RESEARCH NOTE | International Journal of Agricultural Engineering | Volume 5 | Issue 1 | April, 2012 | 121 –122

Effect of drip and micro sprinkler irrigation on soil moisture distribution pattern in tomato crop under clay loam soil

SHIVANAND H. KAKHANDAKI, O. PADMAKUMARI, M.S. MADHUSUDHAN AND K.T. RAMAPPA

Received : 17.01.2012; Revised : 14.02.2012; Accepted : 19.03.2012

See end of the Paper for authors' affiliations

Correspondence to:

SHIVANAND H. KAKHANDAKI
Department of Farm Machineyr and Power Engineering, University of Agricultural Sciences, RAICHUR (KARNATAKA) INDIA
Email : shivuagengg@yahoo.co.in

Abstract **:** Field experiment was conducted using drip and micro sprinkler irrigation on soil moisture distribution pattern in tomato crop under clay loam soil, revealed that moisture content at the surface (below the emitter) decreased from 29.60 to 29.18 per cent vertically down from 15-60 cm depth at the midpoint between two micro sprinklers for micro sprinkler system. Higher level of moisture was distributed in the midpoint between the two micosprinklers, but in drip irrigation more water penetrated into the deeper layer and crop utilized the water very effectively.

Key words **:** Drip irrigation, Micro sprinkler irrigation, Surface applied water, Moisture content

How to cite this paper **:** Kakhandaki, Shivanand H., Padmakumari, O., Madhusudhan, M.S. and Ramappa, K.T. (2012). Effect of drip and micro sprinkler irrigation on soil moisture distribution pattern in tomato crop under clay loam soil. *Internat. J. Agric. Engg.*, **5**(1) : 121-122.

Micro irrigation (*i.e.*, Drip and Micro Sprinkler irrigation) is fast gaining popularity due to water scarcity in most parts of India. In micro irrigation, water movement and its distribution in the soil depends upon many parameters such as soil type, rate of infiltration, hydraulic conductivity, rate of emitter and micro sprinkler discharge, quantity of water applied, depth of water table and certain climatic factors. The rate of applying water in micro irrigation is an important factor which governs moisture distribution in the soil profile. A high rate may cause deep percolation loss whereas, a very low rate may contribute to evaporation loss. Keeping the above facts in view, the present study on the distribution pattern of soil moisture under micro irrigation was studied in tomato crop at Tamil Nadu Agricultural University, Coimbatore.

Field experiment was conducted using drip and micro sprinkler irrigation on soil moisture distribution pattern in tomato crop under clay loam soil at Tamil Nadu Agricultural University, Coimbatore. This place is situated in North Western agro climatic zone of Tamil Nadu at 11^0 N latitude and 77^0 E longitude and at an altitude of 431 MSL. To study the moisture distribution pattern in clay soil under drip and micro sprinkler irrigation system, the system was designed with measured paths and lengths of main, sub main and lateral lines from water source to experimental site. To maintain the required operating pressure in the system the main line was connected with the pumping source (bore well) along with a gate valve for regulating water as per the treatment requirement. Average discharge of drip and micro sprinkler were 4 lph and 36 lph, respectively. Treatments included in this experiment were irrigation by drip system (T_1), irrigation by micro sprinkler system (T_2), and surface irrigation. Soil samples were collected after 24 hours of irrigation. After determining the moisture content (by weight) at different points in the soil profile 60 cm deep and 60 cm wide for micro sprinkler (on both side of drip and micro sprinkler) moisture content lines were plotted. The analysis of the data of moisture content was done before and after irrigation and soil moisture contour maps for longitudinal cross section of the soil moisture were plotted by using software "Surfer". A plane flow profile was considered to explain the behavior of moisture distribution in the soil under drip and micro sprinkler irrigation system.

A plane flow profile was considered to explain the behavior of moisture distribution in the soil under drip and micro sprinkler irrigation. It was observed that maximum water was observed in the surface rather than in deeper layer in case of surface irrigation but in drip and micro sprinkler irrigation, the distribution pattern was quite different. In micro sprinkler system, the moisture content after 24 hours at the surface (mid point between two micro sprinklers) increased

Table 1 : Soil moisture content (%) in drip and micro sprinkler plot after irrigation

		D_1	D_2	D_3	D_4
T_1	E_1	29.20	29.10	29.03	28.95
	E_2	29.25	29.19	29.12	29.01
	E_3	29.30	29.21	29.16	29.09
T_2	E_1	29.08	29.51	29.62	29.65
	E_2	28.95	29.43	29.47	29.20
	E_3	28.60	29.14	29.17	28.70

SED 0.35
CD (0.05) 0.72

from 29.08 to 29.18 per cent (Table 1 and Fig. 1), less water penetrated into the deeper layers, high moisture was distributed at upper layer only. Loss of water through drift and evaporation might be the reason for that.

In drip irrigation system moisture content after 24 hours at the surface (below dripper) decreased from 29.60 to 29.10 per cent (Table 1 and Fig. 2). More water penetrated in the deeper layer and crop utilized water very effectively. This might be due to the deep percolation of water application and less run-off-losses in the surface. This is in the surface. This is in conformity with findings of Geol *et al*. (1993).

To study the horizontal and vertical movement of water moisture content lines were also drawn in terms of per cent moisture content (by weight) (Fig 1) showed that high moisture distributed in the mid point of two micro sprinkler

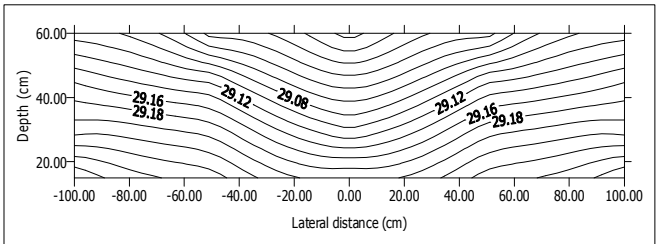

Fig. 1 : Soil moisture distribution in micro sprinkler plot after irrigation

might be reason for that.

Fig. 2 showed that at the beginning, water saturated the soil near the dripper and infiltration was slower, but at later stages water penetrated deeper without any losses as in case of micro sprinkler and surface irrigation. These results are in confirming with the findings of Shivanappan *et al*. (1987). Horizontal movement of water was not related to the quantity of water and was similar in all treatments. Drip irrigation was

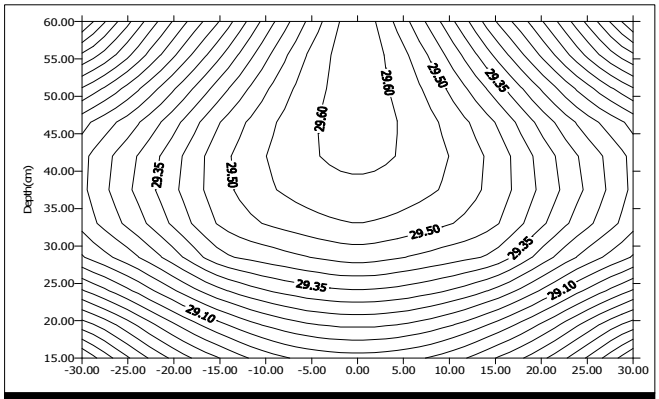

Fig. 2 : Soil moisture distribution in drip plot after irrigation

the best to wet the soil quickly and steadily to utilize moisture very effectively by the tomato crop.

Authors' affiliations:
O. PADMAKUMARI, M.S. MADHUSUDHAN AND K.T. RAMAPPA, Department of Soil and Water Conservation Engineering, University of Agricultural Sciences, RAICHUR (KARNATAKA) INDIA

REFERENCES

Sivanappan,R.K., Padmakumari, O. and Kumar, V. (1987). Drip irrigation, Keerthi Publishers,126, Sarojini Street, Coimbatore,Tamil Nadu. 428.

Goel, A.K., Gupta, R.K. and Kumar, Rajinder (1993). Effect of drip discharge rate on soil moisture pattern. *J. Water Management,* **1**(1): 50-51.

***