



Genetic variability and correlation studies for traits related to drought tolerance in chickpea (*Cicer arietinum* L.)

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(Received: September 2005; Revised: June 2006; Accepted: June 2006)

The present investigation was undertaken to study the extent of genetic variability and association of traits related to drought tolerance in chickpea (*Cicer arietinum* L.). The experimental material comprised of 30 chickpea genotypes obtained from a large germplasm collection maintained at IARI, New Delhi. The material was planted in RBD with three replications under rainfed conditions. The seeds were sown in 2-rows plots of 4m length with a spacing of 45-30 cm. Five competitive plants of each genotype in each replication were randomly taken to record observations on days to maturity, plant height (cm), number of pods per plant, biological yield per plant (g), seed yield per plant (g) and 100-seed weight (g). Relative leaf water content (RWC%) was determined as per method suggested by Barrs and Weatherley [1] and membrane injury index was estimated as per method given by Deshmukh *et al.*, [2].

A wide range of variation was observed for almost all the traits in the material studied (Table 1). The magnitude of phenotypic coefficient of variation (PCV) was higher than the corresponding genotypic coefficient of variation (GCV) for all the characters suggesting the influence of environmental forces on the expression of these traits. The phenotypic and genotypic coefficients of variation were highest for 100-seed weight followed by seed yield whereas RWC and days to maturity (2.12 and 2.03) showed the low PCV and GCV respectively. Tolerant and susceptible genotypes behaved differently under moisture-stress. The genotypes ICCV 10, ICC 4958, Pusa 362 and Pusa 256 were found least affected while genotypes Pant G114 and H 208 were found

highly affected due to moisture-stress under rainfed environment. The mean relative water content (RWC%) was highest in ICCV 10 (81.64%) and it was lowest for H 208 (62%) under rainfed. Similarly, membrane injury under rainfed condition was highest in the genotype ICCV 10 (45.41%) whereas Pant G114 (74.45%) showed lowest membrane injury.

The correlation studies showed the higher estimates of genotypic correlation coefficient than the corresponding phenotypic component. The seed yield showed significant positive correlations with 100-seed weight, number of pods per plant, biological yield, plant height and RWC at both genotypic and phenotypic levels. Significant negative correlations of seed yield were observed with days to maturity and membrane injury at both genotypic and phenotypic levels. Biological yield showed significant positive correlation with 100-seed weight at both the levels while with number of pods per plant at genotypic level. Therefore, it is apparent that genotypes with higher biological yield, 100-seed weight, more number of branches and taller are high yielding and tolerant to moisture-stress under rainfed condition.

References

1. Barrs H. D. and Weatherley. 1962. A re-examination of the relative turgidity technique for estimating water deficit in leaves. *Aust. J. Biol. Sci.*, 15: 413-428.
2. Deshmukh P. S., Sairam R. M. and Shukla D. S. 1991. Measurement of ion leakage as screening technique for drought resistance in wheat genotypes. *Indian J. Plant Physiol.*, 34: 89-91.

Table 1. Mean, range, PCV and GCV of chickpea genotypes under rainfed conditions

Sl. No.	Characters	Mean	Range	PCV	GCV
1.	Days to maturity	139	133-144	2.12	2.03
2.	Plant height (cm)	44.0	33.4-51.4	10.72	10.11
3.	Pods/plant	113	71-141	15.13	14.86
4.	Biological yield (g)	71.7	53.0-99.8	17.04	16.79
5.	Seed yield/plant (g)	30.1	18.5-46.8	25.57	25.26
6.	100-seed weight (g)	18.1	11.9-32.4	30.62	30.61
7.	Membrane injury (%)	59.8	45.4-74.4	15.09	15.74
8.	Relative water content (%)	69.9	62.8-81.6	7.62	7.35