03	56.25
22	IC 257407	165.98	181.94	18.73	37.18	34.73	45.43	65.17	31.72	3.23	66.21
23	IC 253273	152.75	172.15	12.77	42.39	37.97	50.76	69.58	25.45	3.83	74.10
24	IC 20514	67.78	87.60	19.66	43.85	39.95	49.97	67.76	18.18	4.57	63.52
25	IC 253276	50.14	69.93	14.92	38.91	38.17	47.71	65.02	23.55	5.03	32.98
26	IC 202918	86.37	102.48	12.49	37.19	34.50	46.73	64.36	25.83	4.83	39.18
27	IC 202926	74.63	95.08	14.35	40.57	38.06	51.60	69.28	17.58	3.70	33.71
28	IC 259085	97.97	114.12	20.14	36.50	32.85	50.17	67.44	20.57	3.90	65.28
29	IC 202821	106.57	125.53	11.42	42.21	39.39	51.59	70.12	28.35	3.77	36.09
30	IC 58905	55.69	73.04	15.74	34.69	32.00	46.28	63.91	30.99	3.37	60.71
31	IC 253281	115.56	134.58	18.30	40.70	39.38	45.07	61.78	16.97	3.79	66.36
32	IC 214751	133.95	152.78	19.64	43.19	42.99	52.78	71.03	25.57	4.76	40.83
33	IC 219594	121.10	138.07	14.79	43.18	40.84	50.53	71.02	13.05	3.25	54.34
	Mean	104.51	121.82	15.89	39.17	36.22	47.32	65.09	22.39	4.32	51.69
	CV	8.67	6.50	7.89	7.07	7.93	8.34	7.21	7.32	6.88	7.69
	S.Em±	5.23	4.57	0.72	1.60	1.66	2.28	2.71	0.95	0.17	2.30
	C.D.(0.05%)	14.79	12.92	2.05	4.52	4.68	6.44	7.65	2.67	0.48	6.48
	Minimum	50.14	69.93	11.05	33.30	30.07	40.79	56.51	13.05	3.10	30.86
	Maximum	165.98	181.94	20.42	43.85	42.99	52.78	71.03	31.72	6.64	76.53

Table 1(b): Mean performance of various genotypes under study in cowpea

Sl. No.	Genotypes	Dry pod weight (g)	Pod length (cm)	Number of seeds per pod	Number of seeds per plant	Seed weight per plant (g)	Test weight (g)	TSS (%)	Protein content (%)	Pod yield (Kg/ha)
1	IC 202835	3.06	22.40	15.01	561.56	58.66	133.99	14.19	25.96	6126.34
2	IC 202791	2.42	19.17	16.89	426.10	35.54	145.76	13.11	25.32	5558.49
3	IC 202881	3.12	19.17	13.99	683.16	63.70	128.25	13.04	26.23	8838.09
4	IC 202799	2.72	16.14	12.69	755.36	68.06	149.89	14.35	24.48	5079.14
5	IC 257446	2.92	21.07	13.69	886.08	97.07	154.94	14.78	26.94	7351.68
6	IC 259063	2.32	16.37	12.03	467.53	53.33	152.73	13.97	28.51	6117.46
7	IC 39853	2.86	20.46	11.81	989.24	126.84	139.18	14.45	25.90	8119.00
8	IC 259106	1.78	18.02	16.30	739.43	84.95	130.04	15.17	27.12	8004.07
9	IC 199701	2.91	17.32	15.15	359.73	29.41	172.09	14.33	25.71	5567.46
10	IC 20561	2.38	20.79	11.54	877.06	68.75	174.74	12.77	23.53	5770.39
11	IC 259071	2.60	19.01	13.17	955.36	135.08	126.44	13.01	25.77	8455.66
12	IC 39911	2.32	16.40	11.32	459.85	49.80	157.15	14.93	27.44	7883.79
13	IC 202827	3.18	18.75	14.81	1002.36	152.09	136.74	15.44	24.77	8570.74
14	IC 333208	2.21	22.00	14.36	532.00	66.32	158.28	12.32	27.07	8262.29
15	IC 219574	2.88	17.16	12.60	599.79	95.22	176.83	12.95	23.90	6430.59
16	IC 202707	2.32	19.90	14.43	780.07	76.44	142.46	13.10	26.07	6146.21
17	IC 253277	2.67	21.50	13.35	1002.61	152.29	130.74	13.85	24.94	5241.22
18	IC 243501	2.63	18.08	12.04	385.65	34.51	131.71	13.25	24.12	8434.85
19	IC 202709	2.87	17.02	13.98	656.21	85.65	145.59	14.37	23.67	9205.89
20	IC 202854	2.33	19.09	11.99	845.23	102.41	147.44	12.85	26.17	7402.44
21	IC 259104	3.10	20.70	14.18	679.24	61.11	129.17	14.33	24.87	7197.39
22	IC 257407	2.70	19.93	11.72	937.39	125.91	131.50	13.21	26.85	9524.15
23	IC 253273	2.83	17.12	13.06	741.04	76.25	133.86	14.16	24.17	9644.38
24	IC 20514	2.84	16.99	12.15	412.14	47.30	141.46	14.94	26.34	9039.42
25	IC 253276	3.38	16.45	16.98	666.94	108.00	139.71	14.10	24.09	9836.44
26	IC 202918	3.18	18.15	16.25	624.21	129.16	135.69	13.31	24.82	6236.84
27	IC 202926	2.78	20.15	12.17	551.04	85.37	154.59	14.08	25.95	6125.35
28	IC 259085	2.34	22.34	15.87	985.13	96.95	137.39	14.75	24.18	7944.15
29	IC 202821	3.04	19.23	16.78	924.82	87.08	155.60	15.27	26.92	8061.48
30	IC 58905	2.44	20.63	14.65	373.17	31.68	135.35	14.10	25.89	7261.79
31	IC 253281	2.69	18.14	11.96	352.49	28.48	127.19	13.52	25.08	7224.74
32	IC 214751	3.44	21.95	16.51	842.77	98.45	134.03	14.66	23.41	9118.84
33	IC 219594	3.03	18.91	16.50	572.20	84.35	152.06	15.16	23.41	8252.47
	Mean	2.74	19.11	13.94	685.67	81.70	143.72	14.00	25.44	7516.16
	CV	7.75	7.61	7.25	7.35	8.23	8.10	6.76	5.70	7.78
	S.Em±	0.12	0.84	0.58	29.09	3.88	6.72	0.55	0.84	337.40
	C.D.(0.05%)	0.35	2.37	1.65	82.18	10.97	18.99	1.54	2.37	953.24
	Minimum	1.78	16.14	11.32	352.49	28.48	126.44	12.32	23.41	5079.14
	Maximum	3.44	22.40	16.98	1002.61	152.29	176.83	15.44	28.51	9836.44

Table 2(a): Estimation of genetic parameters related to yield and yield contributing traits in cowpea

Genetic Parameters										
	Plant height (At flowering)	Plant height (Maturity)	Number of nodes on main stem	Days to first pod formation	Days to first flowering	Days to 50% flowering	Days to 50% maturity	Number of peduncles per plant	Number of pods per peduncle	Number of pods per plant
Var Environmental	82.16	62.77	1.57	7.67	8.25	15.59	22	2.69	0.09	15.81
ECV	8.67	6.5	7.89	7.07	7.93	8.35	7.21	7.32	6.87	7.69
Var Genotypical	923.27	878.94	9.42	7.51	7.11	9.75	10.52	31.27	0.7	198.72
GCV	29.07	24.34	19.31	7	7.36	6.6	4.98	24.97	19.36	27.27
Var Phenotypical	1005.43	941.71	10.99	15.18	15.36	25.34	32.52	33.95	0.79	214.53
PCV	30.34	25.19	20.86	9.95	10.82	10.64	8.76	26.02	20.54	28.34
h2 (Broad Sense)	91.83	93.33	85.69	49.48	46.31	38.48	32.34	92.09	88.8	92.63
Genetic Advancement 5%	59.98	59	5.85	3.97	3.74	3.99	3.8	11.05	1.62	27.95
Gen. Adv as % of Mean 5%	57.39	48.43	36.83	10.14	10.32	8.43	5.84	49.37	37.57	54.07

Table 2(b): Estimation of genetic parameters related to yield and yield contributing traits in cowpea

	Dry pod weight (g)	Pod length (cm)	Number of seeds per pod	Number of seeds per plant	Seed weight per plant (g)	Test weight (g)	TSS (%)	Protein content (%)	Pod yield (Kg/ha)
Var Environmental	0.05	2.11	1.02	2538.22	45.19	135.47	0.9	2.1	341522.95
ECV	7.75	7.61	7.25	7.35	8.23	8.1	6.76	5.7	7.78
Var Genotypical	0.12	2.86	2.99	44486.38	1188.63	144.71	0.41	1.03	1798311.93
GCV	12.77	8.85	12.42	30.76	42.2	8.37	4.58	3.99	17.84
Var Phenotypical	0.17	4.97	4.02	47024.6	1233.82	280.18	1.31	3.14	2139834.88
PCV	14.93	11.67	14.38	31.63	42.99	11.65	8.17	6.96	19.46
h2 (Broad Sense)	73.06	57.48	74.58	94.6	96.34	51.65	31.43	32.89	84.04
Genetic Advancement 5%	0.62	2.64	3.08	422.6	69.71	17.81	0.74	1.2	2532.46
Gen. Adv as % of Mean 5%	22.48	13.82	22.09	61.63	85.32	12.39	5.29	4.72	33.69

Table 3(a): Phenotypic correlation matrix among various traits in thirty-three cowpea genotypes

	Plant height (at flowering)	Plant height (maturit y)	No of nodes on main stem	Days to first pod formatio n	Days to first flowerin g	Days to 50% flowerin g	Days to 50% maturity	No of peduncles per plant	No of pods per peduncle	No of pods per plant	Dry pod weight (g)	Pod length (cm)	No of seeds per Pod	No of seeds per plant	Seed weight per plant (g)	Test weight (g)	TSS (BRIX°)	Protein content (%)	Pod yield (kg/ha)
X1	1.0000																		
X2	0.953**	1.0000																	
X3	0.1400	0.1589	1.0000																
X4	0.1686	0.1870	0.0178	1.0000															
X5	0.0644	0.0940	-0.0521	0.537**	1.0000														
X6	-0.0674	-0.0378	0.1068	0.1601	0.0808	1.0000													
X7	0.0662	0.0663	0.0059	0.1418	0.263*	0.532**	1.0000												
X8	-0.0738	-0.0676	0.0885	-0.217*	-0.1368	-0.0759	-0.1336	1.0000											
X9	-0.1849	-0.199*	-0.0859	-0.1723	-0.1263	0.0816	0.0191	0.0570	1.0000										
X10	0.1234	0.1598	0.1745	-0.208*	-0.1900	0.0415	0.0354	0.0676	0.203*	1.0000									
X11	0.1650	0.1707	0.1615	0.1835	0.1956	0.0081	0.0661	-0.1156	-0.1151	-0.365**	1.0000								
X12	-0.0182	-0.0227	-0.0402	-0.199*	-0.0919	-0.0639	0.0415	0.0720	0.0131	0.0274	0.0070	1.0000							
X13	0.0214	-0.0075	-0.199*	-0.0295	-0.0239	0.1529	0.1777	-0.0883	-0.0539	-0.263*	0.237*	0.1660	1.0000						

X14	0.1929	0.221*	-0.251*	0.0230	0.0708	0.0019	0.1128	-0.0479	-0.0566	-0.0651	0.0923	0.310*	0.0478	1.0000					
X15	0.0091	-0.0526	-0.1023	0.232*	0.1113	-0.0229	-0.0064	-0.0304	0.1584	-0.315*	-0.0772	-0.0940	-0.0714	-0.1404	1.0000				
X16	0.0277	0.0826	0.0928	0.0902	0.1343	0.1460	0.1342	-0.1821	-0.1390	0.0135	0.1525	-0.1322	0.1577	0.1014	-0.1049	1.0000			
X17	-0.1111	-0.1454	-0.0057	-0.1639	-0.1036	-0.0124	0.0069	0.243*	0.0038	0.1580	-0.331**	0.0266	-0.1152	-0.0750	0.0275	0.0144	1.0000		
X18	0.251*	0.284*	0.1971	-0.0444	0.0325	0.286*	0.270*	0.0343	0.1337	0.534**	0.1885	-0.0439	0.0745	0.1537	-0.299*	0.1080	-0.0515	1.0000	
X19	0.319*	0.326**	0.1727	-0.0920	-0.1256	0.0803	0.1466	-0.0999	0.200*	0.556**	0.231*	0.1316	0.237*	0.1060	-0.1879	0.2077*	-0.0715	0.682**	1.0000

Phenotypical Correlation Matrix

Table 3(b): Genotypic correlation matrix among various traits in thirty-three cowpea genotypes

	Plant height (at flowering)	Plant height (maturity)	No of nodes on main stem	Days to first pod formation	Days to first flowering	Days to 50% flowering	Days to 50% maturity	No of peduncles per plant	No of pods per peduncle	No of pods per plant	Dry pod weight(g)	Pod length (cm)	No of seeds per pod	No of seeds per plant	Seed weight per plant(g)	Test weight(g)	TSS (BRIX°)	Protein content (%)	Pod yield (kg/ha)	
X1	1.0000																			
X2	0.920**	1.0000																		
X3	0.1742	0.1606	1.0000																	
X4	0.214*	0.1962	-0.0541	1.0000																
X5	0.1160	0.1138	-0.0405	0.925**	1.0000															
X6	-0.0640	-0.0782	0.1747	0.202*	0.332**	1.0000														
X7	0.0490	0.0904	0.0281	0.483**	0.313*	0.854**	1.0000													
X8	-0.0699	-0.0790	0.1030	-0.303*	-0.238*	-0.0795	-0.226*	1.0000												
X9	-0.1933	-0.215*	-0.0945	-0.276*	-0.273*	0.202*	0.0500	0.0550	1.0000											
X10	0.1449	0.1750	0.216*	-0.312*	-0.331**	0.0717	0.0855	0.0499	0.222*	1.0000										
X11	0.218*	0.213*	0.1586	0.411**	0.380**	0.1408	0.1148	-0.1257	-0.1741	-0.422**	1.0000									
X12	-0.0544	-0.0233	-0.1009	-0.302*	-0.382**	-0.0279	-0.1551	0.0556	-0.0026	0.0152	-0.0230	1.0000								
X13	-0.0161	-0.0150	-0.261*	-0.0667	0.0095	0.271*	0.368**	-0.1181	-0.0476	-0.299*	0.314*	0.200*	1.0000							
X14	0.1973	0.225*	-0.286*	0.0165	0.1051	-0.0216	0.0902	-0.0359	-0.0640	-0.0544	0.1066	0.442**	0.0435	1.0000						
X15	-0.0344	-0.0591	-0.1787	0.513**	0.255*	0.1378	0.243*	-0.0225	0.1856	-0.454**	-0.1507	-0.251*	-0.1857	-0.200*	1.0000					
X16	0.1967	0.1546	0.0537	0.459**	0.411**	0.1147	0.343**	-0.277*	-0.200*	0.0625	0.381**	-0.1133	0.473**	0.1442	-0.0414	1.0000				
X17	-0.259*	-0.237*	-0.0843	-0.367**	-0.482**	0.1721	-0.0162	0.386**	-0.0051	0.256*	-0.559**	-0.0723	-0.321*	-0.1555	0.0130	0.0040	1.0000			
X18	0.290*	0.334**	0.261*	-0.0878	-0.0361	0.473**	0.586**	0.0019	0.1425	0.569**	0.294*	-0.1375	0.0872	0.1812	-0.462**	0.341**	-0.1024	1.0000		
X19	0.341**	0.365**	0.1890	-0.0868	-0.1568	0.1807	0.284*	-0.0992	0.225*	0.590**	0.292*	0.1741	0.284*	0.1209	-0.246*	0.392**	-0.1960	0.770**	1.0000	

Genotypical Correlation Matrix

Summary and Conclusion

The experimental material consisted of thirty-three cowpea genotypes. These genotypes evaluated in a randomized block design with three replications during 2019-2020 season at experimental farm of the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, (Formerly Allahabad Agricultural Institute), Prayagraj (U.P). The salient feature of the present study and conclusion drawn from the results are summarized below: The mean sum of squares due to genotypes showed significant differences for all characters at 1% level and 5% level of significance, indicating the presence of substantial amount of genetic variability among the cowpea genotypes. The maximum pod yield was recorded in variety IC 253276 (9836.44 kg/ha) followed by variety IC 253273 (9644.38 kg/h), whereas the minimum pod yield was recorded in IC 202799 (5079.14 kg/h) followed by IC 253277 (5241.22 kg/h). Highest GCV and PCV were recorded for seed weight per plant (42.20 & 42.99 respectively), followed by number of seeds per plant (30.76 & 31.63). Lowest GCV and PCV were recorded for protein content% (3.99 & 6.96 respectively) followed by TSS° (4.58 & 8.17). Heritability in broad sense was noticed high for all the characters and high was noticed for seed weight per plant (96.34 g) followed by number of seeds per plant (94.60g) and minimum for TSS (31.43) followed by days to 50% maturity (32.34). High genetic advance at 5% were observed for the characters like pod yield per hectare (2532.46 kg) followed by no. of seeds per plant (422.60) and low was observed for dry pod weight (0.62) followed by TSS 0 brix (0.74) High genetic advance as % of mean at 5% was high for seed weight per plant (85.32g) followed by no. of seeds per plant (61.63) and minimum for protein content (4.72%) followed by TSS (brix°) (5.29). High heritability (bs) coupled with high genetic advance as % of mean 5% were observed for seed weight per plant (96.34 & 85.32 g) and number of seed per plant (94.60 & 61.63) followed by plant height (maturity) (93.33 & 48.43). At Genotypic level Plant height at flowering (0.341cm), plant height at maturity (0.365), days to 50% maturity (0.284), number of pods per peduncle (0.225), number of pods per plant (0.590), dry pod weight(g) (0.292), number of seeds per pod (0.284), seed weight per plant(g) (-0.246), test weight (0.392), protein content (0.770), showed significant positive correlation with pod yield (kg/ha) Number of nodes on main stem (0.189), days to first pod formation (- 0.086), days to first flowering (-0.156), days to 50% flowering (0.180), number of peduncle per plant (- 0.099) pod length (0.174) number of seeds per plant (0.120) TSS (brix°) (-0.196) showed significant negative correlation with pod yield (kg/ha) at genotypic level. At phenotypic level plant height at flowering (0.319 cm), plant height at maturity (0.326), number of pods per peduncle (0.200), number of pods per plant (0.556), dry pod weight(g) (0.231), number of seeds per pod (0.237), test weight(g) (0.2077), showed significant positive correlation with pod yield (kg/ha). At phenotypic level number of nodes on main stem (0.1727), days to first pod formation (- 0.092), days to first flowering (-0.125), days to 50% flowering (0.080), days to 50% maturity (0.1466) no. of peduncle per plant (- 0.099) pod length (0.131 cm) no. of seeds per plant (0.106) seed weight per plant (-0.187) TSS° (-0.0715) showed significant negative correlation with pod yield (kg/ha).

Improvement in these characters ultimately enhances the pod yield per ha in cowpea. Out of nineteen character studied characters number of seeds per plant had positive indirect effect on pod yield per ha. Whereas, seed weight per plant (-0.1366) had highest negative indirect effect on pod yield per hectare in cowpea.

Conclusion

Among the tested genotypes the higher pod yield per plant were recorded by IC 253276 followed by IC253273 they may be used for commercial cultivation. The earliest days to maturity was recorded by IC 243501 that may fit for multiple cropping system. IC 39911 recorded highest number of pods per plant and this genotype may be used in the crossing programme for crop improvement. Greatest estimates of PCV and GCV were recorded for seed weight per plant, number of seeds per plant. Higher estimates of heritability were observed pod yield per ha and seed weight per plant. High estimate of heritability coupled with high genetic advance as percentage of mean was observed for number of seeds per plant and seed weight per plant. These characters indicated that they may be included in selection criteria for crop improvement programmed in cowpea.

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