EVALUATION THE IRRIGATION SYSTEMS AND THE SOIL CONDITIONERS TO IMPROVE THE SUCCESS OF THE TRANSLANT OF THE SATE PALM IN NEW VALLEY

Submitted By

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A thesis submitted in Partial Fulfillment
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The Requirement for the Doctor of Philosophy Degree
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ABSTRACT

A field experiment was conducted during two successive seasons of 2012 and 2013 at Dakhla Oasis, lies in the New Valley Governorate , Egypt to study the effect of two irrigation systems under two organic manure (chicken and cattle) on soil properties and date palm(Barhi, Segae. Khadry and Majdool) grown in sandy soil. Vegetative growth parameters were measured after three times (6, 12, 18 months) during the studied seasons.

The results of the two seasons showed that added different organic manures to the soil improved its physical properties which decreased soil bulk density, hydraulic conductivity compared to the soil without organic manures application. The most important results indicate that soil natural amendments proved soil moisture retention, particularly soil field capacity.

Plant growth parameters in terms of plant height, number of leaves, stem diameter, greatly affected with irrigation and organic manure on percentage of nitrogen, phosphorus and potassium, in the fourth leaf was determined. The results showed that date palm plant growth was influenced by increasing organic manure under irrigation system. The highest plant growth was obtained by50% mineral and 50% cattle with drip irrigation.

Nitrogen and potassium increased in 100% cattle and drip irrigation. Phosphorus increased with 50 % mineral and 50% cattle.

Key words: -

Organic manure, cattle manure -chicken manure - sandy soil - irrigation –date palm.

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1. INTRODUCTION

The date palm **(*Phoenix dactylifera* L.)** is the most important tree grown in arid and semi arid regions. The date palm is one of the main causes for sustainability of human life in many of the hot and arid parts of the old world **(Sawaya, 2000)**.

Such importance is related to its ability to the highly tolerate of high and cold temperatures, drought and salinity compared to other fruit crop species. It needs a climate with much sun, minimal rain, good access to water; such conditions are only provided by oases, **(Saudi Aramco World, 1962)**. Importance of the date palm goes to as it gives a wide range of products and services, including many necessities of life. The date itself contains high doses of vitamins, and mineral salts. For this reason the date is very important to the critical edge for the diet of mankind as well as animals.

The major producers of dates in the world are situated in the Arabia Gulf and North Africa. Whenever, at(**FAOSTAT, 2010)**, reports that, Egypt has been the world's largest producer of dates since 1974 and reports very high average yields as compared to other countries.

In Egypt cultivation of date palm goes back to thousands of years. Nowadays date palms are spread all over Egypt, wherever water is available **(Riad, 1996)** and date industry supports over one million people **(Bazza, 2008)**. Recently, there are about 14 million trees, occupying 30,934 ha, which represents 6.32 % of the fruit cultivated area in Egypt, and date production of Egypt represents about 20 % of the total world production **(FAOSTAT, 2009)**.

For in spite of the fact that, Egyptian farmers have very much accumulated experience in irrigation, date palms do not receive much

attention regarding irrigation or fertilization. Egyptian date producers believe that date palms can grow and afford fruits under drought conditions and do not require much irrigation. However, all studies show that the water requirement of date palms must be provided to produce high-quality fruit and high yield.

Lots of irrigation systems are used in date palm orchards in Egypt. One of these systems is surface irrigation system. About 47 % of the total area of plantations and about 35 % of the total productive date palm trees use this irrigation method **(Hussein and Hussein, 1983)**. However, in the newly reclaimed land in Nobaria and the resort area in south Sinai and the Red Sea, drip irrigation system is used.

The date palm like any other fruits need to adoption of a proper fertilization program of date palm, including adequate rates, appropriate sources, and efficient application methods and timing, is an important strategy for obtaining better fruit yield and quality. On the other hand, organic wastes is critically needed to applied as soil amendments for improving soil properties at the same time as slow release fertilizers.

The present study aims to investigating the impact of organic fertilizer on soil properties as well as irrigation requirement of date palm. Due consideration was given to study the response of palm trees to different irrigation systems.

2. REVIEW OF LITERATURE

The virgin desert soils of Egypt are characterized in general by inferior physical, chemical and nutritional properties. Reclamation and development of such soils require enhancing the rate of improvement of such properties, which in turn well enhance the economic returns, as well as the economic feasibility of desert land reclamation in Egypt. With the beginning of large-scale desert soil reclamation in the sixties and seventies, the use of natural conditions of various varieties and sources received an ever increasing interest.

2.1. Effect of organic matter on some soil physical and chemical properties:

Many of studies were reported on the role of organic matter and its effects on the physical and chemical properties of soils.

Organic matter affects both the chemical and physical properties of the soil and its overall health. Properties influenced by organic matter include: soil structure; water holding capacity; diversity and activity of soil organisms, both those that are beneficial and harmful to crop production; and nutrient availability. It also influences the effects of chemical amendments, fertilizers, pesticides and herbicides.

According to **Epstein (1971)** the processes whereby the addition of organic matter makes and modifies are numerous. The pH of the soil solution chelates heavy metal ions in it, support microbial life, release carbon dioxide, accelerate the chemical weathering of minerals, and has effects on the physical conditions and water-holding capacity of the soil. The organic materials may be solid plant residues, leachates from leaves, 3

flower nectars, root exudations and products of decay. Indirectly, animals depending ultimately on the plants also alter the chemistry of the soil through their excretions and the products of their decay after death. These additions of organic matter have general effect on mineral nutrients of making them more mobile and available absorption by the plants and for removal via run-off and percolation.

According to **Hamed *et al.* (2011)** compost, sheep and poultry manure showed a significant decrease in pH morale and increase content of organic matter in soil. Therefore, the recycling of organic materials may be appropriate to improve the chemical properties of the soil

Angelova *et al.* (2013) showed that organic matter treatments had significant effect on soil physical and chemical properties like EC, pH, organic matter, macro and micronutrients content.

According to **Mounir and Alaa. (2013)** addition of sheep waste impact of cows' wastes with the less effect is the poultry waste.

2.1.1. Effect on soil chemical properties

The effect of organic matter on soil chemical properties is a result of the interaction of the organic matter with soil mineral and the chemical characteristics of the organic manure. The latter is often a function of the feed stock characteristics and the method of preparation. The single most important effect of organic matter on soil chemical properties involves cation exchange capacity (CEC) since this property governs the potential fertility of a soil. An increase in organic-C results in an increase in the CEC **(Kononova, 1975).**

To determine the effect of the organic amendments, the soil samples were collected 1 month after addition of organic amendments from depth of 20 cm. The soil characteristics (pH, EC, organic content and humus fractions) were determined. Compared with the unamended soil, soil treated with organic amendments showed apparent improvement of organic matter, total N, EC and available macro elements (P, K, Ca and Mg) and reduced the soil pH. **(Angelova *et al*., 2013)**.

a) Effect on soil organic matter content

El-Damaty and Mobarek (1962) found that organic manur especially with high rates resulted in increasing the organic matter content over the control of virgin sandy soils at Tahreer Province.

Abdou *et al*. (1969) studied the effect of the rates 10, 15, 20 and 5, 7.5 and 10 tons/ feddan for farmyard and town refuse, respectively on some properties of sandy loam and loamy sand soils of Egypt. They found that adding different amounts of both manures slightly increased the percentage of organic matter in both soils and the increase was higher in the former soil than in the latter one.

El-Badry *et al.* (1982) studied the effect of addition farmyard manure - 300 kg/acre/year - for different periods on the organic matter content of a newly reclaimed sandy loam soil. They found that after five years of yearly application, the increase of soil organic matter was from 0.62 to 3.36% and from 0.36 to 2.36%in 0-30 cm and 30-60 cm soil layers, respectively.

Badran (1983) studied the effect of applying organic manures from different origins, farmyard manure, town refuse and sewage sludge on