Agri. Res. J. Kerala, 1979. 17 (2) 227—231

GENETIC VARIABILITY AND CORRELATIONS IN COWPEA *VIGNA SINENSIS* (L) SAVI

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Information on the magnitude and nature of variability in a population owing to genetic and non-genetic causes is a pre-requisite for initiating a breeding programme. Wide range of variability available in cowpea, a popular pulse crop of Kerala, can be exploited successfully for the development of new economic varieties. Since economic characters are highly influenced by the environment it is necessary to partition the observed variability into its heritable and non-heritable components by means of suitablee genetic parameters The present study aims to estimate phenotypic variation in cowpea and the heritable components using genetic parameters such as genotypic coefficient of variation, heritability and genetic advance.

Materials and Methods.

Fourty three diverse genotypes of cowpea available in the germplasm collection were grown adopting a randomized block design with 2 replications during khariff season 1978. Observations on days to flowering, total duration and number of grains per pod, were made on 5 plants selected at random in each plot. In the case of yield of grains and yield of haulms mean plot yield was recorded. The data were subjected to statistical analysis.

Coefficient of genotypic and phenotypic variation (GCV and PCV) were calculated using the formula suggested by Burton (1952). Heritability (h^2) and Genetic advance (G. A.) were calculated by the formula suggested by Allard (1960) and genotypic and phenotypic correlations by Panse and Sukhatme (1961).

Results and discussion

The phenotypic, genotypic and environmental correlations of the 6 characters are presented in Table I and the other genetic parameters are presented in Table 2. All the characters under study showed positive phenotypic correlations with yield of grain. Significant positive phenotypic correlation has been noticed between yield and total duration of the crop. Significant phenotypic correlation reported between yield and grains/pod, 100 grain weight etc by Singh and Mehndiratta (1969) was not confirmed in this study. Significant positive phenotypic correlation between yield of haulms and all other characters were also noticed.

Table 1 Phenotypic (P) Genotypie (G) and Environmental (E) Correlations among 6 charactors in cowpea.

		Total duration	Number of grains/pod	100 grain weight	Yield of grain	Yield of haulms
Days to flowering	P	0.2624*	0.1050	0.0460	0.0706	0.2159*
	G	0.3628**	0.0781	0.0506	0.1782	0.2158*
	E	0.1280	0.3460**	0.0442	—0.0651	0.2173*
Total duration	P		0.2736*	0.3682**	0.3836**	0.6537**
	G		0.5619**	0.5406**	0.3913**	0.9937**
	E		0,0405	—0.0334	0.3771**	0.1482
No. of grains/pod	P			0.2837**	0.1029	0.2424*
	G			0.3744**	0.3267**	0.3065**
	E			0.3415**	—0.0591	0.1884*
100 grain weight	P				0.1145	0,2659*
	G				0.1600	0.3014**
	E				0.0764	0,1174
Yield of grains	P					0.4048**
	G					0.4385**
	E					0.4072**

* Significant at 5 per cent probability level. ** Significant at 1 per cent probability level.

Genotypie correlation between yield and other characters, in general, were found to be greater than phenotypic and environmental correlations. Positive genotypic correlation between yield and all the other characters were noticed. The positive correlations noticed between yield and grains per pod, 100 grain weight etc. are in conformity with that of Singh and Mehndiratta (1969) in cowpea. Environmental correlation of yield with all the other characters are quite low and this is in conformity with the results of Singh and Singh (1969) in field peas. Phenotypic coefficient of variations (PCV) was the lowest (6.14) for days to flowering and highest (54.73) for yield of haulms. Genotypic coefficient of variation (GCV) was the lowest (4.48) for total duration and highest (47.07) for yield of haulms. Considerable heritability (h^2) in broad sense was observed in mcst of the yield components and therefore, there is scope for further improvement. The lowest heritability recorded for number of grains per pod agrees with the findings of *Veeraswamy et al.*

Table [illegible]. Range, mean, phenotypic coefficient of variation, phenotypic and genotypic variances, heritability and Genetic advance on [illegible] characters

Character	Range	Mean ± S.E.	Phenotypic coefficient of variation (PCV)	Genotypic coefficient of variation (GCV)	Phenotypic variance VP	Genotypic variance VG	Heritability h^2	Genetic advance as percent Mean (Mean of [illegible] best 5% of the varieties) (GA)
Days to flowering	31.90 — 45.30	40.03 ± 0.26	[illegible]4	5.11	6.05	4.19	69.20	8.76
Total duration	71.20 — 90.80	9.27 ± 2.88	6.39	4.48	[illegible]5.[illegible]	12.64	49.20	6.48
No. of pods per plant	9.70 — 17.40	13.98 ± 0.81	19.67	12.53	7.56	3.07	40.[illegible]	16.45
100 grain weight	4.50 — 10.15	7.07 ± 0.[illegible]	25.02	23.50	3.13	3.02	96.49	49.69
Yield of grains	67.50 — 443.00	206.39 ± 11.15	49.33	32.50	[illegible]367.90	4501.57	43.42	[illegible]4.11
Yield of haulms	700.00 — 4925.00	1860.50 ± 108.53	54.73	47.07	1036900.11	767026.58	73.97	[illegible]3.32

(1973) in cowpea, Singh and Malhotra (1970) in green gram. High heritability estimate recorded for 100 grain weight is in conformity with the result of Singh and Mehndiratta (1969) in cowpea. Comparatively low heritability estimate was noticed for grain yield as reported by Singh and Malhotra (1970) in mungbean, Singh and Singh (1970) in field peas and Veeraswamy *et al.* (1973) in cowpea.

Genetic advance (G. A.) was lowest for total duration (6.48) and highest for yield of haulms (83.32). Comparatively higher genetic advance was noticed for 100 grain weight (49.69). This is in conformity with the result of Singh and Mehndiratta (1969) in cowpea.

High heritability estimate have been found to be helpful in making selection of superior genotypes on the basis of phenotypic performance of quantitative characters. However, Johnson *et al.* (1955) in their studies with soyabean have reported that heritability estimate along with genetic advance is more useful than heritability value alone in predicting the resultant effect for selectjng the best individuals.

High heritability and genetic advance were noticed for 100 grain weight. It therefore appears that selection for this character will be effective and satisfactory for practical purposes. Heritability and genetic advance were comparatively high for grain yield and yield of haulms. This suggests that selection for these characters will also be of considerable importance for the improvement of the crop. According to Panse (1957) if the heritability is mainly owing to non-additive gene effect the expected genetic advance would be low and if there is additive gene effect a high genetic advance may be expected. Therefore, low genetic advance noticed for days to flowering. Total duration and number of grains per pod seems to suggest that these characters are mainly controlled by non-additive genes.

It is concluded that while selecting higher yielding varieties of cowpea due emphasis has to be given for the characters viz. 100 grain weight, grain yield and yield of haulms,

Summary

43 different genotypes of cowpea were grown in a Randomized block design with 2 replications during Khariff 1978. The different genetic parameters viz. coefficient of Phenotypic and genotypic variation, heritability in broad sense and genetic advance were calculated. The study revealed that all the characters showed positive phenotypic and genotypic correlations with yield. High heritability and genetic advance were noticed for 100 grain weight, yield of grain and yield of haulms. This indicate that selection based on the above characters will be very effective for the improvement of the crop.

സംഗ്രഹം

നാല്പത്തിമൂന്നു വ്യത്യസ്ത ജനസ്സുകളിൽപ്പെട്ട വൻപയറിനത്തിൽ, വിളവും അതുമായി ബന്ധപ്പെട്ട മറ്റു ജനിതഘടകങ്ങളും തമ്മിലുള്ള പരസ്പരബന്ധം സഹസംബന്ധഗുണാംക പാനത്തിനു (Correlation Coefficient) വിധേയമാക്കി. കൂടാതെ ജനിതക അന്തഖണ്ഡ ratona പാതങ്ങളായ (Genetic Parameters) ജീനപ്രകടനത്തെ ഗുണാംഗവിഭിന്നത (Coefficient of genotypic and phenotypic variation) പാരമ്പര്യാർജിനീയത (heritability) ജനറിക് അഡ്വാൻസ് (Genetic advance) എന്നിവയും കണക്കാക്കുകയുണ്ടായി. അതിൽനിന്നും വിളവും അതുമായി ബന്ധപ്പെട്ട മറ്റു ഘടകങ്ങളും തമ്മിൽ പരസ്പരബന്ധം ഉള്ളതായി കണ്ടു. 100 മണികളുടെതൂക്കം, വിളവ്, ഇല, തണ്ട് മുതലായവയുടെ മൊത്തം തൂക്കം എന്നിവസ്സ് വർദ്ധിച്ച പാരമ്പര്യാർജിനീയതയും ജനിതക അഡ്വാൻസും ഉള്ളതായി കണ്ടു. അതിനാൽ പ്രസ്തുത സ്വഭാവങ്ങളെ ആസ്പദമാക്കിയുള്ള നിർധാരണത്വം (selection) പയറിന്റെ മൊത്തത്തിലുള്ള വിളവ് മെച്ചപ്പെടുത്തുവിനു ഉപകരിക്കും.

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(M. S. Received: 2-1-1979)