International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(5): 142-144

Received: 18-07-2017
Accepted: 19-08-2017

D Swetha
Ph.D Scholar, AGRONOMY, College of Agriculture, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad, Telangana, India

SA Hussain
Professor, agronomy, College of Agriculture, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad, Telangana, India

Correspondence
D Swetha
Ph.D Scholar, agronomy, College of Agriculture, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad, Telangana, India

Effect of moisture regimes on nutrient uptake and quality of chickpea cultivars (*Cicer Arietinium L.*)

D Swetha and SA Hussain

Abstract
The present investigation entitled "Effect of moisture regimes on nutrient uptake and quality of chickpea (*Cicer arietinum L.*)" were carried out at College Farm, College of Agriculture, Rajendranagar, Hyderabad. The results revealed that N, P and K uptake was more in 0.6 IW: CPE (I_3) but it was on par with 0.9 IW:CPE (I_4) and significantly superior as compared to I_1 (Rainfed) and I_2 (0.3 IW:CPE) while, varieties did not differ significantly in respect of NPK uptake. Protein content was recorded significantly superior in 0.9 IW:CPE (I_4) it was on par with 0.6 IW:CPE (I_3). The varieties have no influence on protein content.

Keywords: Chickpea, Irrigation scheduling, IW/CPE ratio, NPK uptake, Protein content, Quality parameter

1. Introduction
Pulses are commonly known as food legumes which are secondary to cereals in production and consumption in India. Pulses are the most valuable and naturally occurring sources of protein, vitamins, minerals and calories. Pulses play an important role in Indian agriculture as they restore soil fertility by fixing atmospheric nitrogen (approximately 20 kg ha^{-1}) through their nodules. Some pulses are drought resistant and some are having erosion resisting property due to their deep root system and good ground coverage. Because of these good characters, pulses are called as 'marvel of nature' (Parihar and Sandhu, 1987) [4].
Chickpea (*Cicer arietinum L.)* is one of the most important grain legumes and belongs to the family Leguminosae. It is a drought tolerant leguminous crop used in various foods in several developing countries including India as a source of highly digestible (70-90%) dietary protein. Water is a crucial input for augmenting crop production towards sustainability in agriculture. Scientific water management aims to provide suitable soil moisture environment to the crop to obtain optimum yield commensurate with maximum economy in irrigation water and maintain soil productivity.
Availability of moisture in the soil enhances the efficiency of applied nutrients. Any reduction of soil moisture at critical stages will considerably reduce the grain yield. Therefore, it is necessary to evaluate irrigation scheduling so as to realize highest nutrient (NPK) uptake and quality parameter (protein) of chickpea cultivars.

2. Materials & Methods
A field experiment was conducted to during *rabi*, 2013-2014. The research work was carried out at College Farm, College of Agriculture, Rajendranagar, Hyderabad. The soil of the experimental field was sandy loam in texture with pH of 7.8. The soil was low in available nitrogen (226 kg ha^{-1}), available phosphorus (18.5 kg ha^{-1}) and medium in available potassium (235 kg ha^{-1}) contents. The experiment was laid out in a randomized block design (two factors) with one factor I: treatments of four moisture regimes *viz.*, I_1 (Rainfed), I_2 (0.3 IW: CPE), I_3 (0.6 IW:CPE), I_4 (0.9 IW:CPE) and factor II : varieties JG-11 and Annegiri and replicated thrice. Chickpea was sown after treating the seed with Rhizobium and were hand dibbled @ 2 seeds $hill^{-1}$ at a depth of 6 cm and sowing was carried out in N-S direction leaving 10 cm space between two hills with a row to row gap of 30 cm. Immediately after sowing basal application of N-20, P_2O_5-50, K_2O-40 kg ha^{-1} was applied. Intercultural operations like weeding, irrigation, pruning, disease and insect management were done as per necessary.
Nitrogen content in grain samples of chickpea were estimated by modified micro Kjeldahl method after digesting the powdered plant sample with H_2SO_4 and H_2O_2 (Piper, 1966) [5].

This nitrogen content of grain samples was multiplied with a factor 6.25 and protein content of grain samples of chickpea was obtained (Piper, 1966) [5].

The tri-acid digested plant samples were analysed for phosphorus content by Vanado - molybdo phosphoric acid yellow colour method. The intensity of yellow colour developed was measured using Spectronic – 20 D. The uptake of phosphorus was calculated by multiplying the phosphorus content with the respective dry matter production and expressed in kg ha^{-1}.

Potassium content of the diluted tri-acid digest was determined by using ELICO flame photometer and the uptake of potassium was estimated by multiplying the K content with the respective dry matter production and presented in kg ha^{-1}.

The data recorded were statistically analyzed duly following the analysis of variance technique for randomized block design as suggested by Panse and Sukhatme (1978) [3].

3. Results and discussion

The present investigation entitled "Effect of moisture regimes on nutrient uptake and quality of chickpea (*Cicer arietinum L.*)" were carried out during *rabi*, 2013-2014 at College Farm, College of Agriculture, Rajendranagar, Hyderabad. The results of the investigation, regarding the chickpea on NPK uptake and protein content have been presented in table 1.

Table 1: NPK uptake and protein content of chickpea grain influenced by varied moisture regime

TREATMENTS	N uptake (kg ha^{-1})			P uptake (kg ha^{-1})			K uptake (kg ha^{-1})			Protein content (%)		
	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
T1-CONTROL	51.06	54.45	52.76	0.32	0.22	0.27	24.54	23.09	23.82	19.13	18.67	18.90
T2-0.3IW:CPE	66.78	58.45	62.62	0.45	0.42	0.37	31.33	29.58	30.46	22.50	22.00	23.30
T3-0.6 IW:CPE	74.92	71.23	73.08	0.51	0.55	0.53	36.44	34.23	35.34	24.90	24.70	24.80
T4-0.9 IW:CPE	70.47	62.34	66.41	0.25	0.35	0.30	33.92	32.16	33.04	23.00	22.90	22.30
Mean	65.81	61.62	63.71	0.38	0.39	0.38	31.56	29.77	30.66	22.82	22.50	22.66
	SE(m)	CD		SE(m)	CD		SE(m)	CD		SE(m)	CD	
Factor A	1.11	3.36		0.04	NS		0.46	1.39		0.63	NS	
Factor B	1.57	4.76		0.06	NS		0.65	1.97		0.89	2.61	
Factor (A x B)	2.22	6.73		0.08	NS		0.92	2.79		1.25	NS	

3.1 NPK Uptake (AT Harvest)

Varied moisture regime had a significant influence on N, P_2O_5 and K_2O uptake of plants at harvest (table 1).

Increasing irrigation frequency resulted in increase in total uptake of N, P_2O_5 and K_2O (table 1). The highest uptake was obtained with I_3 treatment. With additional increase in the frequency of irrigation upto I_4, nitrogen uptake was lower due to leaching losses and lower yield levels. The lowest uptake was obtained with I_1 (control) treatment. But as a whole, the increase in irrigation frequency resulted in higher solubility of nutrients and higher uptake. Meager water supply or excessive irrigation can result in unavailability or leaching of a major part of nutrients resulting in insufficiency of nutrient and low yields. Proper water management will hold these losses to a bare minimum. Likewise, the amount and movement of water in soil influence the availability of nutrients to plant roots. Similar findings were reported by Roy and Tripathi (1985), Dixit *et al*. (1993) [1], Srivastava and Srivastava (1994), Reddy and Ahlawat (1998).

The highest K uptake was obtained with I_3 treatment. With additional increase in the frequency of irrigation upto I_4, P uptake has been not influenced by irrigation.

Varieties and interaction effect of varied moisture regime and varieties has shown significant effect. Among varieties, JG-11 has showed more N and K uptake but P uptake remained non significant.

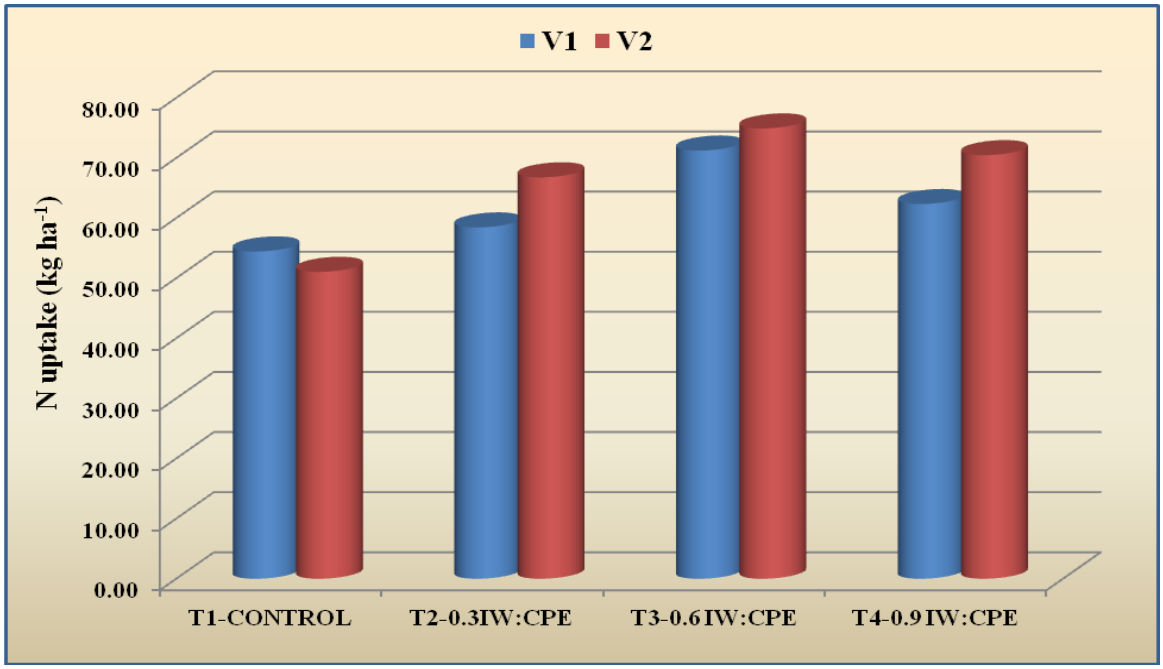

Fig : N Uptake of chickpea grain influenced by varied moisture regime

IW:CPE- Irrigation Water:Cumulative Pan Evaporation, V1-JG-11, V2-Annegiri

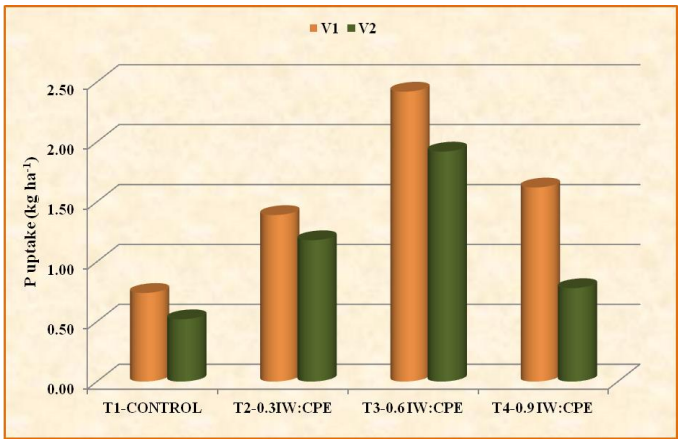

Fig : P Uptake of chickpea grain influenced by varied moisture regime

IW:CPE- Irrigation Water:Cumulative Pan Evaporation, V1-JG-11, V2-Annegiri

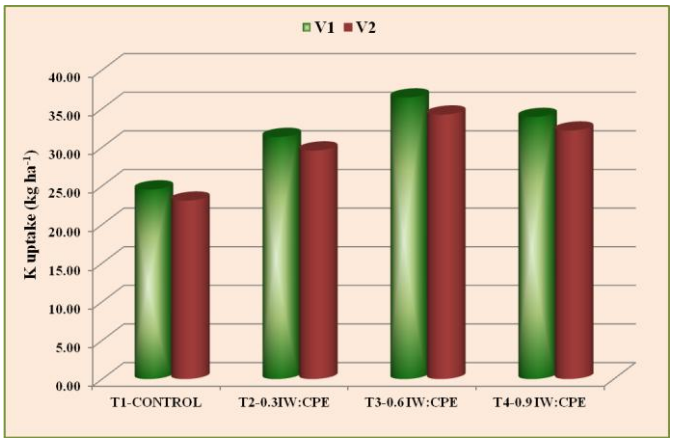

Fig : K Uptake of chickpea grain influenced by varied moisture regime

IW:CPE- Irrigation Water:Cumulative Pan Evaporation, V1-JG-11, V2-Annegiri

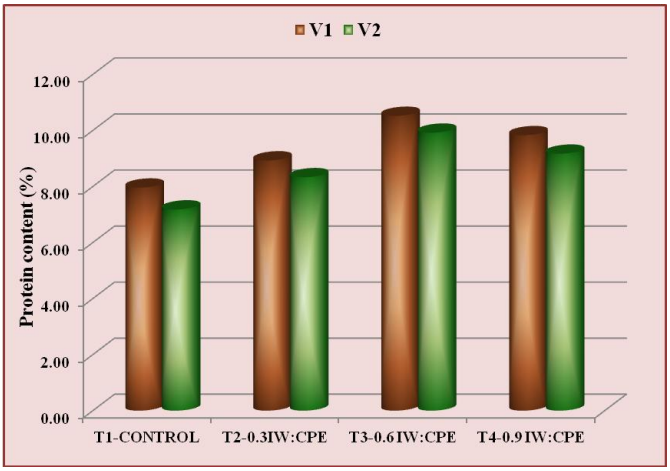

Fig : Quality parameter of chickpea grain influenced by varied moisture regime

IW:CPE- Irrigation Water:Cumulative Pan Evaporation, V1-JG-11, V2-Annegiri

3.2 Quality Parameter

1. Protein content (%)

It was evident from the data in (table 1) that the protein content of chickpea was significantly influenced by varied moisture regime. The treatment I_3 (0.6 IW:CPE) recorded (24.9% and 24.7% for JG-11 and Annegiri, respectively) significantly higher protein content as compared to I_1 - control (19.13 % and 18.67 % for JG-11 and Annegiri, respectively), I_2 -0.3 IW:CPE (22.50 % and 22 % for JG-11 and Annegiri, respectively) and I_4 -0.9 IW:CPE (23% and 22.9% for JG-11 and Annegiri, respectively). The lowest protein content was observed in I_1 (control) treatment. This finding is conformity with those of Dixit *et al.* (1993) [1].

The varieties as well as the interaction effect of irrigation schedules and varieties has no consistency and finally results in insignificant data.

4. Conclusion

In view of the experimental results obtained during the present investigation, the total N, P_2O_5 and K_2O uptake was lowest with I_1 (rainfed) and increasing frequency of irrigation resulted in higher uptake of nutrient. The treatment 0.6 IW:CPE (I_3) has recorded highest uptake. Genotype variation was not seen. Protein content (%) was highest in 0.9 IW:CPE (I_4) but it was on par with 0.6 IW:CPE (I_3). Treatment I_4 is significantly superior than I_1 (rainfed) and I_2 (0.3 IW:CPE). The varieties have no influence on protein content.

5. References

1. Dixit JP, Dubey OP, Soni NP. Effect of sowing date and irrigation on yield and nutrient uptake by chickpea cultivars under Tawa Command Area. Indian Journal of Agronomy. 1993; 38(1):227-231.
2. Pathi RS. Effect of irrigation and phosphorus on yield, nodulation, water use efficiency and nutrient concentration in chickpea. Indian Journal of Agronomy. 1985; 30(4):401-406.
3. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. 3rd edn., ICAR, New Delhi, 1978, 347.
4. Parihar SS, Sandhu BS. Irrigation of field crops principles of practices. Published by Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa, New Delhi, 1987.
5. Piper. *Soil and Plant Analysis.* Academic Press, New York and Hons Publications, Bombay, 1966, 28-46.
6. Srivastava GP, Srivastava VC. Effect of irrigation and foliar spray of nutrients on growth and seed yield of gram (*Cicer arietinium*). Indian Journal of Agricultural sciences. 1994; 64(4):219-22.