

*Review Articles***IMPORTANCE OF DATE PALMS AS A SOURCE OF NUTRITION**

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*The date-growing region of Iraq extends along both banks of the Tigris and Euphrates, from Samarra down to the Arabian Gulf. The temperature hovers around 38°C from May through October; the rainfall season extends from early autumn to late spring, pleasant winters with moderate rainfall and sufficient water for proper irrigation. Dates in the arid zones of the Old World have always been essential to the diet. Iraqi dates contain proteins, fats, salts, carbohydrates and vitamins, all in an easily assimilated form. One pound (453 g) of dates supplies the human body with 5.33 kilojoules of physiological energy.*

**Key words:** Phoenix dactylifera, Iraq, nutrition, cultivation, chemical composition, sugar analysis, vitamin content, macro element, micro element

**INTRODUCTION**

Few plant species have developed into an agricultural crop so closely connected with human life as has the date palm. One could go as far as to say that, had the date palm not existed, the expansion of the human race into the hot and barren parts of the "old" world would have been much more restricted. The date palm not only provided a concentrated energy food, which could be easily stored and carried along on long journeys across the deserts, it also created a more amenable habitat for the people to live in by providing shade and protection from the desert winds. In addition, the date palm also yielded a variety of products for use in agricultural production and for domestic utensils, and practically all parts of the palm had a useful purpose. But if the palm had an impact on human life, the influence was reciprocal, because through a long process of learning and experience, date palm cultivation was gradually adapted to man's needs. If left undisturbed, in its wild state, the date palm would, favourable growth conditions permitting, expand in an impenetrable forest of highly competitive clusters of an approximate equal number of male and female palms with relatively few reaching appreciable height or fruit producing capacity. Examples of such uninhibited growth can still be found in some of the more remote areas of the Sahara (FAO, 2002).

The date palm (*Phoenix dactylifera* L.) is a typical tree of the desert oasis and rivers. It likes high temperatures,

dry air and sunshine. Rains or high atmospheric humidity late in the development of fruit or during blossoming limits date growth to about the same extent as inadequate heat. The date palm is therefore confined to arid or semi-arid regions. However, water requirements are very high, 20 000–30 000 m<sup>3</sup>/ha/year (Rehm and Espig, 1976).

In general date palms are planted, therefore, where they will be able to reach the groundwater level at a maximum depth of 6 m. Although the date palm requires a well-aerated soil for maximum yields, the roots will survive submergence in water for considerable periods, possibly due to the structure of the roots that may enable them to conduct some air downward to the absorbing rootlets (Rehm and Espig, 1976).

**MATERIALS AND METHODS**

Date palms are very salt-resistant and can tolerate as much as 3% of salt, but they prefer less saline soils. Normal planting distances are 10 × 10 m, sometimes 9 × 9 or 9 × 8 m.

In Iraq, which accounts for about 80% of the world's date trade and where about 60% of the palms are situated in the Central Area, there are over 450 female varieties and five male varieties, but four female varieties account for about 85% of the producing palms (43% Zahdi, 23% Sayer, 13% Hillawi, and 6% Khadrawi variety). The slower-maturing Zahdi dates are produced mostly in

the Central Area and adjoining districts. The other three, higher-quality varieties are grown in the Basra area.

To assure a good yield dates are pollinated by hand. Insect damage constitutes one of the biggest problems.

Yields depend on many factors such as variety, age of the trees, soil and water management practices. In order to increase the yield level, plantings should be rejuvenated, the water supply improved and manure and fertilizers used on a much larger scale. The fact that a high yield is often followed by a few years with moderate yields may indicate a nutrient deficiency (Rehm and Espig, 1976).

Date Fruits constitute a substantial part of the diet in Iraq especially for those of the low income group. The provision of vitamins and minerals as well as sugars is the greatest contribution that date can make to the human diet.

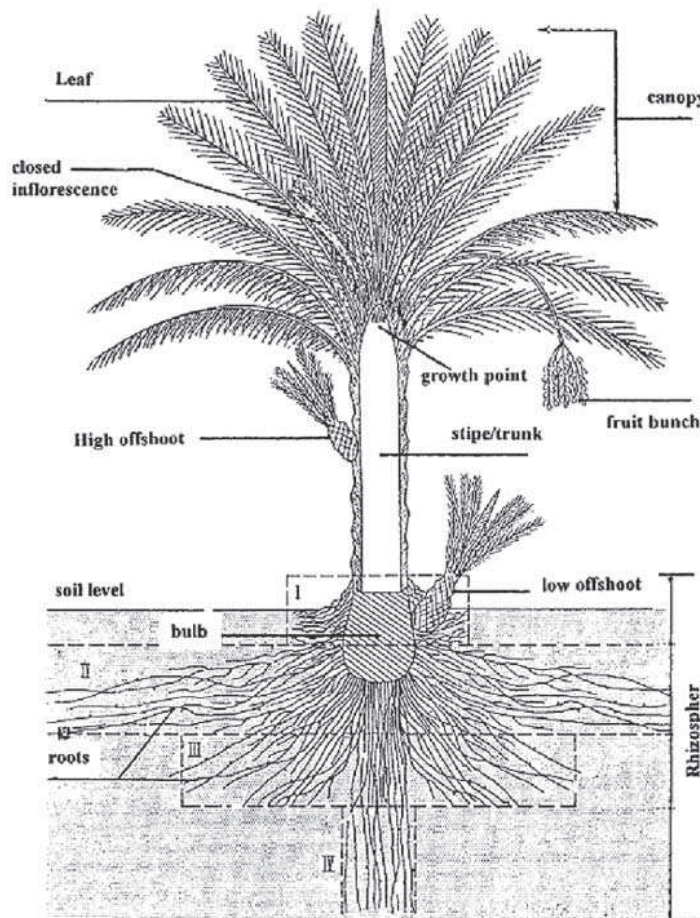
This is an ancient tree. It is some kind of a subtropical plant which reaches a height of between 15 and 30 meters. The Trunk wears a crown of 60 to 150 large leaves without a crown. At the trunk of a grown-up date palm

70 000 vein clusters were discovered. The leaves are 100 to 250 cm long, very large leaves reach to length of 4 to 7 meters (Al-Gaboori, 1983).

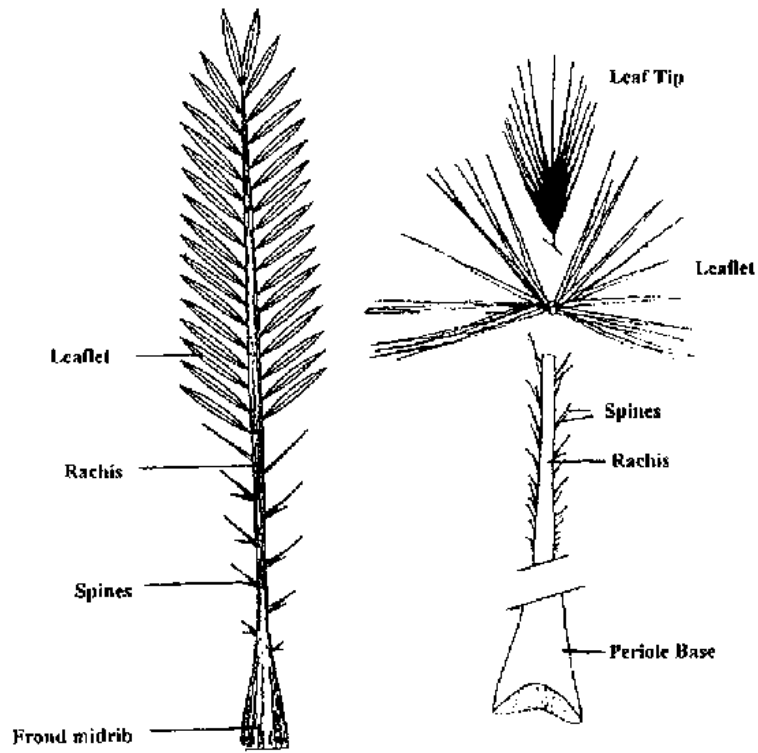
**Phoenix dactylifera terms of use:**

- The trunk usually is used to erect bucolic houses (roofs). Because it is a wood of poor quality from which no planks can be produced, it often is used for wood veneer or combustion.
- The leaves are important to the production of paper, cartons and glue plates.
- The fruit captures seed and pulp.
- The seed (Endosperm) contains: 65% Hemilloze, 7% Oil, 6% protein, enzyme Cytoze and Pulp.
- The Fruit is a fleshy, one seeded berry of a long, egg like, seldom round Shape.
- It reaches 18 to 118/ 8 to 32 mm (average: 20 to 40 mm), reaches a weight of 2 to 60 g, mainly 7 to 10 g.
- The colour of the fruit is normally brown (Al-Gaboori, 1983)

**Figure 1:** Diagrammatic construction of a date palm with its root system



**Figure 2:** Date palm leaf characteristics



**Figure 3:** Female inflorescence of a seeding date palm 3 days after opening



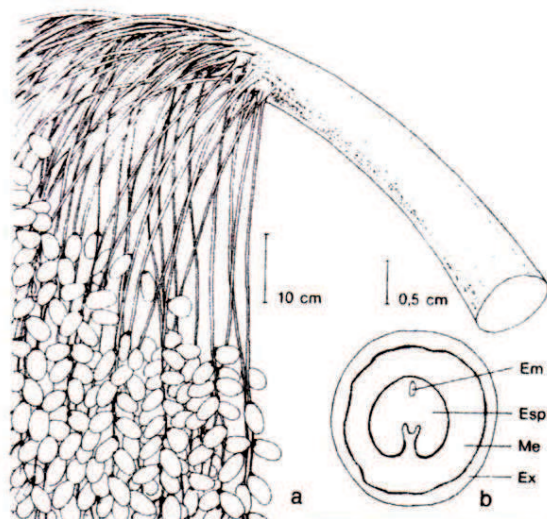
**Figure 4:** Date palm leaves grouped in 13 columns, spiraling to the right or to the left





**Figure 5:** Phoenix dactylifera (a) part of the fruit (b) Fruit in cross section

Em = Embryo, Esp = Endosperm, Ex = Exokarp, Me = Mesokarp (Rehm and Espig, 1976)



**Cultivation**

A date palm is the dicotyledonous plant. To multiply the female tree in the appropriate way the tillers are used between the ages of 5 to 10 years. If the tillers have produced their own roots they can be planted immediately (plant distance 9 × 9 to 10 × 10 m), otherwise they can be kept for up to 6 weeks in a nursery.

The female pollen blossom is a rip with long branches. Pollination has been helped from ancient times by hanging male branches into the female inflorescence, in modern cultivation 2 to 3 month lasting pollen are pollinated by machines or hand machines (Rehm and Espig, 1976).

**Date palm – Phoenix dactylifera content**

Rip exported date palms content (%):	
Water	15–25
Protein	1.3–1.9
Sourness	3.4–4.0
Sugar of all kind	63–73
Fibre	1–1.8
Ashes	1.8

Juicily (mellow) dates in a ripe condition contain 74–75% sugar of all kinds of which the most are reduced sugars and 0–3% is saccharine. The oldest content of crystallized sugar is palms. During the tapping from the filter duct they excrete syrup which contains 12–17% saccharine.

Date palms are eaten directly at the place of growing or away from it. When freshly harvested (a phase called Khalal) they are hard, gloomy, full contained, of a bright yellow changing to dark rose colour.

The fruits are conserved at the place of harvesting by drying to get them ready for storage and export.

By compressing the ripe fruits a thick syrup, the so-called Date palm Honey, is obtained. This is used in a thinner form as lagmi (date palm wine). The Pollen blossom, which is carried on a plate stem, is separated into 100 to 150 twigs of length up to 15 cm. The blossom contains 3500 to 7000 fluorescence.

The reach the same output and full equipped fruits every year some blossoms are thinned.

**Chemical composition of four Iraqi Date cultivars**

The nutritive value of four commercial Iraqi date cultivars: namely, Hallawi, Sayer, Zahdi and Khadrawi, were studied with regard to sugar, protein, fat, ash, fiber, water soluble vitamins, minerals and trace element content. The analysis revealed that the studied dates had low moisture, protein, fat and non-reducing sugar content. On the other hand, dates were found to contain relatively large amounts of reducing sugars.

The ratio of glucose to fructose was found to be a function of the agroclimatic conditions prevailing in the areas from which the samples were obtained. The date also showed that the dates contained moderate amounts of thiamine, riboflavin and folic acid, while biotin and ascorbic acid are present in small quantities. With respect to minerals and trace elements, the results of this study showed that dates could be considered a good source of iron, potassium, copper, sulphur and manganese and a fair source of calcium, chlorine and magnesium (Yosef and Kado, 1982).

**RESULTS AND DISCUSSION**

The chemical analysis of the date cultivares studied. viz. total soluble and insoluble solids, pH, protein, ash and crude fiber and the results are presented in Table 1. The moisture, total soluble and insoluble solid values are expressed as percentages of the fresh weight of the sample, whereas protein, fat, ash and crude fibre values are given on a dry weight basis.

Results in Table 1 indicate that the cultivars date studied have a low moisture content varying from 7.30 to 9.50%. A close similarity can be seen with the total soluble solids of Sayer, Khadrawi and Zahdi cultivares while the values were higher for Hallawi. Data presented in Table 1 also show that the pH varied from 5.6 for Hallawi

**Tab. 1:** Chemical composition of commercial Iraqi date cultivares\*

Composition	Date cultivars			
	Hallawi	Sayer	Khadrawi	Zahdi
Moisture (%)	7.30	7.50	9.50	8.26
Total soluble solids (%)	84.20	81.30	80.80	82.14
Total insoluble solids (%)	17.90	10.00	9.52	9.23
Protein (%)	2.30	2.78	2.43	2.16
Fat (%)	0.51	0.32	0.47	0.43
Ash (%)	1.92	1.80	2.12	1.86
Crude Fibre (%)	1.82	1.72	2.28	2.50
pH	5.60	6.00	6.70	6.10

\*The first three determination are expressed on a fresh weight basis while the last four are based on dry weight  
Source: Yousef and Kado (1982)

to (6.7) Khadrawi. This indicates that dates are slightly acidic.

Table 1 further reveals the presence of relatively small amounts of protein and fat in all the cultivars studied. In spite of the low protein content of dates, they can contribute an additional source of protein to the human diet with high qualities of some essential amino acids. As far as ash is concerned, one can notice a low variability in the ash content of the analyzed dates. On the other hand, a relatively large variability can be observed in the crude fiber content. However, these differences could be explained by variations in cultivars and/or agroclimatic conditions.

The average percentages of total sugars, reducing sugars, sucrose, glucose and fructose are given in Table 2. The sugar values are given on a dry weight basis.

Results in Table 2 indicate that reducing sugars are the dominant form of sugars found. The glucose: fructose ratio was the same in the three date cultivars obtained from Basrah. However, the glucose contents of these cultivars were 17% more than fructose, while the opposite was true in Zahdi dates obtained from the central area of Iraq.

The vitamin content of four Iraqi date cultivars is given in Table 3. The thiamine content of studied dates ranged from 80 mcg/100 g in case of Zahdi dates to

**Tab. 2:** Sugar analysis of 4 commercial Iraqi date cultivars

Composition	Date cultivars			
	Hallawi	Sayer	Khadrawi	Zahdi
Total sugars (%)	87.91	86.10	87.74	86.80
Reducing sugars (%)	82.72	82.60	81.91	73.40
Sucrose (%)	4.80	3.50	4.50	12.70
Glucose (%)	43.69	44.79	44.73	32.77
Fructose (%)	37.21	38.04	38.48	39.15
Glucose/Fructose ratio	1.17	1.17	1.16	0.83

Source: Yousef and Kado (1982)

**Tab. 3:** Vitamin content\* of 4 commercial Iraqi date cultivars (mcg/100g)

Vitamins	Date cultivars			
	Hallawi	Sayer	Khadrawi	Zahdi
Thiamine (B1)	99	130	94	80
Riboflavin (B2)	173	135	149	167
Biotin (H)	4.63	4.66	4.09	5.74
Folic acid (Folacin)	57	70	43	63
Ascorbic acid (C)	3.56	17.51	3.20	2.41

\*On dry weight basis  
Source: Yousef and Kado (1982)

**Tab. 4:** The macro element composition\* of 4 commercial Iraq dates (mg/100g)

Minerals	Date cultivars			
	Hallawi	Sayer	Khadrawi	Zahdi
Calcium	184	203	133	207
Phosphorus	16	13	15	14
Potassium	854	833	894	887
Sodium	14	10	16	5
Chlorine	260	312	266	342
Magnesium	56	58	60	59

\*On dry weight basi

Source: Yousef and Kado (1982)

130 mcg/100 g in Sayer dates. As far as folic acid is concerned, dates appear to contain moderate amounts of this vitamin. On the other hand, dates seem to be a poor source of biotin.

Although fruits and vegetable are usually considered the major dietary source of ascorbic acid, results in Table 3 reveal that dates contain negligible amounts of this vitamin.

The macro element composition of the four commercial Iraqi date cultivares studied is presented in Table 4:

Results in the Table 4 indicate that potassium is the predominate element found in dates. As far as calcium and chlorine are concerned, the results show that studied date cultivares also contain relatively high concentrations of these two elements. The cultivar Zahdi showed more calcium and chlorine than the other cultivars studied.

On the other hand, the analyses suggest that dates are a poor source of both phosphorus and sodium.

The data presented in Table 4 indicate that Iraqi dates contain comparatively higher qualities of calcium, potassium, sodium and magnesium and lower concentrations of phosphorus than American dates (Zook, 1968).

Considering the daily requirements of humans for macro elements, it can be concluded that approximately 15 dates could furnish more than 80% of magnesium,

70% of sulphur, 25% of potassium and 20% of the calcium needed.

The micro element content of the four commercial Iraqi dates cultivares is given in Table 5.

The human daily need for iron has been estimated as 10 mg, manganese 4 mg; cooper 1–2 mg and zinc 15 mg (Robinson, 1972).

Referring to data presented in Table 5, it can be concluded that Iraqi dates contain relatively high amounts of iron, manganese and cooper and small amounts of zinc. On the other hand, the human daily need for cobalt has not so far been established. As far as fluorine is concerned, the results in Table 5 show that the dates contain relatively a high concentration of this element, as (Cliford, 1945) reported that most fruits contain less than 0.03 mg fluorine per 100 g.

Results given in Table 4 and 5 also indicate that Zahdi dates contain higher values of potassium, iron, sulphur and chlorine than the other three cultivares (*Hallawi, Sayer, and Khadrawi*), which implies that the nutritive value of Zahdi dates with respect to their mineral composition is higher than those of the other cultivares studied.

Furthermore, some differences in the vitamin and mineral composition of the cultivars studied can be observed which may be due to variations in cultivars and/or agro-

**Tab. 5:** The micro element content\* of 4 commercial Iraqi date cultivars (mg/100 g)

Minerals	Date cultivars			
	Hallawi	Sayer	Khadrawi	Zahdi
Iron	5.26	3.21	4.5	10.37
Manganese	5.86	5.25	5.14	5.16
Copper	2.77	2.89	2.54	2.75
Zinc	1.39	1.82	1.29	0.74
Cobalt	0.76	0.96	0.96	0.95
Fluorine	0.20	0.12	0.14	0.12

\*On dry weight basis

Source: Yousef and Kado (1982)

climatic conditions. The present findings appear to confirm those obtained by Duckworth (1966) who reported that vitamin and mineral contents of fruits in general may show considerable variations not only among species and cultivars but also among different of the same cultivar grown under different agroclimatic conditions.

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*Received for publication on June 2, 2010  
Accepted for publication on October 18, 2010*

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