

# Effect of water stress on growth and seed yield of different varieties of chickpea (*Cicer arietinum* L.)

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## SUMMARY

A field experiment was conducted for exposing yield performance of twelve varieties/genotypes of chickpea under rainfed condition. The results revealed that more water stress condition affected the growth and development as well as yield of plant.

**Key words :** Chickpea, Water stress, Genotype, Growth, Yield

Chickpea (*Cicer arietinum* L.) is primarily a Rabi season crop grown throughout the country. Chickpea is the third most important grain legume in the world after dry beans. Its cultivation is mainly confined to Asia with 90% of the global area and production (Ali, 1985; Sharma, 1998; Haque, 2007). Water is required in the largest amount in plant life. Water is also most important for all equity in plant system. Without water any activity of plant does not take well during its life period. But the lack of water at appropriate time of plant growth stages the soil water adversely affects the metabolic processes like photosynthesis, protein synthesis, accumulation of metabolites, chlorophyll contents, as well as growth and developmental process like leaf area, rate of earing, reproductive growth and yield etc. (Benzoini *et al.*, 1967, Hasio, 1993).

The present paper deals with the growth and yield parameter of Chickpea varieties/genotypes for determining characters under soil moisture stress condition.

## MATERIALS AND METHODS

The experiment was conducted during 2006-07 in the field, Department of Botany, M.L.K.P.G. College, Balrampur. Twelve varieties/genotype *viz.*, Avarodhi, KWR-1108, KGD-1174, K-850, Radhey, ICCV-2, BG-256, Pusa-72, ICCV-10, Pusa-1053, Pusa-372 and JG-11, were used in this experiment. All varieties/genotype were procured from the IARI, New Delhi. The seeds were mostly sown as a rainfed crop and also experiment

was related to drought. The field was maintained at 14.6% moisture when seeds were sown. Smooth, healthy, bold and diseased free seeds were sown in well prepared soil. Sowing was done on 15, Nov. 2006 with the help of hand kudali to a distance of 13cm. row to row and 5cm seed to seed randomized block design with 4 replications. The growth parameters *viz.*, primary and secondary branches per plant were counted at different days intervals. The yields were also recorded. The data were statistically analyzed (Fisher, 1937).

## RESULTS AND DISCUSSION

Water stress has detrimental effects on growth development and yield of chickpea plants. The results are presented in Table 1. The result revealed that the water stress condition significantly affected growth parameter as well as seed yield in all the varieties/genotypes of chickpea. The genotypes Pusa-72, KGD-1174, and Pusa-1053 had maximum seed yield/hectare together with primary and secondary branches/plant. It is evident from the results that decrease in water uptake, leaf turgidity, and water status in plant under moisture stress may be associated with decrease in internal water status of the protoplasm (Kramer, 1963; Malik *et al.*, 1987; Sharma and Singh, 1987; Singh and Kumar, 1992, Haque, 2007), ultimately cause the reduction of seed yield.

The results suggested that an in built system of water economy in chickpea genotypes enables them to maintain vital function. Similar results were obtained by different workers (Ashraf and Karim, 1991; Nanda and Saini, 1992; Hasio, 1993; Patil *et al.*, 2002; Prasad *et al.*, 2008).

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**Table 1 : Growth parameters and seed yield in chickpea varieties/ genotypes**

Stages / genotypes	At 40 DAS		At 55 DAS		At 85 DAS		At 145 DAS		Seed yield/ ha(kg)
	Primary branches/ plant	Secondary branches/ plant	Primary branches/ plant	Secondary branches/ plant	Primary branches/ plant	Secondary branches/ plant	Primary branches/ plant	Secondary branches/ plant	
Avarodhi	2.8	2.0	3.3	2.9	5.8	23.6	6.2	31.1	1780
KWR-108	2.8	1.0	3.3	3.2	4.8	30.1	5.0	39.2	1813
KGD-1174	3.0	1.8	3.4	4.1	5.1	38.0	7.2	49.6	1973
K-850	3.2	1.0	3.7	3.6	6.8	33.7	7.3	28.0	1840
Radhey	2.9	1.3	3.3	2.7	5.3	33.7	5.9	35.2	1690
ICCV-2	3.3	1.2	3.1	3.0	6.2	27.6	6.1	30.5	1733
BG-256	2.7	1.0	3.6	2.4	4.8	23.9	4.8	38.5	1624
Pusa-72	3.3	2.1	3.4	4.3	6.5	26.9	6.9	49.9	1885
ICCV-10	2.4	1.0	3.1	2.0	5.2	36.4	5.1	31.3	1823
Pusa-1053	2.9	1.2	3.0	3.9	5.3	25.3	5.9	40.4	1824
Pusa-372	3.1	1.3	3.1	2.9	5.1	32.8	6.9	25.8	1798
JG-11	2.9	1.3	3.0	2.8	5.3	24.8	5.4	32.1	1673
Mean	2.9	1.4	3.3	3.2	5.5	26.2	6.0	35.9	1774.5
S.E. $\pm$	0.399	0.185	0.358	0.143	0.646	1.321	0.586	1.764	81.536
C.D. (P=0.05)	0.699	0.372	NS	0.291	NS	2.687	1.192	3.588	165.886

N.S.-Non significant

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