

Research Paper :

Moisture distribution studies through emitters of drip irrigation in soil

M.H. KAUTE AND S.P. GAIKWAD

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ABSTRACT

The ever increasing population growth rate has compelled to maximize food production per unit of water used, as water is major resource for agricultural production. The micro irrigation system has now become indispensable for increase in crop production as water is directly applied to the root zone of the plant. Thus micro irrigation minimizes conventional losses due to deep percolation, runoff and soil evaporation and also permits the effective utilization of fertilizers, pesticides and other water soluble chemicals along with irrigation water with better crop response. A perfect design of trickle irrigation requires knowledge of water distribution pattern in soil. The moisture distribution pattern will determine effectiveness of drip irrigation system in field conditions. One of the important parameter affecting water distribution to the plant in the field condition is hydraulic characteristics of drip irrigation system, therefore, it is essential to understand hydraulic performance of drip irrigation system in relation to soil moisture distribution.

See end of the article for authors' affiliations

Correspondence to:

M.H. KAUTE

Department of Irrigation and
Drainage Engineering,
Padmashree Dr. D.Y. Patil
College of Agricultural
Engineering and Technology,
KOLHAPUR (M.S.) INDIA

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Now a days India facing the major problem of population explosion, therefore, the micro irrigation system has now become indispensable for increasing in crop production. Micro irrigation is an efficient method for providing prescribed amount of irrigation water directly in to the soil at the root zone of the plant. Also it is science of planning and designing of efficient low cost economic system tailored to fit natural condition.

Efficient trickle irrigation system requires selection of emitters spacing, water application rate and duration of irrigation. This parameter depends upon the hydraulics of soil moisture plant and growth stage of crop to be irrigated. Water moves across the soil surface away from the emitters until the infiltration rate of the ponded area matches with the discharge area. The rate of application of water in the drip irrigation is an important factor which governs moisture distribution in soil profile. Water moves through soil profile under gravitational and capillary forces. A high rate may cause deep percolation loss where as very low rate may contribute to evaporation losses.

METHODOLOGY

The present investigation moisture distribution study through emitters of drip irrigation systems was carried out at Pad. Dr. D.Y. Patil college of Agricultural Engineering and Technology during May 2007 to June

2008. The details regarding the materials used and methodology adapted is explained as below.

Specifications of equipment used:

Pump and filter unit :

A monoblock centrifugal pump set of following specification was used to lift water from tank. HP- 1, rpm- 2880, size – 50cm x 40 cm, voltage 180/ 240, make – Bhargar enterprises Bombay. An ISI mark 100 mesh was used for the present study to make the water free from dust and debris.

Laterals:

An ISI marks LLDPE tube of 16 mm diameter and 20 m length was used for the present investigation. The inner diameter of lateral was 13.66 mm and thickness was 1.17mm. The emitter was spaced at every 60cm along total lateral length to be tested.

Emitters :

The following specifications emitters were used for this study.

Pressure gauge :

The pressure gauge was used to measure operating system of system and was attached on the main line as