MOISTURE AND FERTILIZERS DISTRIBUTION UNDER TRICKLE IRRIGATION SYSTEM

BY

ABD EL-AZIZ IBRAHIM GAD AHMED

A thesis submitted in partial fulfilment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

In
Agricultural Science
(Soil Science)

Department of Soils
Faculty of Agriculture
Ain Shams University

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Approval Sheet

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Abstract

The study revealed that the depletion rate in trickle irrigated sandy soils decreased when the soil depth increased during the first 24 hours after irrigation.

The average moisture content at any time, for the high irrigation intensity was a little bit lower than the low irrigation intensity.

It was found that a distance, between lateral lines, of 100 cm could be assumed to be adequate for best moisture distribution.

The varying effect of different cultivation methods, under trickle irrigation system, on the crop yield was due to variations in moisture stress levels in the root zone.

The chelated compounds showed a preferable behaviour when chelated Iron and Zinc were used through the pipe lines of the irrigation system. It was found that chelated iron and Zinc partially moved through mass flow.

It was found also that Iron and Zinc precipitated at the edge of the wetted core in the middle distance between lateral lines.

ACKNOWLEDGEMENT

The author wishes to express his deepest gratitude to Prof. Dr. M.E. El-Nenneh, professor of Soil Science, Dept. of Soils, Faculty of Agriculture, University of Ain Shams, Prof. Dr. A.M. El-Gindy, professor of Agricultural Engineering, Dept. of Soils, of the same Faculty and University, and Prof. Dr. M.A. Massoud, Professor of Soil Science, Dept. of Soil and Water Research, Atomic Energy Authority, for planning, supervising and advising throughout the work and writing the manuscript.

The author wishes also to thank Dr. Hesham El-Abd for his advice in the field and laboratory work.

Thanks are also due to the staff members and technicians of the Agricultural Dept. for Soil and Water Research, Atomic work. Thanks are due to the Desert Development Center of the American University in Cairo specially Mr. J. Carlier for providing Broccoli seedlings.

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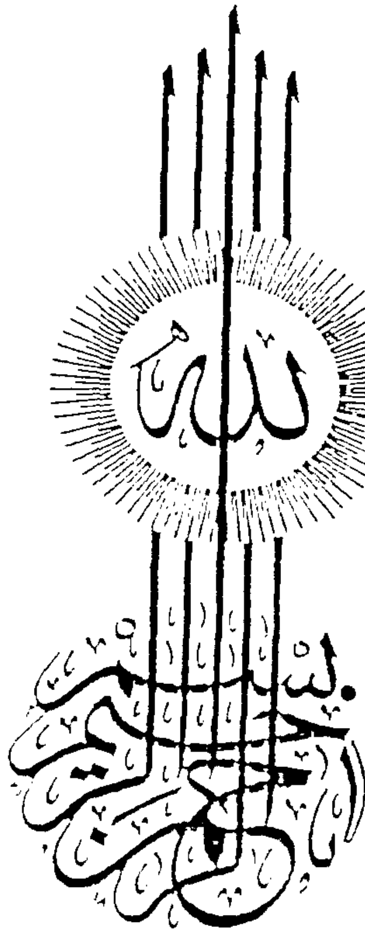


وجعلنا من المآء كل
شيءٍ حيٍ أفلا يؤمنون.

الأنبياء [illegible]

1.INTRODUCTION.

One of the major problems in Egypt is the rapid increase of population. To solve this problem, it is necessary to increase agricultural production, both vertically and horizontally.

Because of the limited water supply in Egypt, increasing water use efficiency is essential in the development.

Egypt has a large area of marginal desert soils, introducing these soils to agricultural production requires development of new irrigation and fertilization techniques different from those used in the valley. Drip irrigation method is considered the best techniques for solving irrigation and fertilization problems in desert soil.

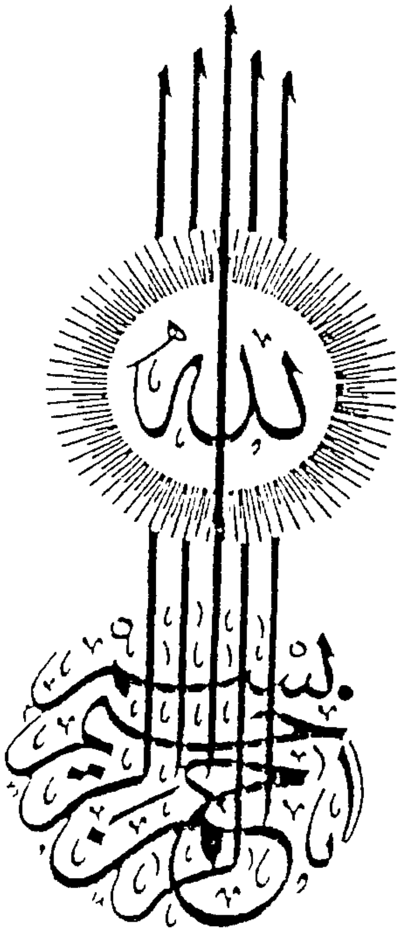
Drip irrigation introduces possibilities for precision application of water,fertilizers, and other chemicals. One of the advantages often attributed to drip irrigation is high uniformity of water application over the irrigated area.

Generally, in arid regions, water supply is inadequate compared with the area that can be irrigated, limited irrigation is often practiced with a view to obtain less than maximum yield, which increase the total farm yield and water-use efficiency and increases the irrigated area.

In the new reclaimed land, the Egyptian government imposes, by , the use of modern irrigation techniques, it is strongly recommended to use untraditional irrigation methods, such as flood or furrow irrigation. The introduction of new irrigation methods, could cause several detrimental problems. Farmers are not accustomed to use new techniques and supporting services. For example, land preparation, cultivated varieties, irrigation, and fertilization could be different. If the users of the new technologies do not utilize the benefits to the full extent, such new technologies could be detrimental to production.

A farmer that does not use proper filtration in a drip irrigation system, would face, at least two problems, first the efficiency of the system decreases, and second is the increased cost of labor to clean plugged drippers. Usually the economic justification for using drip irrigation is centered around the improved performance and the reduction in labor costs.

The objective of this research is to study several factors related to drip irrigation. First is the study of water monitoring and movement under the drip irrigation system. Second, is the effect of irrigation intensity and frequency on water movement. Third, is the effect of planting patterns on the growth of broccoli. Fourth, is fertigation with micro nutrients through the drip system.



أولم يروا أنا نسوق الماء
إلى الأرض الجرز فنخرج به زرعاً
تأكل منه أنعامهم وأنفسهم (السجدة (٢٧))

2. REVIEW OF LITERATURE

The overall yield of row crops irrigated and fertilized by means of drip lines is expected to depend on, according to Tsipori and Shimshi (1979) :-

1. The ratio between drip lines and crop spacing.
2. The phase relation between the drip lines and rows; whether the lines are laid directly over rows, or between two adjacent rows.
3. The amounts of water applied through the drip lines.
4. The soil moisture pattern formed below the rows as function of 1,2 and 3.
5. The ability of rows located at the same distance from the lines to send out roots to the wetted soil volume.

2.1. Drip Irrigation System and Moisture Distribution.

Drip irrigation is a discharge of a low flow of water from small diameter orifices connected to, or a part of, distribution tubings situated on or immediately below the soil surface.

2.1.1. Components of a Drip System :-

Drip irrigation management division of Agricultural Sciences Department, University of California (1981) reported that the components of the drip irrigation system are, for all practical purposes, similar to those of sprinkler systems. They can be classified into three principal categories

1. Control head.
2. Water distribution lines.
3. Orifices or emitters.

The control head may consist of flow meters, control valves, chemical injectors, filters and pumps. David Karmeli and Jack Keller (1975), mentioned that an emitter is the heart of the trickle irrigation system, through which water passes, and ending with drops, at a constant low discharge, normally a few liters per hour. A large assortment of emitters has been developed and can be classified according to any one of several characteristics, for example

1. Long path pressure dissipating emitter.
2. Single exit long path emitter.
3. Multi-exit long path emitter.
4. Single exit orifice type emitter.
5. Orifice vortex type emitter.
6. Twin wall emitter lateral.
7. Flushing type emitter.

The superiority of drip irrigation is discussed by El-Gindy, (1984). He compared the effect of furrow and drip irrigation on water use efficiency of Sweet pepper (*Annium capsicum*). The experiments were carried out at the Faculty of Agriculture, Ain Shams University in 1979 and 1980. The