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Effect of Inter Spaces and Emitter Types on the Hydraulic Performance of Drip Irrigation System

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Abstract

This study was conducted at the Demonstration Farm of the Faculty of Agriculture, University of Khartoum – Shambat, during May 2011 to February 2012, to investigate the effect of inter-space and emitter type on hydraulic performance of drip irrigation system. The farm lies at 32°E and 15.36° N and 380 m above mean Sea level. Two types of emitters were used, online pressure compensation (Eo) and inline labyrinth (Ei) with two different inter spaces (0.5 and 0.3 m). Factorial design was used to analyze the variation in Discharge (q), Reduction of discharge(R)%, Coefficient Uniformity (CU)%, Emission Uniformity (EU%) and Clogging percentage (P_{clog}). Analysis of variation showed that there were significant differences ($P \leq 0.05$) among the measured parameters. Whereas highest values of discharge(q), Coefficient Uniformity (CU)% and Emission Uniformity (EU)% were recorded by Eo. While the highest values of Clogging percentage (P_{clog}) and Reduction of discharge (R) were recorded by Ei . The 0.5m emitter inter space showed higher values of Discharge (q), Uniformity of Coefficient(CU)% and Emission Uniformity (EU)% than 0.3m inter space, and at the same time it is showed the lowest values of Reduction of discharge (R)% and Clogging percentage (P_{clog}). This study concluded that emitter types and inter spaces are important factor in drip irrigation system design. Therefore, should be considered when planning for efficient drip irrigation system.

Keywords: Drip irrigation system; Uniformity parameters; Emitter types; Inter-Spaces.

1. Introduction

The growing scarcity and misuse of available water resources particularly in arid and semi-arid regions constitute challenges to water demands for various utilities, and major threats are facing sustainable agricultural development which use about 80-85% of water consumption.

Adequate water demand management necessitates the establishment of structure of incentives regulations and restrictions that will help guide influence and coordinate how water is used efficiently. Hence, innovations in irrigation water saving technologies are highly needed. For obtaining high effectiveness of irrigation water application, drip irrigation is the most appropriate modern technology of irrigation, Sharma, (2013). It is considered as a method which takes water from source to plant without water losses. Thus, it is saving for about 70% of used water without affecting significantly the crop yield, (Pandey, 2005). Also Dutta, (2008) stated that water will be saved with

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