SINGH B. B., B. R. MURTHY and O. P. JAIN. 1971. Nature of divergence among varieties of upland cotton. *Indian J. Genet, 31* : 363-68.

SOMAYAJULU P. L. N., A. B. JOSHI and B. R. MURTHY. 1970 Genetic divergence in wheat *Indian J. Genet. 30* : 47-58.

VAIRAVAN, S. A. DDIQUE, V. ARUNACHALAM and M. S. SWAMINADHAN 1973. A study on the nature of genetic divergence in rice from Assam and North Eastern Himalayas *Theoret Appl. Genet., 43* : 213-21.

VERMA V. S. and R. K. ETHA. 1976. Genetic divergence in lucerne. *J.Maharasntra Agric. Univ., 1* : 23-28.

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VARIABILITY PARAMETERS IN CHICKPEA (*Cicer arietinum* L.)

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Twenty one diverse varieties of chickpea were evaluated for the estimation of different variability parameters in two environments. Genotypic coefficient of variation (GCV) ranged from 1.53 for days to maturity to 27.67 for grain yield per plant in E_1 and 2.14 for days to maturity to 37.40 for grain yield par plant in E_2. The estimates of heritability were high for all the characters studied. High genetic advance as per cent of mean coupled with high heritability were recorded for grain yield per plant, number of pods per plant and number of primary branches per plant.

The primary aim of any breeding programme is to evolve high yielding varieties with improved quality. Adequate genetic vari bility is a pre-requisite for any crop improvement programme to be asuccess. Quantitative characters are under heavy influence of environmental factors which necessitate the knowledge of variability owing to genetic factors, actual heritable variation in offsprings and the advance which can be made through selection. Therefore, the present study is undertaken in order to study the variability parameters in chickpea for different yield contributing characters.

MATERIALS AND METHODS

The experimental material comprising of 21 diverse varieties of

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Table 1. Analysis of variance for eight characters studied in chickpea.

Source	Environment	d. f.	Mean squares							
			Days to flower	Days to maturity	Plant height	Number of primary branches per plant	Number of pods per plant	Number of grains per pod	100-grain weight	Grain yield per plant
Replication	E_1	2	0.49	0.62	0.16	0.02	2.85	0.00	0.05	0.07
	E_2	2	0.01	4.64	0.54	0.03	0.19	0.00	0.23	0.09
Treatments	E_1	20	323.62**	11.91**	26.31**	9.32**	544.62**	0.03**	17.98**	8.98**
	E_2	20	270.76**	18.93**	34.44**	2.48**	311.96**	0.03**	22.11**	7.49**
Error	E_1	40	0.92	1.07	0.25	0.05	3.08	0.00	0.09	0.05
	E_2	40	2.03	1.45	0.23	0.09	3.98	0.00	0.12	0.07

** Significant at 1 per cent level.

chickpea was tested under two environments (E_1 & E_2) separately created by two different dates of sowing *viz.*, 28 November, 1983 and 14 December, 1983. The crops were raised in both the environments in randomised block design with three replications, keeping single row of each entry (30×15 cm spacing) in each replication. The mean data based on five randomly selected plants were subjected to statistical scrutiny by the method of analysis of variance. (Panse and Sukhatme, 1978). Phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were computed following the method of Burton (1952). Heritability (broad sense) estimates were computed after Burton and Devane (1953), Johnson *et al.* (1955) and Hanson *et al.* (1956). Genetic advance as per cent of mean was computed according to Johnson *et al.*, (1955).

RESULTS AND DISCUSSION

Analysis of variance (Table 1) indicated highly significant differences among the varieties for different characters in both the environments separately. The range, mean, GCV PCV, heritability, expected genetic advance and genetic gain are presented in Table 2. There was a close resemblance between GCV and PCVestimates in the two environments. High values of GCV were recorded for grain yield per plant *viz.*, 27.67 and 37.40 per cent in E_1 and E_2 respectively. In general, number of pods per plant, number of primary branches per plant, 100 - grain weight and days to flower also had high to modreate values of in GCV in

both the environments suggesting that selection for these traits would be much effective. Minimum PCV and GCV values were recorded for days to maturity in both the sets. Characters such as number of grains per pod and plant height also exhibited low estimates of GCV indicating that these attributes are more influenced by environments.

Estimation of genetic and phdnotypic coefficient of variation alone does not indicate the amount of heritable variation which can be studied by estimating heritability. In the present study, high values of heritability estimated in broad sense were observed in both the environments for all the characters. Days to maturity exhibited relatively low values of heritability in E_1. Similar results were also reported by Chandran (1968), Malhotra and Singh (1973) and Patil and Phadnis (1977) for different characters in chickpea.

Burton (1952) suggested that GCV along with heritability estimates would give a better idea about the efficiency of selection as heritability measures the proportion to which the variability of a character is transmitted to progeny. High heritability values coupled with high to moderate GCV were observed for almost all characters except days to maturity, plant height and number of grains per pod, thereby indicating less environmental influence on these characters and high transmission index.

Table 2. Variability parameters for different characters in chickpea.

Characters	Environment	Range	Mean±S. Em	G. C. V. (%)	P. C. V. (%)	Heritability (%)	Genetic advance	Genetic gain (%)
Days to flower	E_1	49.33-92.67	74 84±0 78	13 86	13.92	99.15	21.27	28.42
	E_2	58.33-90.33	76.08±1.16	12.44	12.58	97.78	19.28	25.34
Days to maturity	E_1	121.00-127.33	123 89±0 84	1.53	1.75	77.18	3.44	2 78
	E_2	108 (0-117.00	112.67±0.98	2.14	2.39	80.06	4.45	3.95
Plant height(cm)	E_1	27 36-38 89	32.88±0.40	8.94	9 06	97.24	5.99	18.16
	E_2	20.50-32.70	24.44±0.39	13.82	13 96	98.00	6.89	28.19
Number of primary branches per plant	E_1	4.47-12.97	6.69±0 18	26.25	26.47	98.35	3.59	53 66
	E_2	4.30-7.30	5.56±0.24	16 06	16 94	89 78	1 74	31 29
Number of pods per plant	E_1	24.80-78.90	48.84±1.43	27.51	27.74	98 32	27.44	56.18
	E_2	17.50-60 47	32.18±1.63	31.48	32.09	96 27	20.48	63 63
Number of grains per pod	E_1	1.11-1.46	1.26±0.02	8 53	8 67	96.69	0.22	17 46
	E_2	1.04-1.43	1.24±0.02	8.36	8.56	95 57	0 21	16 93
100-grain weight (g)	E_1	9 20-18.40	13 17±0 24	18 54	18.68	98 57	5 00	37 91
	E_2	8.32-18 99	13.07±0 28	20.72	20 89	98.42	5.53	42 36
Grain yield per plant (g)	E_1	2 93-9 44	6.24±0 18	27.67	27.89	98 39	3 53	57 15
	E_2	1.81-8 72	4.21±0.21	37.40	37.91	97.34	3.20	76 06

High heritability coupled with high GCV were also observed by Malhotra and Singh (1973) for yield, pod number and 100-seed weight.

Johnson *et. al.* (1955) suggested that the heritability and genetic advance when calculated together would be more useful in predicting the resultant effects of selection. In the present study, the highest genetic advance as per cent of mean in both the environments was noted for grain yield while the lowest for days to maturity. Characters other than grain yield, *viz.*, number of pods and number of primary branches had high estimaets of genetic advance as per cent of mean and high heritability in both E_1 and E_2. Traits like 100-grain weight exhibited moderately high genetic gain and high heritability in E_1 and E_2. This may be due to preponderance of additive gene action (Panse, 1957). Therefore, selection for these traits would be effective for the improvement in yield levels of chickpea.

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REFERENCES

BURTON, G. W. 1952. Quantitative inheritance in grasses. *Proc. 6th Int. Grassland Cong 1* : 227-283.

BURTON, G. W. and E. M. DEVANE. 1953. Estimation of heritability in tall fescue. *Agron. J., 45* : 478-481.

CHANDRA, S. 1968. Variability in gram. *Indian J. Genet. 28* : 205-210.

HANSON, C. H., H.F. ROBINSON and R.E. COMSTOCK 1956. Biometrical studies of yield in segregating population of lespedeza. *Agron. J., 47* : 268-272.

JOHNSON, H. W., H. F. ROBINSON and R. E COMSTOCK. 1955. Estimate of genetic and environmental variability in Soyabean. *Agron. J., 46* : 314-318.

MALHOTRA, R. S. and K. B. SINGH. 1973 Genetic variability and genotype-environment interaction in Bengal gram. *Indian J. Agric. Sci., 43* : 914-917.

PANSE, V. G. 1957. Genetics of quantitative characters in relation to Plant breeding *Indian. J. Genet., 17* : 318-328.

PANSE, V. G. and P. V. SUKHATME. 1978. *Statistical Methods for Agricultural Workers* I. C. A. R. II Ed., New Delhi.

PATIL, V. N. and B.A. PHADNIS 1977. Genotyp variability and its implication in selection of gram (*Cicer arietinm* L.) *J. Maharastra agric. Univ., 2* : 121-123.