Source: http://www.icarda.org/APRP/Datepalm/introduction/intro-body.htm

Date Palm in the GCC countries of the Arabian Peninsula

William Erskine[1], Ahmed T. Moustafa[1], Ahmed E. Osman[1], Zaki Lashine [2], Arash Nejatian[1,] Tamer Badawi[3], Subhy M Ragy[3]

1 International Center for Agricultural Research in the Dry Areas (ICARDA)

2 Ain Shams University, Cairo, Egypt

3 Ministry of Agriculture and Fisheries, UAE

Introduction

The Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates) constitute a total area of 259 million hectares. They are characterized by an arid and semi-arid climate. Rainfall is highly erratic in space and time—annual precipitation ranges from less than 50 mm to 250 mm although some areas in Oman receive much more rainfall. Temperatures are generally high, reaching 50°C at times in some places in summer, when the relative humidity is also high.The soils of the region are fragile and subject to erosion by wind and water, as well as degradation through salinization. Over 95% of the total land area in the Arabian Peninsula suffers from some form of desertification, of which 44% is severe to very severe; wind and water erosion account for over 60% of the desertification.

The region's population was 32 million in 2002 (WB 2004) and with current annual growth rates (2.0 to 6.9%), it is estimated that the population will be more than double (64 million) by the year 2025. The total commodity demands resulting from population growth in the Arabian Peninsula has caused a rapid increase in food imports. Food imports are expected to be more than double by 2010, if per-capita consumption remains the same and domestic productivity is not increased.

Of the total 259 million hectares, 173 million hectares (67%) is under permanent pasture (mostly in Saudi Arabia), which supports different types of vegetation and animals. Rangeland condition is very poor and in some areas well below the production potential. Large areas are classified as -empty lands, and other has few species with very low density. Signs of deterioration were evident on both soil and plant components of the range ecosystem. Overgrazing is the main cause of rangeland deterioration. Rangeland degradation is reflected on feed shortages for livestock. In attempts to alleviate feed shortages, farmers have relied on growing exotic forages with high water requirements. Excessive use of underground water has resulted in lowering of water table, increased salinity and in severe cases the abandonment of croplands. In 2002, the area under arable land and irrigated crops was less than 4 million ha (FAO statistics 2004).

Given the limitations in rainfall and the lack of available surface water, most of the cultivated areas in the Arabian Peninsula depend on irrigation from groundwater, springs, aflaj canals and a series of small dams. Because of the increasing demand for water, several countries in the Peninsula have established large projects for water desalination and for recycling of the treated sewage effluent (TSE) for agricultural use. Such non-conventional sources now account for 15% of the total available water resources in the region (Figure 1). Almost 86% of the total available water in the region is allocated to agriculture. It is estimated that 22% of the total land area is potentially cultivable. Cultivation expanded from 1977 to 2002, with the area under arable and permanent crops increased by 121% (from 1.9 to 4.2 million ha) and the irrigated area increased by 280% (from 0.5 to 1.9 million ha). There is considerable heterogeneity in the countries of the Arabian Peninsula with respect to agricultural production. The countries with a substantial agricultural sector, in terms of area, production and proportion of the population involved in agriculture, are Oman and Saudi Arabia.

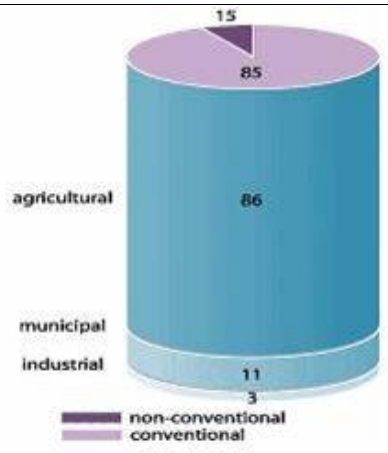


Figure 1. Origin and use of water resources in the Arabian Peninsula (Global Environment Outlook 3 – UNEP 2002)

The countries with a modest agricultural sector are Bahrain, Kuwait, Qatar and the UAE. The cultivated areas in the latter countries are relatively small and scattered, and support a small proportion of the total population. Per-capita food imports are consequently higher than in the more agriculturally oriented countries, and demand for cereals—particularly wheat and wheat products—is met almost entirely by imports. Agricultural production depends mainly on irrigation from groundwater and, to a lesser extent, on rainfall during the winter (November–February). Agricultural production in these countries, as in the countries with more substantial agricultural sectors, is constrained by severe biotic and abiotic stresses including heat, salinity, lack of improved cultivars and cultural practices, as well as lack of trained manpower.

Date Palm is one of the oldest fruit trees in the Arabian Peninsula (AP) and played a key role in the life of its people. Date fruit is marketed all over the world as a high value confectionery and as a fresh fruit it remains an important subsistence crop in most of the desert areas. It is produced largely in the hot arid regions of the world i.e. GCC countries.

Origin of Date Palm

The earliest evidence of date palm cultivation was 4000 BC in Ur, lower Mesopotamia (now Iraq), where the date palm trunks were used for the construction of the temple of moon god. While in the Nile Valley, date palm cultivation goes back to 3000 BC, as mentioned on old temples where the trunk represent one of the year and the fruit punch represent one of the months.The religious importance of date palm goes back to profit Abraham, where he was grown in Ur, and his love for date. In Christianity, they celebrate using the palm leafs on Sunday just before Easter (Easter Sunday). The Jewish consider the date as one of the seven holly seeds (the others being, barely, wheat, lentil, beans, garlic & onion) while in Islam, date palm is mentioned in 20 versus out of 114.

The spread of Date Palm and/or migration had occurred over many centuries along two main roads

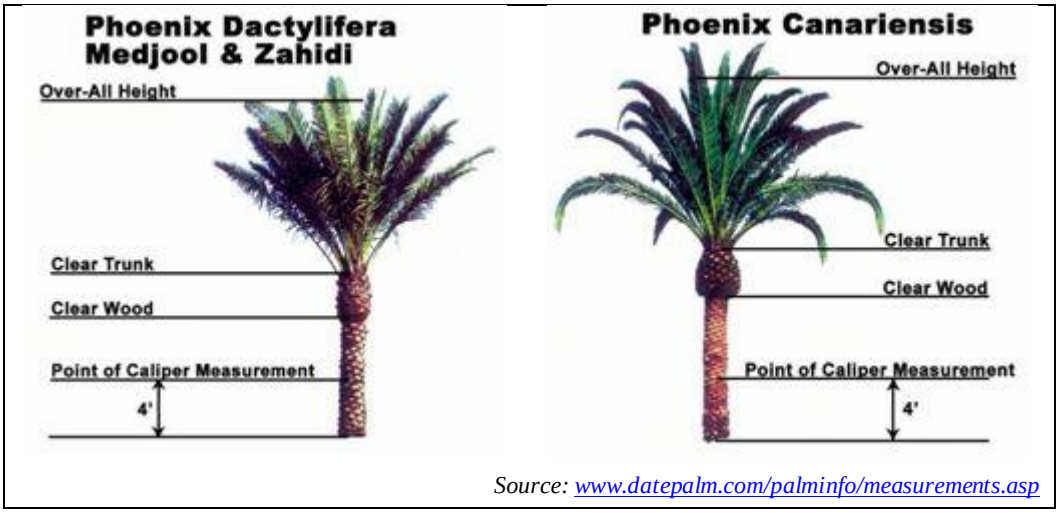
- First from Iraq towards east to Iran, Pakistan and India
- Secondly from Egypt towards west to Maghrab, Spain and to the new world

Figure 2. Dissemination of the date palm in the Old World

In the Arabian Peninsula (AP), date palm varieties had been evolved over a long period, to adapt with environmental conditions. It is the most tolerant tree to the harsh environments of the AP.

Botanical Profile

Date Palm belongs to the species *Phoenix dactilyfera* and has about 19 known genetic relatives. The most important ones are Canary Island Palm (P. canariensis); Senegal Date Palm (P. reclinata) and Indian Sugar Date Palm (P. sylvestris). The genus Phoenix belongs to the plant family Arecaceae and all are Monocotyledons. Date Palms are dioecious; i.e. the male and female parts are on separate plants. The date palm is the tallest of the Phoenix species growing to 30m in some places. The trunk, in cultivation, is surrounded from the ground upwards in a spiral pattern of leaf bases. The leaf are large 4-5m, alternate, sheathing in dense terminal rosette, the ends of leaf fronds are needle sharp protecting the growth tip from grazing animals. The fruit is a Berry type (known also as Drupe) with a single seed in each. Fruit is born on clusters called Bunches and it is the largest among all other species, with a few varieties reaching up to 100x40 mm in size. From the time of pollination, the fruit takes 150 - 200 days to reach the fully ripened stage (Tamar stage). A fully productive palm can support 8 – 10 bunches weighing as much as 60 – 100 kg.



Source: www.datepalm.com/palminfo/measurements.asp

Culture of Date Palm

The date palm has adapted to areas with long dry summers and mild winters. It has a unique characteristic to thrive in desert and oasis where temperature could be high but with underground water close to the surface. Under these situations the date palm is described as having its feet in the running water and its head in the fire of the sky. Date fruit production is dependent on the availability of certain heat requirements according to varieties. Most dry varieties are found in the dry areas whereas soft and semi dry varieties are confined to the humid and semi dry areas.

Date Palms can grow in different types of soil, but the best productions were recorded in light deep soils. It can tolerate high level of salinity i.e. some varieties can survive salinity level upto 22000 ppm, but their growth and fruit productivity would be affected.

Propagation of Date Palm

There are two main techniques to propagate date palm:

1. Sexual Propagation, where new plantlets originate from the sexual embryo in the seed. The resulted seedlings differ considerably in fruit quality, harvesting time and production potential.
2. Vegetative propagation, which is carried by both Offshoot propagation (traditional method) and the recently developed tissue culture techniques.

Offshoot propagation: Date palm is the only species from the Arecaceae family that produce offshoots (develop from axillary buds on the trunk of the mother plant). Offshoots are true to type to the parent plant and consequently the fruit produced will be of the same quality and uniformity.

Tissue culture propagation: it is a cloning technique which involves the use of meristematic tissues isolated under sterile condition from a known healthy and superior quality female or male plant to produce large numbers of true to type plantlets in confined controlled area.

Figure 3. Offshoot propagation

Nutritional Value

Dates are rich in sugar ranging from 65% to 80% on dry weight basis mostly of inverted form (glucose and fructose). Fresh varieties has a higher content of inverted sugars, the semi dried varieties contain equal amount of inverted and sucrose, while dried varieties contain higher sucrose. Water content is between 7% (dried) and 79% (fresh) depending on variety.

*Table 1. Food Value Per 100 g of Edible Portion**

	Fresh	Dried		Fresh	Dried

Calories	142	274 - 93	Phosphorus	350 mg	63 - 105 mg
Moisture	31.9- 78.5 g	7.0 - 26.1	Iron	6.0 mg	3.0 - 13.7 mg
Protein	0.9- 2.6 g	1.7 -3.9 g	Potassium	-	648 mg
Fat	0.6- 1.5 g	0.1 - 1.2 g	Vitamin A (ß carotene)	110-175 mcg	15.60 mg
Carbohydrates	36.6 g	72.9 - 77.6 g	Thiamine	-	0.03 - 0.09 mg
Fiber	2.6- 4.5 g	2.0 - 8.5 g	Riboflavin	-	0.10 - 0.16 mg
Ash	0.5- 2.8 g	0.5 - 2.7 g	Niacin	4.4-6.9 mg	1.4 - 2.2 mg
Calcium	34 mg	59 - 103 mg	Tryptophan	-	10 - 17 mg

**Based on standard analyses.*

Statistics

Date fruit is produced in hot arid regions of the world and is marketed all over the world as a high value confectionery. It is considered an important subsistence crop in most of the desert areas.

Worldwide dates production has increased exponentially over the last three decades. In 1963 production was 1.8 million tones increased to 2.6 and 6.7 millions by 1983 and 2003, respectively (Figure 3). The increase of 4.9 million tones since 1963 represents an annual expansion of about 6.8%.

The top five producing countries in 2001 were Egypt, Iran, Saudi Arabia, Pakistan and Iraq (FAO statistics 2002). This represents 69% of total world production. If the next five most important countries are included, i.e. Algeria, United Arab Emirates, Sudan, Oman, and Morocco, then this percentage rises to 90%. This clearly indicates that most of the world's date production is concentrated in a few countries in the same region.

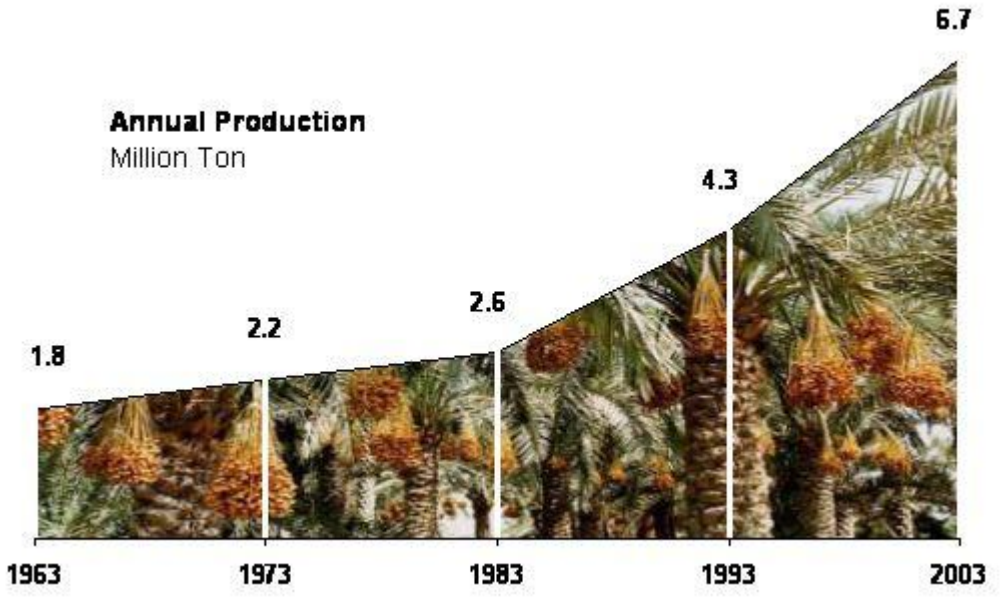


Figure 3. Global date production development (FAO Statistics2004)

Most of the major date producing countries had steadily expanded production over the last 10 years, representing an increment of 43% over the period 1994 to 2001. Date exports increase by only 25%, over the same period, especially by Oman, United Arab Emirates, Egypt and Pakistan. Conversely, an output decrease has been observed by Iraq and Morocco. In the Arab world, total dates production is estimated to be 4,511,494 ton in the 2003 (total production for IRAQ is estimated 400000, FAO 1997) representing 67% of the global date production (Figure 4 & Table 2).

Figure 4. Percentage of date palm area in Arab World to Global (FAO statistics 2004)

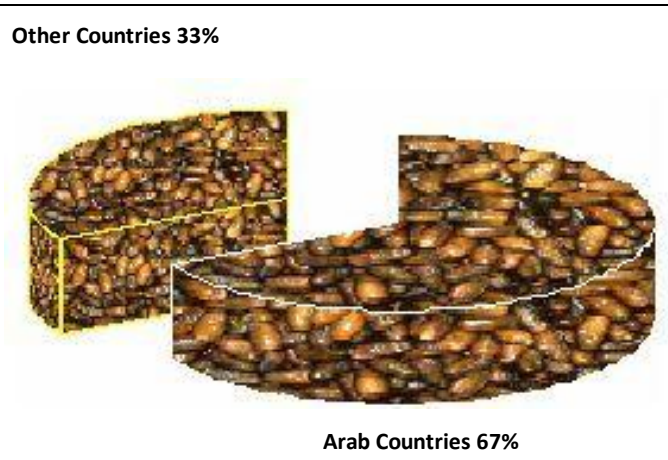


Figure 5. Date Production & Harvested Area in the GCC countries and the World (FAO)

The GCC countries produced 1.9 million tons in 2003, which represent 28% of the global production (FAO 2004).Saudi Arabia and Emirates together produced 1.6 Million tons in 2003. Date palm production in the year 2003 for the GCC is shown in Figure 5

Table 2. Date palm area and production in leading countries (2003)

Countries	Production (Mt)	%	Countries	Production (Mt)	%
World	6,749,356	100.0	Yemen	32,500	0.5
Egypt	1,115,000	16.5	Mauritania	24,000	0.4
Iran	875,000	13.0	Chad	18,000	0.3
Saudi Arabia	830,000	12.3	USA	17,600	0.3
UAE	760,000	11.3	Bahrain	16,508	0.2
Pakistan	650,000	9.6	Qatar	16,500	0.2
Algeria	420,000	6.2	Kuwait	10,400	0.2
Iraq*	400,000	5.9	Turkey	9,400	0.1
Sudan	330,000	4.9	Niger	7,700	0.1
Oman	238,611	3.5	Palestine,	5,500	0.1
Libyan	140,000	2.1	Spain	3,732	0.1
China	120,000	1.8	Mexico	3,600	0.1
Tunisia	115,000	1.7			
Morocco	54,000	0.8	Others	536,305	7.9

*Source FAO statistics 2003, * FAO estimated for 1997*

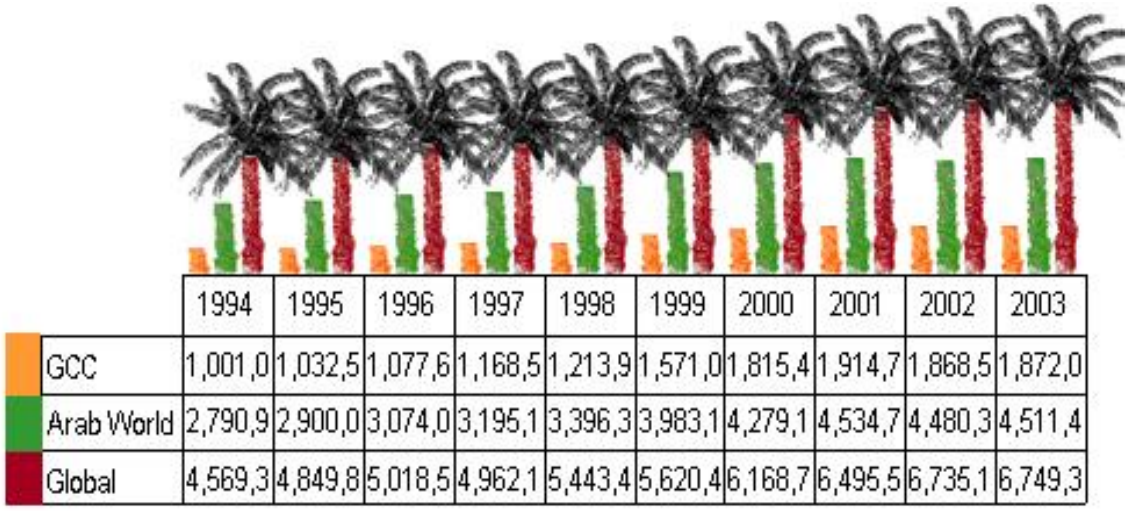
Figure 6. Date palm production in GCC countries during the year 2003 (FAO statistics 2004)

Oman has 7 million trees and a worldwide market acceptance. The remaining GCC countries (Bahrain, Qatar and Kuwait) have fewer date palm trees and production (Figure 6). During the last decade, the date palm production has increased by 86.7%, from 1.0 million tons in 1994 to reach 1.87 million tons by 2003 (Table 3).

Table 3. Date palm production in GCC countries from 1994 till 2003 (tons)

Year	UAE	Oman	Bahrain	KSA	Qatar	Kuwait	Total

1994	236100	170000	12000	568862	11431	3790	1’002’183
1995	236965	173000	16371	589261	12533	4410	1’032’540
1996	244644	180000	16508	616908	14582	5034	1’077’676
1997	288190	185000	16508	649239	22915	5552	1’167’404
1998	290448	236000	16600	648000	16409	6484	1’213’941
1999	535946	282000	16774	712000	16389	7894	1’571’003
2000	757601	280030	16508	735000	16116	10155	1’815’410
2001	757601	298000	16508	818000	14230	10376	1’914’715
2002	760000	238611	16508	829000	16500	10376	1’870’995
2003	760000	238600	16508	830000	16500	10376	1’871’984



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
GCC	1,001,0	1,032,5	1,077,6	1,168,5	1,213,9	1,571,0	1,815,4	1,914,7	1,868,5	1,872,0
Arab World	2,790,9	2,900,0	3,074,0	3,195,1	3,396,3	3,983,1	4,279,1	4,534,7	4,480,3	4,511,4
Global	4,569,3	4,849,8	5,018,5	4,962,1	5,443,4	5,620,4	6,168,7	6,495,5	6,735,1	6,749,3

Figure7. Development of date palm production (ton) from 1994 till 2003

Constrains Facing the Development of Date Palm in GCC

Date palm cultivation in the GCC has a long history, yet the efforts exerted by the individual countries on research and development, although significant, are still insufficient and fall below expectations. In general, the product quality is still low, the field and post-harvest losses are high and the date products and by products utilization need improvement. Therefore, the current status of date palm cultivation in the GCC countries and the enhancement of quality of produce can not be overemphasized. To address the above mentioned constrains, the GCC countries ranked date palm as one of the high research priority as reflected in priority setting for agricultural research in the Central and West Asia and North Africa region - CWANA (ICARDA 2003).

Several problems and constraints might affect the future of the GCC date palm industry. Such problems include:

1. low quality varieties
2. poor farm Management
3. Pests & diseases and inadequate IPM control
4. Harvesting, processing and marketing
5. Shortage in national qualified and trained staff & labours
6. Insufficient research and development activities

References

1. فتحي حسين أحمد، محمد سعيد القحطاني و يوسف أمين والي (1979). زراعة النخيل وإنتاج التمور في العالمين العربي

والإسلامي. جامعه عين شمس- القاهرة- جمهورية مصر العربية.
2. المرزوقى محمد، عوض محمد عثمان ونمردو داؤود بنيامين (1994). تنفيذ مشروعات التصنيع الزراعي في مجال التمور. ندوه القطاع الخاص العمانى في التنمية الزراعية، وزارة الزراعة والثروة السمكية، سلطنه عمان، يوليو 1994 .
3. خليل وجيه المعرى (1995). إكثار النخيل بواسطة تقنيات زراعة الأنسجة النباتية. إصدارات المركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد)، دمشق- الجمهورية العربية السورية.
4. الجربى محمد (1998). أمراض النخيل و التمور. المشروع الإقليمي لبحوث النخيل والتمور في الشرق الأدنى وشمال أفريقيا. منظمة الأغذية والزراعة الأمم المتحدة.
5. تاج الدين عبد الرازق و عبد العزيز نور (1993). استخدام مخلفات النخيل في تغذية المجترات. ملخصات بحوث ندوه النخيل الثالثة، مركز أبحاث النخيل و التمور. جامعه الملك فيصل الاحساء. المملكة العربية السعودية.
6. حمودة حمزه حسن و جمعة سند شلش (1987). تأثير فترات خزن خليط التلقيح على عقد الثمار و بعض صفاتها الأخرى في نخلة التمر صنف خستاوى. مجلة نخل التمر، عدد(1) مجلد(5).
7. عبد الوهاب زايد (1989). الإكثار السريع للتمر عن طريق زراعة الأنسجة. إصدارات ندوه النخيل الثانية، ندوه إكثار و رعاية النخيل في الوطن العربي، مركز أبحاث النخيل و التمور. جامعه الملك فيصل الاحساء. المملكة العربية السعودية.
8. فتحي حسين (1989). دراسات على اللإحتياجات المائية للنخيل تحت الظروف المختلفة. إصدارات ندوه النخيل الثانية، ندوه إكثار ورعاية النخيل في الوطن العربي، مركز أبحاث النخيل والتمور. جامعه الملك فيصل الاحساء. المملكة العربية السعودية.
9. مصطفى الحمادى، احمد خليفة وعبد العظيم الحمادى (1983). خف ثمار البلح. إصدارات ندوه النخيل الأولى، كلية العلوم الزراعية والأغذية، جامعه الملك فيصل الاحساء. المملكة العربية السعودية.
10. محمد إبراهيم عبد المجيد، زيدان عبد الحميد وجميل السعدنى (1989). آفات النخيل والتمور والتوزيع الجغرافي، الضرر والأهمية الاقتصادية و وسائل المكافحة المستنيرة. جامعه عين شمس- القاهرة- جمهورية مصر العربية.
11. Asif,M.I., A.A.Osman & A.S.Al-Ghamdi (1987). Variation in date palm pollen grain size. HortScience 18(3):479-480.
12. Barreveld, W.H. (1993). Date Palm Products, Agricultural services Bulletin No 101, 216pp, FAO Rome.
13. Beaucchesne,G., A.Zaid & A.Rhiss (1986). Meristimatic potentialities of bottom of young leaves to rapidly propagate date palm. Second Symposium on date palm, 87-95, 3-6 March, KSA.
14. Bouabidi,H. & M.B.Rouissi (1995). Influence des pollens sur la maturation et la qualité de la datte. Centre de Recherches Phoenicicoles, Degache, Tunisie.
15. El-Hannawy,H.M. & Y.A.Wally (1978). Date Palm *(Phoenix dactylifera L.)* bud differentiation in vitro. Egypt. Jor. Hort 5:81-82.
16. FAO (1995). Report of the expert consultation on Date Palm- Pest Problems and their control in the Near East. 22-26 April 1995, Al-Ain, UAE.
17. FAO (2002 and 2003). Agro-Statistics Database.
18. IAEA (1996). Bayoud Disease of Date Palm. Report of consultation meeting, Vienna, Austria.
19. Morton, J. 1987. Date.. In: Fruits of warm climates. Publisher Julia F. Morton, Miami, FL. p. 5–11
20. Osman, A.M. (1995). Date palm production and protection in the Arab Countries. Expert consultation on Date Palm- Pest Problems and their control in the Near East. 22-26 April 1995, Al-Ain, UAE.
21. Smith,M. (1992). A computer program for irrigation planning and management, FAO irrigation and drainage paper 46, Cropwater.
22. Tisserat, B.H.; M.F.Gabr & M.T.Sabour (1985). Viability of cryogenically treated dated palm pollen. Date Palm J.4(1):25-32.
23. UN/ECE (1992). Standards for dried fruits. UN NY, USA.
24. Zaid, A. & E.J. Arias-Jiménez (2002). Date Palm Cultivation. FAO publication, within the framework of the date production Support program in Namibia.