International Journal of Agricultural Engineering, Vol. 2 No. 1 : 88-91 (April to September 2009)

Determination of emission uniformity of emitter in gravity fed drip irrigation system

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Accepted : *February, 2009*

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ABSTRACT

The field experiment was performed to study the performance evaluation of gravity fed drip irrigation system for cucumber crop during the year 2007 – 2008 at Research Farm, Department of Irrigation and Drainage Engineering, Dr. Budhajirao Mulik College of Agricultural Engineering and Technology, Mandki – Palvan, Tq. Chiplun, Distt. - Ratnagiri (Maharashtra). The study was carried out for determination of emission uniformity (EU), manufacturers coefficient of variation (cv) and cost economics of gravity fed drip irrigation system with a field area of 10 m × 5 m under the cucumber crop. The emitters, which were used in gravity fed drip irrigation system having average discharge of 2.6 lph. The diameter of mainline and sub main was 25.4 mm and that of lateral was 16 mm. The emission uniformity of system was found to be 90.58 % and was good as compared with ASAE interpretation. The manufactures coefficient of emitter was 0.0428, which was good as per ASAE interpretation and cost of the gravity fed drip irrigation system for experimental field was Rs. 1095 whereas the cost of the gravity fed drip irrigation system per hectare was Rs. 74520.

Key words : Gravity fed drip irrigation system, Manufacturers coefficient of variation, Emission uniformity, Regression coefficient and cost economics of gravity fed drip irrigation systems etc.

Drip irrigation systems are advanced method of irrigation through which water is applied directly to root zone around the plant through a pipe network with the help of emitter. This facilitates the slow release of water to fulfill the consumptive use of plant with high water use efficiency and crop yield (Singh *et al*., 2001). The drip irrigation is very efficient for increase the yield of cucumber with on an average water requirement is up to 1 to 2 inches per day in hot region. The yield of cucumber may be increased 23.7 per cent in drip irrigation as compared to other irrigation systems at the emission uniformity (EU) up to 95 per cent with the benefit cost ratio for cucumber crop by using drip irrigation is 3.72 (Changade, 2005). Low cost irrigation system for growing winter vegetables can save water up to 40 per cent (Sahu, 1984).

In drip irrigation system, small quantities of water are applied at frequent intervals directly to the plant root zone from single emission point, line source, small spray and bubbles or subsurface with proper applicator. The rate of applying water in drip irrigation is an important factor, which governs moisture distribution in soil profile. A high rate may cause deep percolation loss whereas very low rate may contribute to evaporation losses. The drip irrigation method is favored over others systems because of added advantages like higher irrigation efficiency *i.e.* up to 90 per cent. It saves 60 per cent of water as compared to surface irrigation methods.

METHODOLOGY

The Layout of Gravity fed drip irrigation system for 10 m × 5 m area was determined for cucumber plantation and installed in a study field. The basic information required for the layout of drip irrigation system is as given in Table 1.

Table 1: The basic information required for drip irrigation system

Sr. No.	Particulars	Specification
1.	Crop type	Cucumber
2.	Crop spacing	1 m × 1 m
3.	Soil type	Clay loam
4.	Water source	Storage tank (300 lit.)
5.	Topography	Flat
6.	Climatic record	No rainfall during experiment

The emission uniformity is essential for determination of total depth of irrigation. An efficient irrigation system must apply water uniformly through out the field. Low emission uniformity (EU) will necessitate applying more water to satisfy need of plant receiving less than their water requirements. High EU is achieved by maintaining a limited variation in discharge rate amount system emitters. A simple method for evaluation of emission uniformity has been described below.