THESIS

VARIABILITY IN WETTING PATTERNS AND ESTIMATING UNIFORMITY IN FIELD UNDER DRIP IRRIGATION SYSTEM

By

Muhammad Azmat
2008-PG-WRM-27

For the Degree of

MASTER OF SCIENCE

IN

WATER RESOURCES MANAGEMENT

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
University of Engineering and Technology, Lahore, Pakistan

2011

ABSTRACT

Use of pressurized irrigation system getting popularity and drip irrigation has been recognized as the best efficient water saving technique throughout the world. Scientists are working on different aspects of drip irrigation. Selection of appropriate spacing of drippers for efficient utilization of irrigation water is needed to be addressed properly. The dimension of the wetted volume is the main factor in determining the spacing of drippers. Semi-empirical model based on the average change in volumetric water content, the total volume of water applied, the application rate and saturated hydraulic conductivity were used to determine the surface wetting radius and the vertical advance of wetting front produced by point source trickle irrigation. The numerical values of the wetted surface radius and vertical advance of wetting front were verified with the observed data. This study was design at laboratory level to determine the dimensions of wetted patterns beneath the dripper for loamy sand soil during water application rates of 2, 3, 4, 8 Lph in a Plexiglas physical model. Results revealed that the water application and the time of application have significant affects on vertical wetting front advance and horizontal wetting front advance within the soil profile. Field applications of the emitters were also tested in already installed drip irrigation system for estimation of emission uniformity at three different pressure levels (0.80, 1.0 and 1.20 bars). Model results under estimated the wetting front advance but it found to be a reliable method to predict the wetting patterns for small discharged emitters. Based on our experiment, the emission uniformity at 1.0 bar pressure satisfies the performance of emitters in applying water to the tune of designed discharge. The emission uniformity at 1.20 bar pressure was higher compared to 0.80 bar pressure. Further studies were suggested to study the wetting patterns with different angles.