

FERTILIZATION OF DATE PALM TREE

(*Phoenix dactylifera*) IN IRAQ

Ahmad A. H. AL-Rawi¹

ABSTRACT

Date palm tree requires relatively great amounts of macro and micro nutrients to achieve good growth and to give reasonable and economical production. Fertilization is therefore, one of the important practices which increase dates production and improve fruits quality. The amount of fertilizer needed by palm tree depends on soil type, kinds of intercrops grown under, as well as variety and age of the tree.

This article discusses the fertilization practices being followed in Iraq and outlines the importance of the use of chemical fertilizers in improving dates production.

From that review it is obvious that fertilization of date palm tree in Iraq depends wholly on local indigenous and individual experiences, rather than sound scientific basis. There is a need for better understanding of the date palm physiology, concerning water and nutrients uptake to come out with better fertilization program for that important tree in the region.

Regional cooperation between scientists and institutions is vital to achieve that goal.

Additional Index Words: Nutrients requirement, chemical fertilizers, farm manure, tidal irrigation.

INTRODUCTION

Iraq may be considered the date palm country. Apart from the northern part of the country, date palm trees grow everywhere. Its growth extends between 35°, 18 latitude which passes through Tikrit on Tigris and Ana on Euphrates, down to the Fao on the Arabian gulf, 30° latitude. It is estimated that the number of palm trees in Iraq exceeds 22 millions tree which covers an area over 120000 hectares. (Al-Dejaili and Al-Dejaili, 1989). Date palm tree concentrated in Basra Governorate, recent statistic which is considered the largest date palm forest in the world. It is estimated that the number of date palm trees in this Governorate

¹ IPA Agric. Res. Center P. O. Box 39094 Baghdad, Iraq.

exceeds 13 millions with over 400 varieties and cover an area over 50.000 hectares. (Al-Dejaili and Al-Dejaili 1989).

Date fruits constitute a substantial part of the diet of the Iraqi people through the ages, especially for those of low income group. Dates fruits contain substantial amounts of sugars, minerals and vitamins (Tables 1&2). Considering the daily requirements of macro elements by human reported by Robinson, 1972, 15 dates fruits would provide more than 80% of daily body requirement of magnesium, 70% of sulfur, 25% of potassium,, 20% of calcium, and a substantial amount of the body requirements from iron, manganese, copper mid zinc. (Underwood, 1977).

Table 1: Chemical Composition of Four Commercial Iraqi Date Cultivators*

Composition	Hallawi	Sayer	Khadrawi	Zahdi	Mean
Moisture % (FW)	7.3	7.5	9.5	8.3	8.1
Total Soluble Solids FW	84.2	81.3	80.8	82.1	82.1
Total Insoluble Solids FW	17.9	10.0	9.5	9.2	11.7
Protein % (DWB)	2.3	2.8	2.4	2.2	2.4
Fat % DWB	0.5	0.3	0.5	0.4	0.4
Ash % DWB	1.9	1.8	2.1	1.8	1.9
Crude Fiber DWB	1.8	1.7	2.3	2.5	2.1
Sugar on dry weight basis					
Total Sugar %	87.9	86.1	87.7	86.8	87.1
Reducing Sugar %	82.7	82.6	81.9	73.4	80.2
Sucrose %	4.8	3.5	4.5	12.7	6.4
Glucose %	43.7	44.8	44.7	32.8	
Fructose %	37.2	38.0	38.5	39.2	41.5
Vitamins (mcg/100g) dry weight basis					
Thiamine (B ₁)	99.0	130.0	94.0	80.0	100.8
Riboflavin (B ₂)	173.0	135.0	149.0	167.0	156.0
Biotin (H)	4.6	4.7	4.1	5.7	4.8
Folic acid	57.0	70.0	43.0	63.0	58.2
Ascorbic acid © (mg/100g)	3.6	17.5	3.2	2.4	6.7

* After Yousif, et. Al. 1982. ** Fresh Weight *** Dry Weight Basis

Table 2: Macro and Micro Elements in Four Iraqi Date Cultivators* mg/Kg. Dry Basis.

Element	Hillwai	Sayer	Khedrawi	Zahdi	Mean
P	160	130	150	140	145.0
K	8540	8330	8940	8870	8670.0
S	100	200	140	210	162.5
Ca	1840	2030	1330	2070	1357.5
Mg	560	580	600	590	582.5
Cl	2600	3120	2660	3420	2950.0
Fe	52.6	32.1	45.0	103.7	58.4
Mn	58.6	52.5	51.4	51.6	53.5
Cu	27.7	28.9	25.4	27.5	27.4
Zn	13.9	18.2	12.9	7.4	13.1
Co	7.6	9.6	9.6	9.5	9.1
F	2.0	1.2	1.4	1.2	1.5

*After Yousif, et. al. 1982.

Palm tree is a sacred tree which play an important role in the life of Iraqi and Arabs throughout the history. People not only benefited from dates fruits, but they benefited from all parts of that tree, including trunk, rachis, leaves, rachis base and fiber sheath as well as pits for animal nutrition.

In the last 20 years, this important tree however, did not receive attention by farmers as far as agricultural practices which resulted in low production and thus low income for farmers (Table 3). This leads to the abandon of this important tree for economical reasons. In this review, I will give a brief on the date palm tree nutrient requirement and fertilization practices being followed in Iraq.

Table 3: Date Palm Production and Number of Trees in The Main Date Producing Countries*

Country	No. of Trees _x (1000)	Dates production Tons (mean to 91,92,93)	1994	Mean Production Kg/tree
Iraq	21500	542333	35000	20-25
UAE	20800	292300	236000	29
Saudi Arabia	12000	551666	555000	60-70
Egypt	11000	612766	500000	30-50
Oman	8050	123100	172000	25-30
Libya	7000	76000	180000	20-25
Algiers	7500	243666	172000	

Palm Tree Nutrients Requirement and Fertilization:

Until recently, there was a false believe between farmers that date palm tree does not need fertilizer addition. This belief may come out because palm tree has a big root system which may extends to 10m from trunk and 3-7m deep or to the water table level. This huge root system makes palm tree resistant to unfavorable conditions. More over, before dams construction upstream, million tons of sediments are brought up by rivers and precipitated in the plains where palm trees are grown adding great amounts of mineral nutrients to the soil yearly. In the middle palls of Iraq, this root system enables the date palm tree to make use of the fertilizers being added to citrus trees as well as vegetables and forage. crops grown under. However, experiments carried out in the country and elsewhere, showed that fertilizer addition is necessary to improve date palm growth and to increase date fruits production. AL-Baker, 1972, reported that a five years experiment in AL-Tanooma, near Basra, showed that the addition of 1.2Kg of nitrogen, 600g of P_2O_5 and 1.2Kg of K_2O per one palm tree increased the yield 2-3 times and doubled the number of leaves per tree. AL-Dejaili and AL-Dejaili, 1989, outlined that date palm trees are sensitive to fertilizer addition especially, to nitrogen fertilizer, and that the nitrogen deficiency in palm trees caused leaves yellowing, low number of leaves and small leaves as well as low fruit production.

EI-Shurafa, 1984, reported that the amount of nutrients lost yearly by one palm tree var. Taboni (Lebia), through dates fruits and leaf pruning is 472. 47, 422. 219, 36. 5.8, 1.2. and 1.3g for N, P, K. Ca. Na, Fe, Mn, and Zn respectively. This estimate assume a total fresh weight of 100KG of dates from 10 date bunches and 20 leaves which give a total dry matter of 82.4 Kg. These loses of nutrients does not include nutrient losses by leaching or volatilization or other loses. If we assume that the fertilizer-use efficiency to be 30%, then the amount of nitrogen, phosphorus and potassium needed by one tree would be 1.416, 0.141 and 1.266 Kg. respectively. Al-Dejaili and Al-Dejaili, 1989, reported that the average amount of nitrogen needed by palm tree is ranged from 1.8 - 2.7 Kg. yearly. They added that this amount of nitrogen should be added at three doses during the year (Furr, et. al. 1951), showed that the addition of 2.7 to 3.6 Kg of nitrogen to date palm tree var. DeglatNoor resulted in 20% increase in dates production as compared with unfertilized trees through four years experiment. The trunk growth as well as leaves number were increased also, while the quality of fruits did not change or even lowered. He showed that fertilization caused an increase in the number of bunches per tree and number of fruits per bunch but not fruit weight.

It is obvious that although little knowledge are available concerning the amount of fertilizers which should be added to date palm tree, fertilization is

necessary to improve the growth and production of the tree. The amount of fertilizers needed by one tree vary with soil type and depth, as well as dates variety and age of the tree.

In Iraq, farmers are usually following methods used by their ancestors in the fertilization of palm trees. These practices differ from place to place as outlined below:

Fertilization Practices in the Basra Area

In this area palm trees are planted in small distances of 5-6m apart. The soil is heavy soil and the water table is not deep. Irrigation is carried out by tidal stream or what called fingers irrigation. During the last 20 years, salinity is become a problem in this area. Under such conditions, palm trees depend wholly on lateral roots for the absorption of water and nutrients. Fertilization practices followed by farmers in this area is to use farm manure once event 4-5 years. A circular ditch around the tree of 3-4m diameter is made. The ditch is very shallow near the trunk and become deeper until the water table in the outside of the ditch. Manure is then spread in the ditch 0.5-1.5in³ of manure per tree is used. The process is carried out in Autumn or Winter and the soil then is part back. Chemical fertilizers are rarely used in this area. When other crops are grown especially in orchards where date palm trees were planted at 8-10m distances, chemical fertilizer especially urea-N is used. In this area, because of the method of irrigation, nitrogen fertilizer is the main fertilizer need to be added at different intervals throughout the year, as other nutrients would be provided from Irrigation water. Scientific experiments on the use of chemical fertilizers for date palm tree need to be carried for many years in this area before a conclusive recommendations can be obtained.

Fertilization Practices in the middle Part of the Country:

In this large area which include many Governorates such as Wasit, Qasisia, Najaf. Karbalah, Babil, Baghdad, Deila, Salahuldeen, and Anbar, the soil is ranged from loam to silty loam. The soil is a deep soil. Palm trees are planted at 8-10m. distance, Citrus trees or vegetable crops are grown under palm trees. Palm tree roots in this area extend to more than 7m. from trunk and to a depth of about 3-4m. Results of an experiment carried out in Al-Zafarania near Baghdad, by (Abu-Khalid et. al. 1982), showed that 50% of roots were in the depth 0-60cm. and about 30% between 60-120cm. depth, while 20% between 120-180cm. and that the date palm tree absorb 50% of its water requirement from the upper layer (less than 60cm.) and 30% from the layer 60-120cm. (Table 4).

Table 4: Roots Distribution of Date Palm Tree in a Silt Loam Soil in Zafarania Area and the % of Water Absorbed from Different Depths. *

Soil Depth cm	% Roots Dry Weight	% Moisture Absorbed	% Active Roots with Depth at Two Distances from the Trunk	
0-60	51.6	52.0	23.3	27.8
60-120	28.5	34.0	32.8	25.9
120-180	19.9	11.0	27.1	26.5
180-240		3.0	5.6	5.0

* After Abu-Khalid et. al. 1982.

Shabana et. al. 1985, showed that most effective roots are in the 40-120 cm depth (Tables 5 & 6).

Table 5: Vertical Distribution of Date Palm Roots var. Zahdi in a Silty Clay Loam Soil*

Soil depth cm	% of roots of different size in a 10m ² section at different soil depth			
	Roots size mm			
	< 1 mm	1-2 mm	2-3 mm	> 3 mm
0-40	10.26	8.04	10.34	11.90
40-120	63.09	71.66	73.54	71.75
120-160	21.92	16.07	10.87	10.28
160-200	4.73	4.23	4.25	6.07

* Shabana, et. al. 1985.

Table 6: Horizontal distribution of date palm roots var. Zahdi*

Distance from trunk m	% of roots different size in 10 m ² section			
	< 1 mm	1-2 mm	2-3 mm	> 3 mm
1	29.3	31.5	32.1	3.2
2	26.0	27.8	27.6	26.4
3	24.5	24.2	23.2	23.4
4	20.2	10.5	17.1	18.6

*Shabana, et. al. 1985.

Under such conditions, with such big root system, date palm trees would benefit from fertilizers being added to citrus trees or crops grown under. Therefore, farmers in this area rarely fertilize palm trees. The practice being used is that they fertilize citrus trees every 2-3 years, by plowing or turning over the soil around the trees including canals, then they make a trench 60-90 cm. wide and 40-60 cm. Deep in Autumn or Winter. Then they spread farm manure in the trench to a depth of 15-30cm., then they irrigate the trees. When vegetable crops are grown, chemical fertilizers are used in addition to farm manure. Green manure is also used in this area especially at the first 5-6 years of the establishment of the orchards.

Conclusions

From the above discussion, it is clear that date palm tree in Iraq does not receive great attention as far as fertilization and other agricultural practices which resulted in low growth rate and low production. Generally 1.5-3Kg of nitrogen, 0.5Kg of phosphorus and 2-3Kg of potassium per tree yearly is recommended to maintain optimum growth of palm tree. Long trials on the use of chemical fertilizers in different areas is needed. Cooperation between Arab countries and Scientific Institutions dealing with date palm tree studies is vital to face the economical competition the world over in the 21st century. Large steps to modernize dates production, storage and processes need to be taken to make date palm growing is economical to farmers in Iraq as well as in the Arab World.

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تسميد أشجار النخيل في العراق

أحمد عبد الهادي الراوي^١

الخلاصة:

تحتاج نخلة التمر إلى كميات كبيرة من العناصر الغذائية المختلفة، لتحقيق نمو جيد وإنتاجية مقبولة من حيث الكم والنوع لذلك تعتبر عملية التسميد، إحدى العمليات الزراعية المهمة التي تلعب دوراً أساسياً في زيادة الإنتاج وتحسين نوعية الثمار. وتختلف كميات الأسمدة الواجب إضافتها للنخلة، حسب نوع التربة ودرجة خصوبتها، ونوع المحاصيل المزروعة تحت أشجار النخيل. وكذلك حسب صنف وعمر النخلة، بالإضافة إلى نوع الأسمدة المستعملة.

وهذا البحث يلقي الضوء على الأساليب المتبعة في العراق لتسميد نخلة التمر. ويخلص هذا البحث إلى أن الأساليب المتبعة في العراق لتسميد نخلي التمر تعتمد على الخبرة المحلية المتوارثة والخبرات الفردية للفلاحين ولا تعتمد على تجارب علمية رصينة. وبصورة عامة تحتاج نخلة التمر سنوياً إلى 5-1.5 كغم نيتروجين حر، 0.5 كغم فوسفور و 2-3 كغم بوتاسيوم لتحقيق نمو مناسب. وهناك حاجة ملحة لفهم أكثر للعمليات الفسلجية المتعلقة بامتصاص الماء والعناصر الغذائية لوضع صيغة علمية لتسميد هذه الشجرة المهمة في المنطقة. وإن التعاون بين الباحثين والمؤسسات العلمية في المنطقة يعتبر أمراً حيوياً لتحقيق هذا الهدف.

^١ مركز اباء للأبحاث الزراعية ص.ب. ٠ (٣٩٠٩٤) بغداد العراق