Madras Agric. J., 81(9): 463-465 September, 1994

https://doi.org/10.29321/MAJ.10.A01559

GENETIC VARIABILITY, CORRELATION STUDIES AND THEIR IMPLICATIONS IN SELECTION OF HIGH YIELDING GENOTYPES OF CHICKPEA

V.W. CHAVAN, H.S. PATIL and P.N. RASAL

Agricultural Research Station Niphad 422 308 Maharashtra

ABSTRACT

Genetic parameters of variability were calculated for seed yield and other seven quantitative characters in 70 genotypes of chickpea. Heritability estimates were high for all characters except plant breadth. High heritability coupled with high genetic advance expressed as % of mean were observed for seed yield and number of pods/plant. Association analysis revealed that seed yield had positive association with all seven characters studied both at genotypic as well as phenotypic level. The selection criteria based on the no. of branches per plant, pod weight and no. of pods/plant will give fruitful results for yield improvement in chickpea.

A survey of genetic variability with the help of suitable parameters such as genotypic coefficient of variation, heritability estimates and genetic advance are absolutely necessary to start an efficient breeding programme. It is well known that different component of yield vary often exhibit considerable degree of association among themselves and with yield. Hence, an attempt was made to study the inheritance, relation of yield and its components and their implication in selection of better genotypes of chickpea.

MATERIALS AND METHODS

The experimental material consisted of 70 genotypes of chickpea collected all over India, during 1968. They were evaluated in randomised block design with three replications on the farm area of Botany Section, Agril.College, Dhule, during *rabi* 1969-70. Each plot consisted of 6 m length and spacing between row was 45 cm and plant to plant distance was 10 cm. All genotypes were grown in continuous rows. The borders rows on each side were planted around each replication. Five competative plants were selected from each plot and in each replication and were tagged to record the observations on eight quantitative characters. The mean, range, heritability (broad sense), genotypic and phenotypic coefficient of variation and expected genetic advance as percentage of mean were calculated by the method proposed by Hanson *et al.* (1956). Burton (1952), and Johnson *et al.*(1955). The correlation coefficient were also computed for all possible periods of characters at genotypic and phenotypic level.

RESULTS AND DISCUSSION

Significant differences among the genotypes of chickpea suggested the presence of variability for all characters studied. Variability parameters such as genotypic variance, phenotypic variance, gcv, pcv, heritability and genetic advance are presented in Table 1. The 6^2g and 6^2p were observed to be very high for all characters indicating existence of wider variability for these characters. Differences between gcv and pcv were observed to be comparatively low for all characters which suggested all these characters had less influence of environment, thus, confirming the results of Mishra

Table 1. Estimates of different variability parameters in chickpea.

	Range	Mean	6^2p	6^2g	pcv	gcv	h^2	Genetic advance
Branches per plant	5-15	10.18	578.41	502.32	65.81	61.30	82.59	30.34
Plant breadth	29-58	41.81	9114.50	6953.10	19.63	17.60	36.29	19.44
Plant height	22-41	30.78	4474.00	3804.00	14.55	12.50	80.51	27.68
Days to flower	34-65	44.95	17546.62	16355.82	20.13	15.30	90.47	20.04
Days to maturity	75-122	101.52	18220.30	18159.41	9.22	7.40	87.87	18.97
Pod weight /plant	11-40	21.95	8810.62	8540.62	79.74	70.90	95.55	13.77
Pods/plant	35-169	90.12	255854.86	239859.19	78.41	71.41	80.00	66 70
Seed yield/plant	8-35	19.31	6849.00	6717.00	22.67	20.10	87.38	60.48

Table 2. Genotype and phenotypic correlation coefficient for eight traits in chickpea.

		Plant breadth	Plant height	Days to flower	Days to maturity	Pod weight/plant	Pods/plant	Seed yield/plant
Branches/plant	P	0.358**	-0.373**	0.384**	0.367**	0.413**	0.410**	0.537**
	G	0.55**	-0.601**	0.424**	0.730**	0.736**	0.431**	0.567**
Plant breadth	P		0.335**	-0.675**	-0.5222**	0.533**	0.318**	0.502**
	G		0.863**	-0.800**	-0.598**	0.660**	0.369**	0.523**
Plant height	P			-0.646**	-0.521**	0.442**	0.194**	0.490**
	G			-0.667**	o.557**	0.461**	0.217*	0.500**
Days to flower	P				0.101	-0.463**	-0.272*	0.442**
	G				0.649**	0.479**	0.386**	0.486**
Days to maturity	P					-0.393**	-0.297	0.377**
	G					-0.404**	-0.240*	0.437**
Pod weight/plant	P						0.633**	0.768**
	G						0.664	0.879**
Pods/plant	P							0.718**
	G							0.720**

*, ** Significant at 5% and 1% level respectively.

et al. (1988). The existence of very high magnitude of genetic variability was also evidenced through high value of gcv and pcv for majority of characters. A relative comparison of the magnitude of gcv for different characters revealed that the maximum amount of genetic variability was observed for pod weight/plant followed by pods/plant and branches/plant. The low gcv was observed for days to maturity. The presence of moderate genetic variability was indicated for remaining characters.

Heritability estimates were observed to be very high for all characters except plant breadth. The high genetic advance as expressed in percentage of mean was recorded for pods/plant followed by seed yield. A relative comparison of heritability estimates and expected genetic advance will give an idea about the nature of gene action governing a particular character. A comparison of these two estimates made in this study revealed that seed yield and pods/plant had high heritability estimates coupled with high genetic advance indicated the substantial contribution of additive genetic variance in the expression of these characters. Rest of the characters showed high heritability estimates coupled with medium to low genetic advance indicating the significant contribution of non-additive gene action observed for these characters might have resulted in the business of the estimates of broad sense heritability. This further revealed that branches/plant, plant breadth, plant height, days to flower, days to maturity and pod weight/plant are governed by genes having epistatic and dominant gene effects. High heritability estimates observed in this investigations are in accordance with the findings of Chandra (1968) for days to flowering; Rao (1983) for days to maturity; Sandhu and Singh (1970), for branches/plant; Chandra (1968) for plant height; Mishra *et al.*, (1988) for seed yield, who also observed high heritability estimates for above mentioned characters. An overall observations of the findings of heritability estimates and genetic advance, it could be concluded that the selection criteria based on pods/plant and the seed yield will serve the purpose of improvement of seed yield in chickpea.

The correlation coefficient between all possible pairs of eight quantative characters at genotypic and phenotypic levels are presented in Table 2. In general, genotypic correlations were of higher magnitude than their phenotypic correlations. The low amount of phenotypic correlations could result due to the masking or modifying effect of environment on the association of characters. A significant positive correlation for all the characters with seed yield at both genotypic as well as phenotypic levels was observed. A positive relationship among the yield attributes indicated that they had certain inherent relationship with seed yield.

Seed yield was observed to be positively and significantly associated with days to flower and days to maturity at both genotypic as well as phenotypic levels indicating late flowering and late maturing genotypes of chickpea would give more seed yield. However, Mishra *et al.* (1988) reported no correlation of days to flower and days to maturity with seed yield.

A positive association at both genotypic as well as phenotypic levels among the characters branches/plant, pod weight/plant, pods/plant and their positiveness with seed yield indicated that these are the major yield contributing characters in chickpea. The same opinion was expressed by Mishra *et al.*(1988). Thus, finally it can be con cluded that the selection criteria based on branches/ plant, pod weight/plant and pods/plant can give the better results for yield improvement of chickpea.

Madras Agric. J., 81(9): 465-468 September, 1994

REFERENCES

BURTON, G.W. 1952. Quantitative inheritance in grasses. **Proc. 6th Int.Grassland Cong.1**:24-83.

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

HANSON, W.D., ROBINSON, H.F. and COMSTOCK, R.E.1956. Biometrical studies of yield in segregating population of Korean lesspadeza. **Agron.J.48**:268-272.

JOHNSON, H.W.; ROBINSON, H.F. and COMSTOCK, R.E. 1955. Estimates of genetic and environmental variability in soyabean. **Agron.J.47**:314- 318.

MISHRA, R., RAO, S.K. and KOUTU, G.K. 1988. Genetic variability, correlation studies and their implications in selection of high yield genotypes of chickpea. **Indian J.Agric.Res.22**:51-57.

RAO,A.B.S.P. 1983. Biometrical studies in Bengal gram (*Cicer arietinum* L.). M.Sc.(Agri.) thesis, J.N.K.V.Jabalpur (India).

SANDHU, T.S., and SINGH, N.B. 1970. Genetic variability, correlation and regression studies in gram. **J.Res.Punjab Agric.Univ.7**:423-427.

SCREENING *Gossypium hirsutum* GENOTYPES FOR DROUGHT TOLERANCE

A. RAJAMANI

Agricultural Research Station, Kovilpatti 627 701

ABSTRACT

Twenty *G.hirsutum* genotypes were evaluated for their drought tolerance in rainy seasons of 1987 and 1988 under stress and per cent non-stress conditions. The crop under non-stress condition was irrigated at 25 percent available soil moisture at 30 cm depth. The present study revealed that genotype TKH679 registered the maximum seed cotton yield under stress condition and with yield potential as good as under non-stress condition though it produced lesser fruiting forms per plant.

Cotton is grown during the rainy season in vertisol area of the southern districts of Tamil Nadu during North East Monsoon which come in spells often results through depression and storms in Bay

Table 1. Rainfall distribution, irrigation and soil moisture details.

Crop Stage	Rainfall (mm)		No. of irrigations		Available soil mositure at 30 cm depth			
	'87-88	'88-89	'87-88	'88-89	'87-88		'88-89	
					Stress	Non stress	Stress	Non Stress
Vegetative Phase : sowing to 45 days	485.2 (20)	71.6 (7)	Nil	Nil	Moisture does not	Estimate arise	39.5	44.5
Flowering Phase : 46 to 75 days	73.8 (5)	63.4 (4)	Nil	2	60.5 to 75.5	87.0 to 94.0	2.5 to 16.5	18.0 to 29.5
Bolling period : 76 to 105 days	84.2 (1)	41.8 (4)	2	1	14.0 to 43.0	31.0 to 38.5	1.6 to 5.0	26.0 to 81.1
Boll bursting period : 106 to 135 days	49.6 (3)	35.6 (3)	2	1	9.0	18.0 to 26.0	Not taken	20.6 to 29.4
Total	642.8 (29)	212.4 (18)	4	4				

Figures in parenthesis are number of rainy days