# STUDIES ON THE EFFECT OF FERTILIZATION ON DATE PALM PRODUCTION

By

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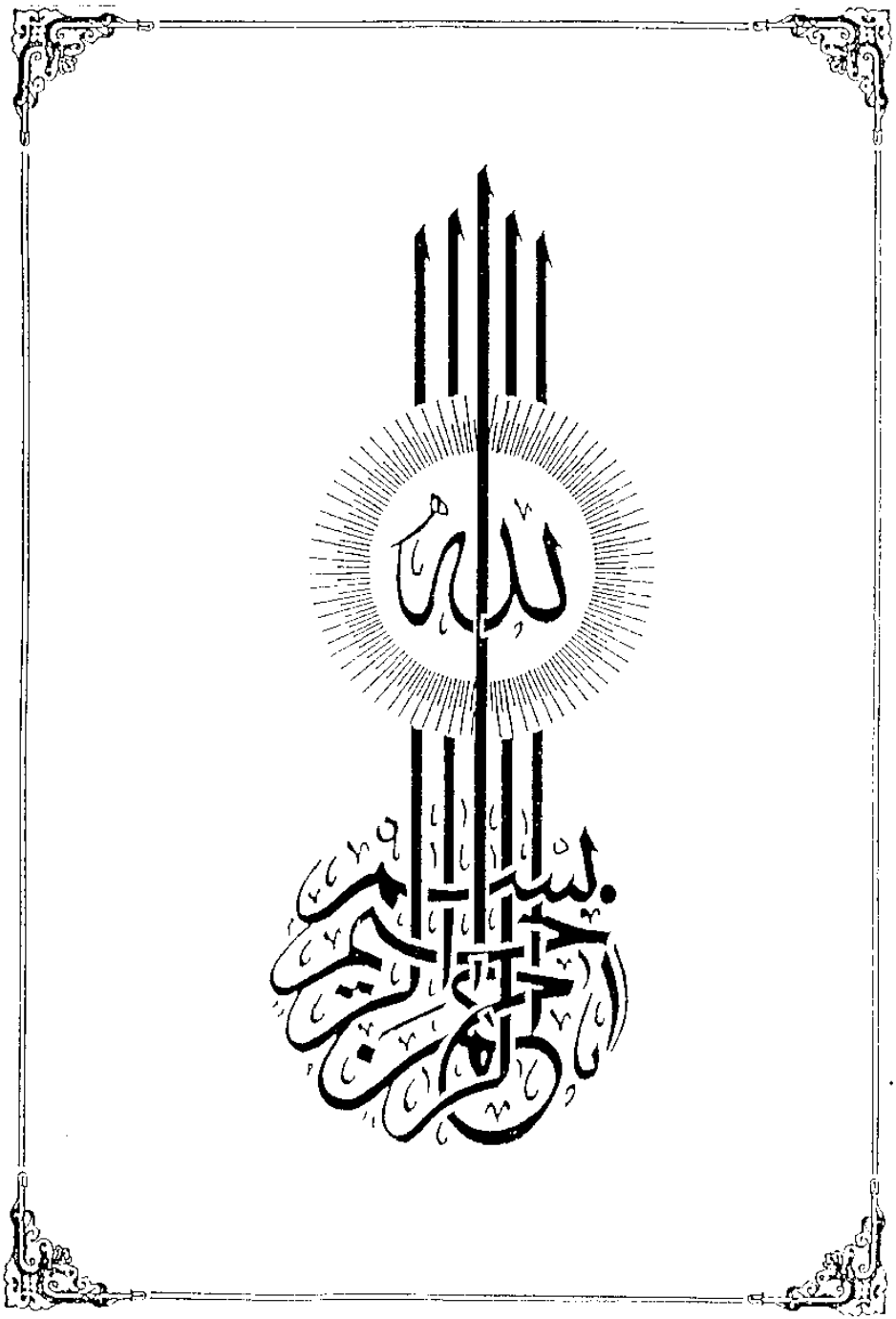

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# INTRODUCTION

Date (Phoenix dactylifera L.) is an important fruit crop in the desert regions of Middle Eastern countries and formed the basis for survival of many ancient desert nomad. Many advances have been-made in date palm culture, and the fruit is processed, shipped throughout the world (Nagy and Shawy, 1980).

In Egypt, date palm is considered one of the leading fruit crops. The total number of date palms (specially female ones) in the Nile Valley is about 5, 271, 937 palms in 1985 and the total production of date fruits attained about 508 511 tons according to Horticulture service section, Ministry of Agric., Egypt, 1985. However, number of date palms in the desert area of Egypt was not reported. The Balady variety dominates other varieties and its total number is 2,883,110 palms mostly concentrated in upper and Middle Egypt. The number of Hayany variety is 886,709 palms in Delta and Middle Egypt. The total number of the Sewy and Samany varieties are 310,464 and 110,906 palms, respectively. Numbers of other varieties namely Bent Aisha, Amhat, Zaghloul, Orabi, Aglani Amri and Iraqi are 263,088-188,567-166,948 - 138,753-97,574, 64,220 and 190 palms, respectively.

Although dates is an important fruit crop, it received scant research work in Egypt. This may be due to the fact that date palm can produce acceptable yield under conditions that are not suitable for any other fruit plants. However, the few recent researches demonstrated that date palm responses well to mineral fertilization and yields more yield. However, most if not all results did not determine the requirements of nitrogen fertilization of date palm.

In the same time, most if not all fertilization experiments either carried out in Egypt or abroad did not recommend the suitable leaf sample for determining mineral status of date palm.

Therefore, this work was planned to investigate three main parts. The first part, was on the effect of nitrogen fertilization on Samany and Hayany date palms and the purpose of this investigation was to study the effect of different rates of N fertilization on yield, fruit quality, fruit and leaf minerals content of two leading date palm varieties in Egypt namely Samany and Hayany. Through this approach a suitable recommendation for N fertilization may be provided.

The second part was planned to study seasonal

changes in vegetative growth and flowering of Sewy and Hayany date palms planted in two locations. This part was based to study the vegetative and flowering habit of date palm in order to determine the number of leaves developed on the palm during the whole year to determine the age of the leaf from its axil bud develops an inflorescence.

Regarding the third part, it was found that several workers determined the mineral states of date palm through analyzing leaf samples but most of them did not determine the suitable age of leaf for sampling. To achieve this purpose , seasonal changes in minerals content of leaves of different ages of two date varieties were determined. The results of this work will help in arriving at a proper sampling for determining the mineral status of date palm.

# REVIEW OF LITERATURE

The literature will include the following topics :

I - Effect of nitrogen fertilization on date palm.

This part comprises the following subjects :

A - Yield.

B - Fruit quality.

C - Fruit minerals content.

D - Leaf minerals content.

II - Number of leaves and Inflorescences in date palm

III - Carbohydrates content of date palm.

IV - Minerals content of fruits and leaves of date palm.

A- Fruits.

B- Leaves.

## I- Effect of nitrogen fertilization on date palm

### A- Yield :

Bliss and Mathez (1946) in california in a study on six-year-old Deglet Noor palms found that manuring with (400 pounds), ammonium sulphate(20 pounds), Potassium sulphate(30 pounds) and triple superphosphate (20 pounds) per palm per year, gave the highest yield which attained 239.6 lbs per palm. Palms received 40 pounds of ammonium sulphate annually gave yield of 234.9 lbs per palm. The lowest yield (193.3 and 182.2 lbs per palm) was obtained by untreated control plots.

Furr and Barber (1950) in Coachella, California reported that an acre of full bearing dates in removed from the soil about 69 pounds of nitrogen per acre per year, through some of this may be returned to the soil by dropped fruits, leaves, etc.

Furr et al., (1951) reported that a nitrogen fertilization experiment with 'Deglet Noor' dates was carried out at Indio, California, from 1944 through 1950. The nitrogen fertilization treatments consisted of unfertilized control (-N), and of the fertilized (+N) in which each tree received 6 pounds of nitrogen annually from 1944 through 1946, and 8 pounds of nitrogen annualy from 1947 through 1950.

During the first 3 years of the experiment nitrogen fertilization had no apparent effect on growth or yield, but during the last 4 years of the experiment, the fertilized trees had about 20 percent greater rate of trunk growth, production of inflorescences and yield of fruit than the unfertilized ones.

Furr et al., (1952) in Indio, California studied the results of nitrogen fertilization experiment with the variety Khadrawi from 1947 through 1951. The results showed that supplying the trees in the fertilized plots with liberal applications of readily available nitrogen over a period of five years had very little effect on growth and apparently non on yield.

They suggested that some of the Coachella Valley soils of medium to heavy texture were well supplied with nitrogen and that long continued, heavy annual applications of nitrogen on such soils were wasteful.

Furr and Armstrong (1957) in California reported that nitrogen fertilization of dates on a N-deficient soil did not immediately increase yield, apparently because the appreciable increase in number of inflorescences produced required more than one year. They showed that the total N in the top 8 feet in date garden and adjacent soils varied from about 2,000 lb. per

acre in some sands to about 15,000 lb. per acre in some loams, and that heavy fertilization of the cultivated soils for years had resulted in little increase in their total N content except in the top foot.

In three trails carried out on soils varying from fine sand to very fine sandy loam, annual additions of 6 to 8 lb. N per tree resulted in increased growth and inflorescence production. In two trails on loam soils trees fertilized annually with 3 to 8 lb. N for five years showed no greater growth or yield than unfertilized ones.The results of this work showed that the light sandy soils were low in total N and that unfertilized palms on these soils soon suffered N deficiency.

Furr and Armstrong (1958) in Indio, California studied the influence of heavy irrigation and fertilization on growth, yield and quality of 'Deglet Noor' dates. Palms were growing on a very fine sandy loam that had received no fertilizers for 9 years and irrigated at rates of 6, 10 or 14 ft. per year. On half of each irrigation plot the trees received 8-13 lb. of nitrogen from organic of steer manure and inorganic forms. They found that different rates of irrigation had little effect on tree growth or fruit yield and

quality. On the other hand, N produced a response more rapidly than in previous experiment. The growing of leaves and trunk improved markedly in the first year and inflorescence production and yield in the second.

Furr and Armstrong (1959) in Indio, California studied the relation of growth, yield and fruit quality of 'Deglet Noor' dates to variations in water and nitrogen supply and to salt accumulation in the soil. Fertilizer applications had consisted of manure and ammonium nitrate at rates of 8 to 13 pounds of nitrogen per tree per year from 1954 through 1958. Leaf growth and yield were greatly improved by heavy nitrogen fertilization. In the first 3 years of the trail, yield was apparently unaffected by the variation in water supply, but in the last 2 years yields were reduced in the plot that received only 6 feet of water per year, probably as a result of water shortage and increased salinity.

A fertilization experiment was conducted by Abd El-Azim and Marie(1961) in upper Egypt on 10-year-old Sewy date palms for three successive years. Trees were grown in an orchard which had received no fertilization before. Trees were subjected to four treatments as follows :

1) 750 g.of actual nitrogen/tree in the nitrate form.

2) 750 g.of actual nitrogen in the nitrate form plus 720 g.of actual nitrogen in the organic form (Balady manure 0.3%)/tree.

3) 720 g. of actual nitrogen/tree in organic form.

4) Unfertilized trees and acted as a control.

It was found that both organic and mineral fertilization had a pronounced effect on palm yield. The yield increases were 44%, 47.4% and 26.6% for the first,second and third treatments, respectively, over the control.

Furr and Brown (1963) in California in a comparative study on 'Deglet Noor' date palms fertilizated with manure or ammonium nitrate and the two materials were applied yearly for 10 years in amounts that supplied approximately 6 lb. of N per palm to different field plots on a very fine sand in the Coachella Valley. In the 8 years of yield records the average yield of palms received ammonium nitrate was significantly greater (10%) than that of palms received manure.

Harvey and Hilgeman (1966) in Arizona, U.S.A., reported that date palm had a deep and widely