respectively. The other herbicides and hand weeding also recorded marked additional income over sole crop of sugarcane. However, groundnut intercropping reduced main crop yield which inturn reduced the additional income.

REFERENCES

PAWAR, L.G. and BHOSALE, R.J. (1987). Companion cropping in sugarcane. A paying practice. **Bharatiya Sugar 12** (9) : 57-60.

SHIVKUMAR and SRIVATSAVA S.N.L.(1994). Effect of planting methods and intercrops on yield and quality of spring planted sugarcane. **Indian Sugar 18** : 919-922.

SPENCER,G.L. and MEADE, G.P. (1955). **Canesugar Handbook** (8th edn.) John Wiley and Sons, London.

YADAV,R.L. and PRASAD,S.R. (1990). Intercropping of French bean in sugarcane at different row arrangements and nitrogen. **Indian J. Agron, 35** : 451-455.

(Received: December 1994 Revised: February 1995)

Madras Agric. J., 83(1): 9-11 January 1996
https://doi.org/10.29321/MAJ.10.A00953

ESTIMATION OF GENETIC PARAMETERS AND INTERRELATIONSHIP OF QUANTITATIVE TRAITS IN CHICKPEA

REKHA MATHUR and M.L. MATHUR

ABSTRACT

Genotypic and phenotypic coefficient of variation, heritability, and expected genetic advance were studied for grain yield and its contributing characters in 34 varieties of chickpea at the Agricultural Research Station, Durgapura, Jaipur during *rabi* season. The highest value of genotypic and phenotypic coefficients were obtained in 1000 grain weight. High heritability estimates were obtained for all the characters under study. Thousand grain weight and grain yield per plant had fairly good value of genetic advance as percentage of mean along with high heritability and therefore these characters may be considered reliable for selection in chickpea. Correlation studies revealed that grain yield per plant showed significant positive genotypic correlation with pods per plant and 1000 grain weight, while it showed negative genotypic correlation with plant height and days to flower.

KEY WORDS : Coefficient of Variation, Heritability, Genetic Advance, Correlation

Chickpea is a multipurpose pulse crop of India. Its leaves are used as green vegetable and grains are used as raw pulse. There is a pressing demand of high yielding varieties of chickpea. The yield is influenced by a number of factors. Environment has a great influence upon many of economically important characters which are quantitatively inherited. Thus it becomes difficult to judge whether the observed variability is heritable or is due to the environment. It becomes therefore, necessary to breakup the observed variability into its heritable and non-heritable components as this proves useful to the plant breeder in selecting suitable plants. The aim of the present study is, to find out, those characters which may be helpful in selecting good genotypes for better yield. The study of suitable genetic parameters and correlations between yield and its components will be helpful in getting above objective.

MATERIALS AND METHODS

in winter season. Five plants were selected to record the plant height, days to flower, days to maturity, pods per plant, grain yield per plant and 1000 grain weight. The mean values were statistically analysed according to Panse and Sukhatme (1957). Genotypic and phenotypic coefficients of variability (Burton, 1952), heritability (Burton and Devane, 1953; Hanson *et al.*, 1956), expected genetic advance (Johnson *et al.*, 1955) and the genotypic, phenotypic and environmental correlations (Panse and Sukhatme, 1957) were calculated.

RESULTS AND DISCUSSION

The estimates of genotypic and phenotypic coefficient of variation, heritability, genetic advance and its percentage of mean for the six characters studied, are presented in Table 1. The 1000 grain weight showed highest value for genotypic and phenotypic coefficient of variation followed by pods per plant which showed

Table 1. Estimates of genotypic and phenotypic coefficient of variation, heritability, genetic advance for six characters in chickpea

Characters	Genotypic coefficient of variation	Phenotypic coefficient of variation	Heritability (broadsense)	Expected genetic advance	Genetic advance as % of mean
Plant height	16.24	16.43	97.68	17.85	33.08
Days to flower	10.03	10.22	96.23	18.92	20.29
Days to maturity	2.49	2.65	88.50	7.13	4.84
Pods per plant	29.69	29.84	98.97	31.90	60.85
Grain yield per plant	5.97	6.04	95.58	25.38	111.90
Thousand grain weight	115.36	115.61	99.98	120.71	138.15

coefficient of variation indicated a wide range of variability present in the germplasm under study. Burton (1952) has observed that genotypic coefficient of variation along with heritability estimates would be better effective for efficient selection.

In the present study, all the characters showed high heritability, indicated, low environmental effect and high capability of the characters for transmission to subsequent generation. On the basis of heritability estimates alone, efficient selection cannot be made, since it does not give us the correct measurement for the genotypic variation and should be observed along with genetic advance as percentage of mean. The high heritability along with high genetic advance in a character suggest that the genotypic variation for such character is probably due to high additive genetic effects (Panse, 1957) and this character is least influenced by environmental effects. Johnson *et al.* (1955) observed that due to non-additive gene effect, the genotypic gain will be low and same will be high when there is additive gene effect. Thus high heritability along with high genetic advance as percentage of mean show the most effective condition for selection and it was observed for thousand grain weight and grain yield per plant in the present study. Similar were the findings of Chand *et al.* (1975).

The genotypic, phenotypic and environmental correlations between different pairs of characters are tabulated in Table 2. At genotypic level, the grain yield per plant showed positive and significant correlation with pods per plant and thousand grain weight. Such correlations revealed the possibility, that in this crop selection for strains with more number of pods per plant and bold seed can be expected to result in higher yielding strains.

Table 2. Estimates of phenotypic (P), genotypic (G), and environmental (E), correlations between different pair of characters in chickpea

Characters		Plant height	Days to flower	Days to maturity	Pods per plant	Thousand grain weight
Grain yield per plant	G	-0.009	-0.017	0.004	0.251*	0.843**
	P	0.315*	0.004	0.127	-0.001	-0.005
	E	0.066	0.482**	0.268*	-0.038	-0.220
Plant height	G		-0.021	0.009	0.004	0.002
	P		0.005	-0.015	0.002	0.001
	E		0.708**	-0.453**	-0.122	-0.145
Days to flower	G			0.281*	-0.082	0.011
	P			0.252*	-0.214	0.006
	E			-0.999**	-0.676**	-0.241
Days to maturity	G				0.579**	-0.462**
	P				-0.192	0.007
	E				-0.213	0.040
Pods per plant	G					-0.395**
	P					-0.056
	E					-0.016

* Significant at P = 0.05 ** Significant at P = 0.01

Similar results have also been reported by Katiyar *et al.*(1977) and Govil (1980). The pods per plant showed positive and significant genotypic correlation with days to maturity and grain yield per plant indicated that late varieties will bear more number of pods per plant with more yield. However, the days to maturity showed significant negative correlation with thousand grain weight.

The grain yield per plant showed significant positive correlation with the plant height. The plant height did not show significant phenotypic correlation with any of the characters under study except the grain yield per plant. The pods per plant had negative correlation with 1000 grain weight , Chand *et al.* (1975) also reported that pod number per plant was negatively correlated with hundred grain weight.

The most of the environmental correlation coefficients were having negative values. However, the grain yield per plant had significant and positive environmental correlation with days to flower and days to maturity. The plant height also had significant positive correlation with days to flower. It may finally be concluded that for selecting high yielding genotypes, the selection based on pods per plant, plant height and 1000 grain weight would be more useful.

REFERENCES

BURTON, G.W. (1952). Quantiative inheritance in crosses. **Proc.Sixth Int. Grassld. Cong., 1:** 227-283.

BURTON, G.W. and DEVANE, E.H. (1953) Estimating heritability in tall fescus *(Fescus arundinacea)* from replicated colonal material **Agron.J.,45:** 478-81.

CHAND, H. SRIVASTAVA, L.S. and TREHAN, K.B. (175) Estimates of genetic parameters, correlation coefficients and path-coefficient- analysis in gram *(Cicer arietinum* L. **Madras Agric.J. 62** : 178-181

GOVIL, J.N. (1980). Plant type in relation to protein yield and disease resistance in Chickpea *(Cicer arietinum* L.), **Legume Res., 3** : 38-44.

HANSON, C.H., ROBINSON, H.F.and COMSTOCK, R.E. (1956). Biometrical studies of vield in segregating populations of*Korean lespedeza* **Agron.J.,** 48: 268-272.

JOHNSON, H.W., ROBINSON, H.F. and COMSTOCK, R.E. (1955) Estimate of genetic and environmental variability in soyabeans.**Agron.J.,47:**314-318.

KATIYAR, R.P., PRASAD, J., SINGH, A.B. and RAM, K.(1977) Association analysis of grain yield and its components in segregating populations, of chickpea. **Indian J.agric.Sci.,47** : 325-327

PANSE, V.G. (157) Genetics of quantitative characters in relation to Plant Breeding.**Indian.J.Genet.,17:** 318-326.

PANSE, V.G. and SUKHATME, P.V. (157) **Statistical Method for Agricultural Workers** 2nd Edn. Indian Council of Agricultural Research, New Delhi, pp.63-69.

(Received : November 1994 Revised : February 1995)

Madras Agric. J., 83(1): 11-14 January 1996

HETEROSIS AND COMBINING ABILITY IN FODDER COWPEA FOR GREEN FODDER AND SEED YIELD

S.ARAVINDHAN AND L.D. VIJENDRA DAS

Department of Agricultural Botany
Agricultural College and Research Institute,
Tamil Nadu Agricultural University
Killikulam, Vallanad 627 252

ABSTRACT

Forty-two crosses of cowpea derived from 14 lines and 3 testers were utilised for heterosis and combing ability studies for green fodder as well as grain yield and yield components. Scope for exploitation of heterosis in cowpea was indicated with the materials studied. The highest heterotic expression for green fodder yield was recorded by the hybrid UPC 9201 x CO 5 (121.01 per cent) over the standard parent CO 5. The hybrid CS 55 x CO 4 recorded the maximum heterotic effect (215.34 per cent) over the standard parent for seed yield. The GCA:SCA variance ratio for all the traits showed predominance of SCA variance over GCA variance indicating predominance of non-additive gene action. Among the parents, the lines UPC 9103 and UPC 9201 and the tester CO 5 were found to be the best combiners. Selection of hybrids based on *per se* performance, *sca* effects and heterotic effects will be effective

KEY WORDS : Fodder Cowpea, Yield, Heterosis, Combining Ability