

1. Introduction

Drip irrigation is one of the recent irrigation-systems which are used to cultivate the desert land. Drip irrigation system is distinguished by its high efficiency in decreasing the loss of irrigation water to the least limit compared to all other systems . The drip irrigation uses small quantities of water which are close to the water consumptive use of the plants and it is added in a low rate, or short consecutive periods. In this system , the plant's root zone is only wetted without the rest of the soil surface, and its use becomes necessary in the regions which suffer from scarcity of water for irrigation and also in the regions which are facing salinity soil problems or shortage of hand-labour. These types of lands are included in the dry barren regions or deserts which have their irrigation water often from the wells which cost lots of money, therefore the water applied should be cut down to the needed requirement . This system is usually used in irrigating fruit trees and vegetable plants which are planted in extensive distances . The idea of drip irrigation is summarized in the passing water in a network of pipes consisting of a main pipe connected with a source of water, and from this main pipe water is distributed in submain pipes, from which branches of laterals hose-pipe which carries the emitters. These emitters humidify the soil in suitable rates under low pressure. The advantages of the drip irrigation system can be fulfilled when it is designed in a way to give any plant in the field enough quantity of water, however its place in the field .

The design of the drip irrigation for any farm requires study of several factors on which the efficiency and success of this system depend. Several factors must be considered for the efficiency of any drip irrigation design of which the dissimilarity of the emitters which results from the difference in manufacturing .

Also determination of the ratio between wetted area and total area for each tree is considered one of the important factors for the success of the design and management of drip irrigation . This ratio depends on; the emitter flow-rate, soil type, space between the emitters, and the spaces between rows. Therefore enough emitters should be located around the tree for a strong root system and subsequently the highest yield . In the case of vegetable or field crops , there strip of soil along the row of planting should be wetted and this need that emitters should be at close distances. Generally , the spaces between emitters along a lateral are determined by considering the selected discharge and the type of soil and crop grown. For designing the drip irrigation system for a field, the relationship between the operating pressure-head and the corresponding discharges for the selected emitters must be known . The selection of optimum spaces of emitters for optimum drip irrigation design is not an easy matter, considering the nonlinear relationships between the variables involved . Local field trials should be carried out in order to achieve the best results . Therefore , the aim of this work is to study the following design parameters :

- Hydraulic characteristics of some emitter and emitter evaluation.
- Effect of discharge rate on soil moisture distribution pattern .
- Effect of drip irrigation design layout on capital cost of the system .