Date Palm
Development in the GCC Countries of the Arabian Peninsula

ICARDA

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

Arabian Peninsula Regional Program (APRP)

Date Palm Development in the Gulf Cooperation Council Countries of the Arabian Peninsula

Summary Proceedings of a Regional Workshop
29–31 May, 2004, Abu Dhabi, United Arab Emirates (UAE)

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Editors' Note

These proceedings are covering the summery and abstracts of presented country reports and scientific papers at Regional Workshop on Date Palm Development in the Gulf Cooperation Council Countries of the Arabian Peninsula, 29–31 May, 2004, Abu Dhabi, United Arab Emirates (UAE). Abstracts are presented in English and Arabic. The full papers will be made available.

For those wishing to obtain more information on the technical presentations of the workshop, the Arabian Peninsula Regional Program (APRP) of the International Center for Agricultural Research in the Dry Areas (ICARDA) has made the full papers available on its homepage under the following address:

WWW.ICARDA.ORG\APRP\Datepalm

We hope that you will find the information on the homepage both easy to access and relevant to your needs. Look out for the discussion forum for matters of relevance to Date palm Development and to APRP in General

The Editors

Foreword

Date palm has played an important role in the economy, history, and culture of the Arabian Peninsula since ancient times. It is estimated that, worldwide, the total area cultivated with date palm amounts to over one million hectares, 60% of which is in the Arab world. Of the global production of 6.4 million tones of dates in 2003, Arab world contributed 63%. The Gulf Cooperation Council (GCC) countries grow date palm over an area of 365,000 hectares, which represents 33% of the global area. They produce 1.9 million tones of dates per year, representing 29% of global production.

ICARDA addresses the needs of the Arabian Peninsula region for agricultural research, technology transfer and institutional strengthening and capacity building through its Arabian Peninsula Regional Program (APRP), which is based in UAE, and is one of the seven regional programs of the Center covering dry areas worldwide. ICARDA has been working with its national partners in these programs to periodically determine their research and development priorities to provide appropriate direction to the joint research efforts. In such a priority setting exercise done with the national programs of Arabian Peninsula in 2002, the GCC countries ranked the date palm research and development as high priority.

Due to date palm's economic and social importance, ICARDA organized a Regional Workshop on Date Palm Development in the Arabian Peninsula, in Abu Dhabi, in May 2004. The workshop was held under the patronage of H.H. Sheikh Nahayan bin Mabarak Al Nahayan, Minister of Higher Education and Scientific Research and Chancellor of the UAE University, and in cooperation with the Ministry of Agriculture and Fisheries, UAE, the UAE University, and the GCC General Secretariat.

The workshop addressed the following scientific themes:

(a) Propagation and crop Management;

(b) Crop protection and integrated pest management (IPM);

(c) Post harvest, marketing and processing of date palm added-value products;

(d) Biotechnology and germplasm conservation; and

(e) Information technology and expert systems.

The workshop was a major step in developing a technically sound research and development program for date palm for the GCC countries. As a result, a research and development Project entitled "Development of Sustainable Date Palm Production Systems in the GCC of the Arabian Peninsula" was formulated. The Project will focus on problem-solving research, technology transfer and capacity building.

This volume presents all the reports and scientific papers presented at the above workshop. I hope all those interested in date palm improvement will find this volume useful.

Prof. Dr Adel El-Beltagy

Director General

ICARDA

Acknowledgments

ICARDA's management would like to express their sincere gratitude to the Government and people of The United Arab Emirates (UAE) for hosting the date palm workshop in Abu Dhabi.

Particular thanks are due to **H.H. Sheikh Nahayan bin Mabarak Al Nahayan,** Minister of Higher Education and Scientific Research, Chancellor of UAE University, for holding the workshop under his patronage.

We also wish to extend our appreciation to **H.E. Saeed Mohamed Al Ragabani,** the UAE's Minister of Agriculture, and Fisheries, for the support he provided while the workshop was being prepared. Thanks are also due to H.E. Eng. Rashid Khalfan Al-Shariqi, Deputy Minister and the organizing committee members from MAF, for the efforts they made and the time they allocated to the workshop.

We also wish to express our gratitude to the municipality of Abu Dhabi and the Department of Agricultural Extension, for arranging field trips to Baniyass Research Station. Thanks are also due to the owner and the management of the Emirates Dates Factory (EDF), at Al Saad at Al Ain, for the generous hospitality they showed workshop participants during the visit.

Special thanks are due to the invited scientists, who have enriched this event with their knowledge and expertise.

We wish to thank the participants from the GCC countries for their comprehensive reports and surveys and for their active involvement in the workshop.

The workshop was financed by the membership contribution the GCC makes to the CGIAR.

Special thanks to Dr. Surendra Varma, head of Communication, Documentation, and Information Services of ICARDA and his staff for their valuable assistance in editing the proceedings.

The Art work and design of this proceedings and the website was done by Eng. Arash Nejatian of ICARDA Office in Dubai to whom we wish to express our thanks for a job well done.

Thanks are also due to Eng. Tamar Badawi and Mrs. Iman Zaki for helping with the Arabic editing and typing.

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Date Palm in the Gulf Cooperation Council Countries of the Arabian Peninsula

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Introduction

The Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) have a total area of 259 million hectares. They are characterized by arid and semi-arid climates. Rainfall is highly erratic in space and time. In general, 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 the summer, when the relative humidity is also high. The soils of the region are fragile and are subject to erosion by wind and water, as well as degradation as a result of salinization. Over 95% of the total land area of the Arabian Peninsula suffers from some form of desertification, of which 44% suffers very severe desertification; wind and water erosion account for over 60% of the desertification occurring.

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

Of the total 259 million hectares that make up the Gulf Cooperation Council countries, 173 million hectares (67%) are under permanent pasture (mostly in Saudi Arabia), which supports different types of vegetation and animals. The condition of the rangelands is very poor, and in some areas the rangeland operates well below its production potential. Large areas are classified as 'empty land', while others contain only a few species growing at a very low density. Signs of deterioration are evident in both the soil and plant components of the range ecosystem. Overgrazing is the main cause of rangeland deterioration, and has

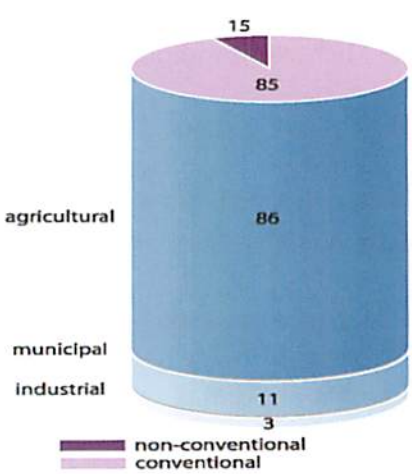


Figure 1. Origin and use of water resources in the AP (Global Environment Outlook 3 – UNEP 02)

caused livestock feed shortages. Farmers have attempted to alleviate feed shortages by growing exotic forage pants with high water requirements, on which they have come to rely. But the excessive use of underground water, for irrigation, has resulted in the lowering of water table, increased salinity and in severe cases the abandonment of croplands. In 2002, less than 4 million hectares were used to produce arable and irrigated crops in the GCC countries (FAO 2004).

Given the limitations imposed by low rainfall and a lack of surface water, most of the cultivated areas in the Arabian Peninsula depend on irrigation fed by groundwater, springs, and water carried by aflaj canals and controlled by a series of small dams. Because the demand for water is increasing, several countries in the Peninsula have established large projects for water desalination and the recycling of treated sewage effluent (TSE) for agricultural use. Such non-conventional sources now account for 15% of the water resources available in the region (Figure 1). Almost 86% of the total amount of water available 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 increasing by 121% (from 1.9 to 4.2 million ha) and the irrigated area increasing by 280% (from 0.5 to 1.9 million ha). Agricultural production varies considerably in the countries of the Arabian Peninsula.

In terms of area, levels of production and the proportion of the population involved in agriculture, Oman and Saudi Arabia have a substantial agricultural sector. Bahrain, Kuwait, Qatar, and the UAE, on the other hand, have a modest agricultural sector, as their cultivated areas are relatively small and scattered, and support only a small proportion of the total population. Per-capita food imports in the latter countries are consequently higher than in the more agriculturally oriented countries; the demand for cereals, particularly wheat and wheat products, is met almost entirely by imports. Agricultural production depends mainly on irrigation using groundwater and, to a lesser extent, on rainfall during the winter (November–February). Agricultural production in these countries, as in those countries with more substantial agricultural sectors, is constrained by severe biotic and abiotic stresses (such as heat and salinity) as well as by a lack of improved cultivars and cultural practices, and a lack of trained labor.

Date palm is one of the oldest fruit trees in the Arabian Peninsula (AP) and has played a key role in the life of the region's people. The date fruit is marketed all over the world as a high value confectionery product; 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. the GCC countries.

Origin of Date Palm

The earliest evidence of date-palm cultivation dates from 4000 BC, when the tree was cultivated around the city of Ur, in lower Mesopotamia (now Iraq), and their trunks used to construct the temple of the moon god. In the Nile Valley, date palms were cultivated as early as 3000 BC. Here date palms are mentioned in old temples, where the trunk of the tree was used to represent one year and the bunch of fruit one month. The religious importance of date palm may be traced back to the prophet Abraham, who was raised

in the city of Ur and who had a love for dates. Christianity uses the leaves of the palm during the celebrations conducted on the Sunday before Easter (Easter Sunday). The Jewish religion considers the date to be one of the seven holy seeds (the others being, barley, wheat, lentil, bean, garlic and onion), while in Islam the date palm is mentioned in 20 chapters (Sura) of the114 contained in the Koran.

The spread of date palm from the areas in which it originally grew occurred over many centuries via two main routes: (1) from Iraq, eastwards towards Iran, Pakistan and India and (2) from Egypt, westwards towards the Maghrab, Spain and the New World (Figure 2).

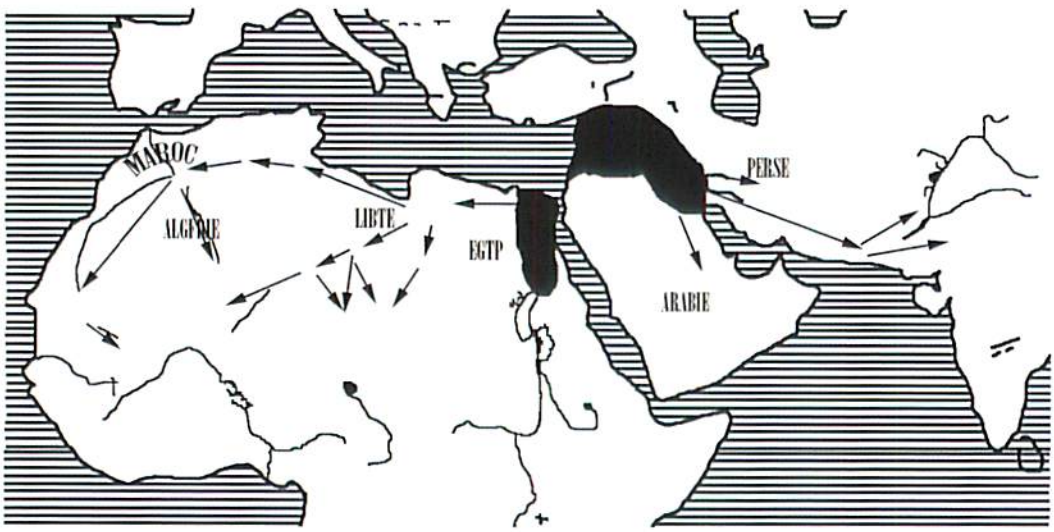
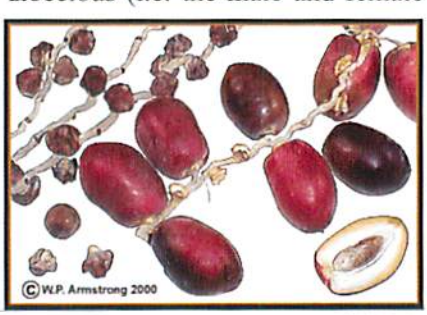


Figure 2. Dissemination of the date palm in the Old World

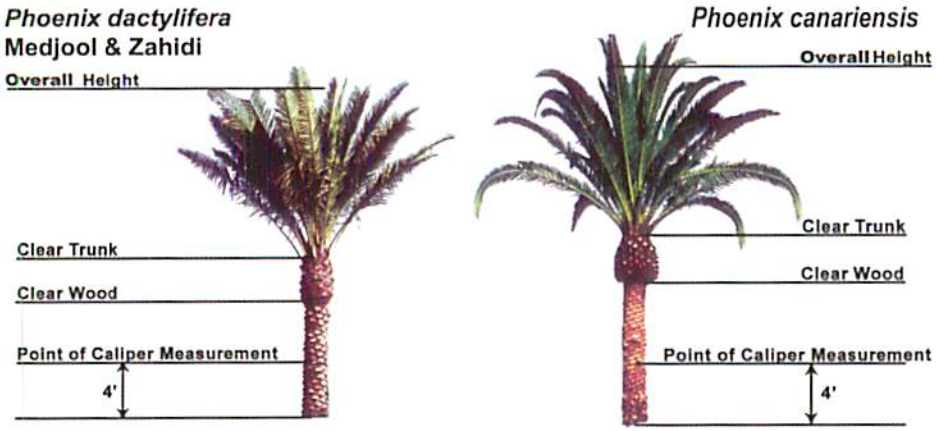
In the Arabian Peninsula (AP), date palm varieties have adapted, over a long period, to the environmental conditions found there. As a result, it is the tree which is best able to tolerate the harsh conditions found in the AP.

Botanical Profile

Date palm (Phoenix dactylifer) has about 19 known relatives, the most important being the Canary Island palm (P. canariensis); Senegal date palm (P. reclinata) and the Indian sugar date palm (P. sylvestris). The genus Phoenix belongs to the plant family Arecaceae, all of which are monocotyledonous. 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 30 m in height in some places. The trunk of cultivated trees is surrounded, from the ground upwards, by a spiral pattern of leaf bases. The leaves of the tree are large (4-5 m), alternate, and sheath a dense terminal rosette. The ends of the leaf fronds are needle sharp, to protect the growing tip from grazing animals. Each fleshy



fruit (known as a drupe) contains a single seed. The fruit of the date palm is borne on clusters called 'bunches', and is the largest among all other species, with a few varieties reaching up to 100 x 40 mm in size. From pollination, the fruit takes 150 to 200 days to reach the stage at which it is fully ripe (known as the tamar stage). A fully productive palm can carry 8 to 10 bunches of dates, weighing as much as 60 to 100 kg.



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

Culturing Date Palms

The date palm has adapted to areas which have long dry summers and mild winters. It has a unique characteristic in that it can thrive in desert oases, where temperatures may be high but underground water is available close to the surface. Under such situations, the date palm is traditionally described as growing with 'its feet in running water and its head in the fire of the sky'. Date fruit production depends on certain minimum temperatures being achieved; these heat requirements vary according to the variety involved. Most of the dry varieties of date are found in 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 highest levels of production have been recorded in light, deep soils. They can tolerate high levels of salinity. Indeed, some varieties can survive salinity levels of up to 22,000 ppm; however, the growth and fruit production of trees growing under such conditions would be affected.

The Propagation of Date Palm

Two main techniques are used to propagate date palms: (1) 'sexual propagation' and (2) 'vegetative propagation'.

'Sexual Propagation' entails the use of plantlets grown from seeds (and which therefore originate from sexual reproduction) to produce more plants. The seedlings that result from sexual reproduction differ considerably in terms of the quality of the fruit they produce, the time at which their fruit is ready to be harvested and the amount of fruit that they are able to produce.

'Vegetative propagation' can be achieved either through 'offshoot propagation' (a traditional method) or recently developed tissue culture techniques.

Offshoot propagation: Date palm is the only species within the Arecaceae family that produces offshoots (which develop from axillary buds on the trunk of the mother tree). Offshoots are true-to-type to the parent plant and, as a consequence, the fruit they produce is of the same quality and exhibits the same degree of uniformity (Figure 3).

Tissue culture propagation: Meristematic tissues isolated, under sterile conditions, from a healthy female or male date palm known to be of superior quality can be cultured and cloned to produce large numbers of true-to-type plantlets in a confined, controlled area.

Figure 3. Offshoot propagation

Nutritional Value

Dates are rich in sugar, with a sugar content that ranges from 65% to 80% on a dry weight basis. The sugar they contain is mostly in the form of invert sugar (a mix of glucose and fructose). Fresh dates give a higher content of invert sugars than semi-dried dates, which contain equal amount of invert sugar and sucrose; dried dates contain higher amounts of sucrose. The water content of dates varies, and is between 7% in the case of dried fruit and 79% in the case of fresh dates, depending on the variety involved.

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

	Fresh, uncooked	Dried		Fresh, uncooked	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

Dates are produced in hot arid regions and are marketed all over the world as a high-value confectionery product. The fruit is considered to be an important subsistence crop in most of the desert areas of the world.

Worldwide, date production has increased exponentially over the last three decades. In 1963 production stood at 1.8 million tonnes in total. This increased to 2.6 million tonnes in 1983, reaching 6.7 million tonnes by 2003 (Figure 4). This increase of 4.9 million tonnes since 1963 represents an annual expansion of about 6.8%.

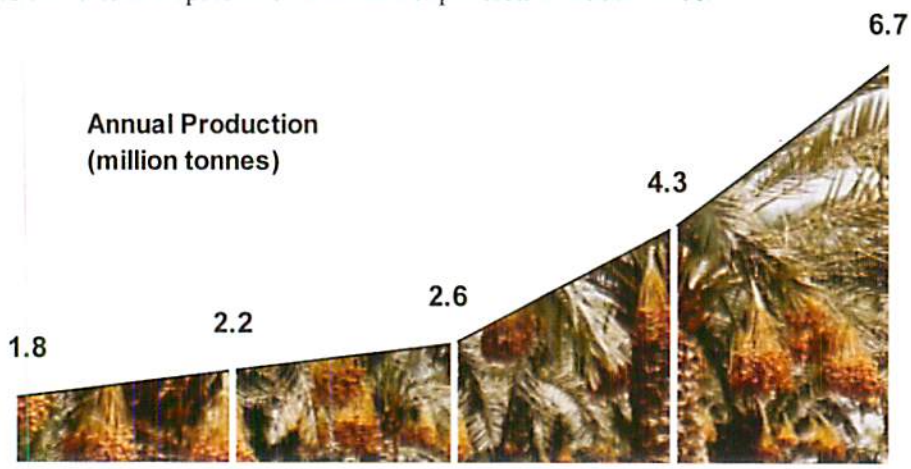


Figure 4. Global date production development (FAO statistics 2004)

The top five date-producing countries in 2001 were Egypt, Iran, Saudi Arabia, Pakistan, and Iraq (FAO statistics 2002), producing 69% of the total amount of dates grown globally. If amounts produced by the next five most important date-producing countries are included in this figure (i.e. Algeria, United Arab Emirates, Sudan, Oman, and Morocco) the group

of countries being considered accounts for 90% of the world's date production. This clearly indicates that most of the world's dates are produced by a few countries in the same region.

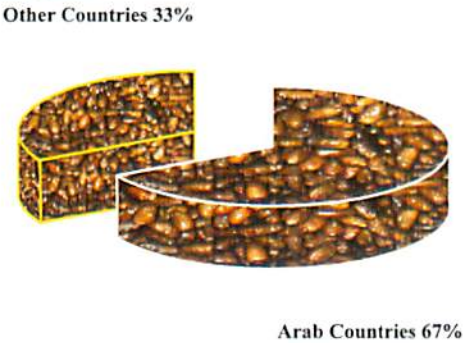


Figure 5. Date production in the Arab countries and the world in 2003 (FAO)

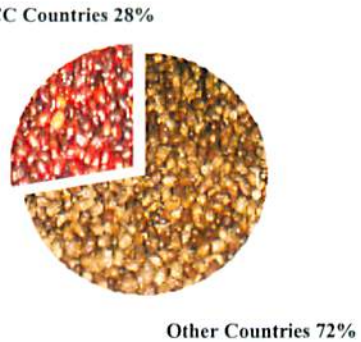


Figure 6. Date production in GCC countries and the world in 2003 (FAO statistics 2004)

Most of the major date-producing countries have steadily expanded production over the last 10 years, increasing the amount produced by 43% between 1994 and 2001. Date exports increased by only 25% over the same period (e.g. in Oman, United Arab Emirates, Egypt, and Pakistan). In contrast to the trends seen in other countries, output decreased in Iraq and Morocco. It is estimated that, in the Arab world, a total of 4,511,494 tonnes of dates were produced in 2003 (total production for Iraq is estimated to be 400,000 tonnes, FAO 1997) representing 67% of global date production (Figure 5 and Table 2).

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

Country	Production (tonnes)	%	Country	Production (tonnes)	%
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

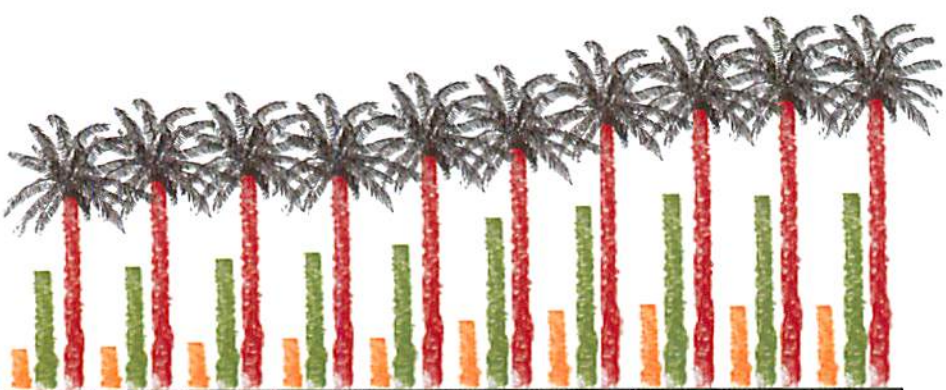
*Source FAO statistics 2003. * FAO estimate for 1997*

The GCC countries produced 1.9 million tonnes of dates in 2003, which represents 28% of global production in that year (FAO 2004; Figure 6). Saudi Arabia and the Emirates together produced 1.6 million tonnes in 2003.

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

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

Year	Kuwait	Qatar	KSA	Bahrain	Oman	UAE	Total
1994	3,790	11,431	568,862	12,000	170,000	236,100	1,002,183
1995	4,410	12,533	589,261	16,371	173,000	236,965	1,032,540
1996	5,034	14,582	616,908	16,508	180,000	244,644	1,077,676
1997	5,552	22,915	649,239	16,508	185,000	288,190	1,167,404
1998	6,484	16,409	648,000	16,600	236,000	290,448	1,213,941
1999	7,894	16,389	712,000	16,774	282,000	535,946	1,571,003
2000	10,155	16,116	735,000	16,508	280,030	757,601	1,815,410
2001	10,376	14,230	818,000	16,508	298,000	757,601	1,914,715
2002	10,376	16,500	829,000	16,508	238,611	760,000	1,870,995
2003	10,376	16,500	830,000	16,508	238,600	760,000	1,871,984



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
GCC	1,001,083	1,032,540	1,077,676	1,168,514	1,213,941	1,571,021	1,815,410	1,914,721	1,868,596	1,872,019
Arab World	2,790,910	2,900,002	3,074,025	3,195,178	3,396,395	3,983,131	4,279,156	4,534,774	4,480,348	4,511,494
Global	4,569,387	4,849,889	5,018,502	4,962,158	5,443,468	5,620,438	6,168,749	6,495,528	6,735,134	6,749,356

Figure 7. Development of date palm production (tonnes) from 1994 till 2003

Constraints Facing the Development of Date Palm in GCC

Date palm cultivation has a long history in the GCC countries; however, the efforts exerted by the individual countries in terms of research and development, although significant, are still insufficient and fall far below expectations. In general, the quality of the product remains low, while field and post-harvest losses are high. By the same token, date products and the ways in which by-products are used need to be improved. In fact, the current poor status of date palm cultivation in the GCC countries and the need to enhance the quality of what is being produced are issues that cannot be overemphasized. To address the above-mentioned constraints, the GCC countries ranked date palm as one of the highest research priorities when setting the priorities for agricultural research in the Central and West Asia and North Africa (CWANA) region (ICARDA 2003).

Several problems and constraints have the potential to affect the future of the GCC countries' date palm industry. Such problems include:

1. The use of low quality varieties
2. Poor farm management
3. Pests, diseases, and inadequate IPM control
4. Problems related to harvesting, processing, and marketing
5. A shortage of qualified and trained staff and laborers at a national level
6. Insufficient research and development activities.

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Abstracts of Country Reports

Kingdom of Bahrain

Date palm cultivation in Bahrain is concentrated in the northern governorate, where approximately 65.7% of all the country's date palm trees are found. In this part of the country, both fertile soil and fresh water are available. In all, 100 varieties of date palm are grown in the different areas of the state. These different varieties exhibit a considerable level of diversity in terms of the size, color, quality, and ripening and marketing time of the fruit produced.

Of the 100 varieties grown, only 7 have been recognized as having commercial potential (Al-Moagy, Al-Begeira, Al-Ghora, Ekhlas, Al-Khoneizy, Al-Marzaban and Al-Solamy). Transplants derived from seeds and offshoots are the major sources of plants for new plantations. In 1983 the first transplant produced from a tissue culture of the Barhie variety was planted in Bahrain. A tissue culture laboratory was established in 1999 in the Ministry of Public Affairs and Agriculture, resulting in the first set of tissue culture transplants to be produced in Bahrain. These are still in the vegetative growth stage.

In Bahrain, the agricultural management of date palm trees, including the management of fruiting and the post-harvest management of date palm fruits, depends mainly on experience and knowledge which has been passed down from generation to generation. Basin irrigation is the major irrigation technique used; drip and/or bubbler irrigation are used on only 27.6% of the total cultivated area. The water requirements of the date palms grown have been calculated to be 50 m3 per tree per year. Studies have found that only manure is added to the soil when the land is being prepared for planting. Recent recommendations advocate the use of a complete fertilizer (NPK) at a rate of 3-6 kg per tree per year. The fruits produced are marketed and consumed fresh, due to a shortage of storage facilities.

Date palm improvement and expansion in Bahrain faces several constraints. Included among these is the fact that good varieties are either not available or, when available, very costly. The lack of date palm tree services including the use of mechanization. Problems also arise because poor quality varieties are planted which are not suitable for packaging or the use of industrialized methods. This is compounded by the fact that only a limited amount of good quality land is available on which to grow date palms. Finally, the prevailing environmental conditions, which do not favor the ripening of date fruits and, most importantly, a lack of the technical manpower needed to improve date palm tree treatment and services, are also both issues which limit date palm improvement and expansion.

Future prospects for the improvement of date palm production include the development of research tools that will lead to:

- Improvements in the techniques used to propagate date palms, through the use of tissue culture. This will improve genetic stability and the quantity of the fruit produced, as well as the timing of production.

- Increased awareness of agro-management practices, mechanization, and the management of flowering and fruiting.
- The recognition and classification of the different pests and diseases that affect date palm trees.
- Improved post-harvest management, with the objective of improving marketing and improving the utilization of by-products by conducting market surveys to assess the need for such products.
- The identification, classification and genetic 'fingerprinting' of the local varieties, in line with the establishment of a gene bank.
- The use of new techniques for varietal improvement (i.e. gene transfer), especially in relation to increasing the ability of different varieties to adapt to salinity, drought and pests.
- The development of a management database and a system of experts that will cover all areas of date palm production.

مملكة البحرين

تتركز زراعة النخيل في البحرين في المحافظة الشمالية من البلاد حيث يزرع حوالي 65.7% من إجمالي مساحة النخيل. و ذلك لتوفر المياه و التربة الصالحة للزراعة. يوجد في المملكة حوالي 100 نوع من التمور و تتميز بتنوع واسع من حيث حجم الثمرة و اللون و النوعية و كذلك فترات النضج و مواعيد التسويق.من أهم هذه الأصناف والتي ينتشر زراعتها بشكل اقتصادي (المواجى -البجيرة - الغرة -الخلاص الخنيزى -المرزبان -السلمى)

تعتمد طرق إكثار الأصناف السائدة على البذور (النواة) و الفسائل و قد تمت أول تجربة للزراعة النسيجية في عام 1983 على الصنف(البرحى) و تم إنشاء مختبر زراعة الانسجة عام 1999 .

إن إدارة وخدمة أشجار النخيل والثمار وعمليات ما بعد الحصاد تعتمد كلها على الخبرات المتوارثة لدي المزارعين. ويتم ري أشجار النخيل بالغمر في معظم المساحة أما الري بالتنقيط أو باستخدام الفقاعات فيستخدم بمعدل 27.6% من إجمالي المساحة فقط و قد حسب كمية المياه التي تحتاجها الشجرة الواحدة حوالي 50 متر مكعب / شجرة في السنة . وتحصل أشجار النخيل علي احتياجاتها السمادية أثناء تسميد الزراعات الأخرى التي يتم زراعتها داخل مزارع النخيل .

تستهلك التمور بشكل طازج بعد الحصاد و ذلك لقلة الإمكانيات المتاحة لعملية التخزين والتصنيع .

العقبات التي تواجه زراعة وإنتاج النخيل بالمملكة :

1. عدم توفر فسائل الأصناف الجيدة وبالسعر المناسب.
2. سوء إدارة مزارع النخيل.
3. رداءة مواصفات ثمار الأصناف المزرعة حيث لا تصلح للتصنيع.
4. نقص الأيدي العاملة المدربة .
5. محدودية الأراضي الصالحة لزراعة النخيل

<u>مستقبل زراعة النخيل في البحرين</u>

- تحسين تقنية إكثار النخيل باستخدام زراعة الأنسجة .
- إرشاد المزارعين بأهمية خدمة مزارع النخيل.
- مكافحة الآفات التي تهاجم أشجار النخيل.
- تصنيع التمور للاستفادة من الإنتاج بشكل افضل .
- استخدام التقنيات الحيوية (البصمة الوراثية) وإنشاء بنك للجينات.

United Arab Emirates

The United Arab Emirates (UAE) has made great progress in the establishment of date palm plantations and in date production. Date palm trees are now planted all over the Emirates, with over 40 million trees having been planted in rural and urban areas according to official estimates.

Emphasizing the importance of technology transfer, a tissue culture laboratory was established at UAE University in 1989. In 2003, this produced around 100,000 transplants from different varieties. The Ministry of Agriculture and Fisheries (MAF), in collaboration with the El-Raghy Group, has also instituted a tissue culture laboratory, to produce date palm transplants. It has also conducted research to compare the true-to-type date palm trees grown from tissue culture with those produced from offshoots. In the first generation produced, no differences were found in the physical and chemical properties of the fruit or the vegetative parts of the two types. The findings were similar in the case of the second generation of date palms grown from tissue culture. Based on a long-term experiment (which began in 1995), recommendations were derived for the agricultural management of the date palm. An irrigation and fertilization program was prepared which took into consideration both the age of the tree and the month of the year; the program can be adjusted to fit different types of soils. MAF has addressed the use of biological control methods to reduce the incidence of pests and diseases and reduce the amount of chemical pesticides used.

Considerable attention has been given to fruiting, post-harvest management, and the use of different date palm by-products. Mechanical pollination was introduced, as was the use of *P. sylvestris* as a male pollinator (to improve fruit setting, fruit size and to enhance ripening). Efforts are also being made to improve the quality of the fruit produced, by thinning and bagging bunches. Cold storage and drying chambers are widely used, by different farmers, to improve their income by marketing *rutab* dates off season. An increase in the number of date palm fruit manufacturers has led to improved methods of packaging and the marketing of different products. Most of the date palm varieties found in UAE have now been planted in research stations belonging to MAF. The total number has reached 130 varieties, though only 15 of these have commercial potential.

Future prospects for the improvement of date palm production include the development of research tools for

- The management of date palm (in terms of fertilization, irrigation, and the mechanization of tree services), in order to improve the productivity of existing farms, as well as date quality.
- The development of techniques which can be used to improve the productivity of 'second class' varieties and to identify the genetic variants available in different commercial varieties, placing emphasis on improving the varieties' ability to adapt to environmental stress.
- The identification of the major pests and diseases (other than red palm weevil) affecting date palm trees and the fruits produced, either in the field, or in storage and at markets.

- The improvement of the post-harvest methods used with date palm fruits, in order to improve marketing during the off-season period and provide techniques which will allow the processing of by-products to be industrialized. The markets for such by-products should be identified by means of a market survey.
- The genetic 'fingerprinting' of the major varieties grown in UAE.
- The development of a database to organize the information gathered regarding the varieties, research, and expertise available in the area of date palm production, management, and marketing.
- The construction of an expert system to improve date palm tree production in the different areas of emirates.

الإمارات العربية المتحدة

يزرع النخيل في أرجاء دولة الإمارات العربية المتحدة و يبلغ اجمالي عدد الأشجار حسب الإحصائيات الرسمية 40 مليون نخلة ، وقد ساهمت الدولة في تعزيز زراعة وانتشار النخيل حيث تم إنشاء مختبر لزراعة الأنسجة في العام 1989 وقد بلغ إنتاجه من الفسائل في العام 2003 حوالي مائة ألف فسيلة من أصناف النخيل المختلفة. ولقد قامت الوزارة مؤخرا بالتعاون مع مجموعة الراجحي بتطوير هذا المختبر .

قامت الوزراة بإجراء بحوث عديدة للمقارنةبين النخيل المنتج من الفسائل وتلك المنتجة من زراعة الأنسجة حيث أظهرت النتائج أنة لا توجد اختلافات في الصفات المورفولوجية ومواصفات الثمار بين الفسائل الناتجة من زراعة الأنسجة والناتجة من ألام بطريقة طبيعية .

منذ عام 1995وبناء على نتائج الأبحاث فقد تم إعداد برنامجا تطبيقيا يشمل الري والتسميد خلال مراحل نمو النخيل كما قامت الوزارة بوضع برامج للمكافحة البيولوجية لآفات النخيل وذلك للتقليل من استخدام المبيدات الكيميائية .

اولت الوزارة أيضا اهتماما بطرق جمع الثمار وتخزينها منذ الحصاد كما جرت تطبيقات على طرق التلقيح الميكانيكي وذلك لتحسين إنتاج الثمار.

يستخدم المزارعون اليوم طرق التجفيف والتبريد بواسطة غرف خاصة لحفظ التمور وذلك لزيادة دخل المزارعين. وقد بلغ عدد الأصناف بالدولة حوالي 130 منها فقط 15 صنف ذات مواصفات ثمار جيدة.

<u>الوسائل المستقبلية لتطوير زراعة التمور</u>

- تحسين إدارة مزارع النخيل باستخدام وسائل الري الحديث وبرامج التسميد ومكافحة الآفات .
- الاهتمام بمرحلة ما بعد الحصاد لتحسين تسويق الثمار على مدار السنة.
- استخدام البصمة الوراثية للأصناف الرئيسية في الدولة.
- إعداد برامج النظم الخبيرة للاستفادة منها في مجال تقنية المعلومات .
- إعداد برامج تربية لتحسين الأصناف .

State of Kuwait

The State of Kuwait gave high priority to cultivation & production of date palm. The total number of date palm trees reached 1.5 million in 2003.

Research carried on date palm

- Effects of time on fertilization ability of female inflorescene of Barhi and Samaran date varieties.
- Effects of different quantities of pollen grains on fertilization and fruit development of Barhi date variety.
- Studies on crop fertilizer requirements of two date varieties (Barhi & Samaran).
- Studies comparing effects of drip irrigation and bubble irrigation on date production.

Important constraints of date palm in Kuwait

- Problem of diseases.
- Insect poets (Date moth, Date mile, Trunk borer, Rhinoceros beetles and Red palm weevil).
- Mutants in tissue culture dates and contamination problems in tissue culture laboratories.

Date palm research priorities for Kuwait

- Research on pest and diseases.
- Research involving biotechnology (tissue culture and finger printing). The finger printing is needed for date palm variety classification.
- Research on data processing.

دولة الكويت

اهتمت دولة الكويت بزراعة وإنتاج أشجار النخيل، وقد وصلت أعداد النخيل في الدولة حتى عام 2003 حوالي 1.500.000 نخلة بأصنافها المختلفة

أهم الأبحاث التي أجريت على النخيل في دولة الكويت

- أبحاث على المدة التي تبقى فيها مياسم الأزهار المؤنثة في النخيل قادرة على استقبال حبوب اللقاح وإحداث الإخصاب على صنفي البرحي والسعمران.
- تأثير استخدام نسب مختلفة من حبوب اللقاح على عقد الثمار في صنف البرحي.
- تجارب على تسميد أشجار نخيل التمر (البرحي – السعمران)
- تجارب في الري لمقارنة بالعمر و الري الفقاعي و تأثيرها على إنتاج التمر.

أهم المشاكل التي يتعرض لها النخيل بدولة الكويت

- مشاكل مرضية: اللفحة السوداء على السعف, خياس الطلع , تبقع الاوراق الديبلودي, تعفن قواعد السعف, البلعات (يسببه فطر فيتوفثورا)
- مشاكل حشرية: الحميرة, حلم العناكب, حفار الساق, حفار العذوق، حشرة سوسة النخيل الحمراء
- الطفرات في النخيل النسيجي و مشاكل التلوث التي تصيب النباتات في الأوساط الغذائية في معامل الأنسجة.

الأبحاث التي لها أولوية بالنسبة لدولة الكويت

- بحوث في الآفات والأمراض التي تصيب نخلة التمر.
- التقنية الحيوية وزراعة الأنسجة وذلك بإدخال البصمة الوراثية للاستفادة منها في تعريف الأصناف.
- بحوث الصناعات التحويلية في مجال النخيل والتمور.

Sultanate of Oman

Date is the most important crop in the Sultanate of Oman. At present Oman has more than 8 million date palms, occupying 35,630 ha. (48.1% of the total cultivated area).

The agro-management practices applied to date palm in Oman are the result of knowledge gained through experience by previous generations and passed on to their children. In 1995, the amount of research being conducted increased, with the goal of identifying and better managing the different aspects of date palm tree production (i.e. the trees' water requirements, irrigation levels, water use efficiency, and fertilization requirements). Emphasis was also placed on those management aspects concerned with managing the head of the tree (i.e. pollination, thinning, tending, and pruning). Date palm productivity in Oman is constrained by several factors. Environmental constraints limit production (especially the fact that Oman has limited water resources), as do low levels of soil fertility, the improper use of fertilizers, the fact that farms are small, the low quality of the date palm varieties being grown and the fact that the laborers working on the farms producing dates are inexperienced.

With regard to date palm, the Ministry of Agriculture and Fisheries is working to maintain Oman's national heritage by conserving its genetic resources and carrying out research which aims to improve and multiply this important crop. Two main institutes have established: the Tissue Culture Laboratory (established in 1992) and the Biotechnology Laboratory (established in 2000). The aims of both these institutes are (1) to facilitate the propagation, *en masse*, of date palm, (2) to establish a genetic map (which will characterize Oman's genetic resources) and (3) to develop techniques that can be used for the molecular detection of infestation in date palm. A Date Palm Research Station was also established in 1998, to produce offshoots for use in a replacement program, and to supply explant material for mass propagation and the conservation of Omani cultivars. Accordingly, 30,000 date palm plantlets were produced yearly and the morphological classification of 45 cultivars was accomplished. A shortage of major equipment (e.g. DNA analyzers) and trained staff and a lack of links between the different laboratories have all imposed constraints on the development of biotechnology research in Oman. Date palm plantations have suffered from a number of pests and diseases, mainly because trees have been planted too close together and because of the excessive use of irrigation. Those pests and diseases of major economic importance, which affect the growth and yield of date palm both qualitatively and quantitatively, are the dubas bug, red palm weevil, lesser

date moth, Old World date mite, the wilts associated with Ceratocystis and the leaf spot diseases.

Considering the importance of date palm to Oman's agricultural sector, the need to improve the techniques used during harvest, as well as those used post harvest and during the handling, marketing and storage of dates, are all issues that deserve more attention. The absence of a comprehensive quality control program has resulted in farmers ignoring extension recommendations. In addition, higher production costs and a lack of new products have reduced the competitive advantage previously associated with local date palm production and discouraged investment in this area.

Future development includes the prospect of the following:

- The development of an agricultural management program for date palm tree services, the application of quality control measures and an increase in capacity building in order to reduce the cost of production.
- The provision of support, through Oman's tissue culture laboratory, for a national program implemented to replace old, lower quality date palms grown on plantations with new cultivars.
- The identification and classification of the different pests and diseases affecting date palm fruits and development of appropriate methods of IPM control techniques.
- The expansion of Oman's gene bank and the increased maintenance of this facility, as well as the genomic mapping of the most important Omani date palm cultivars and the introduction of new date palm varieties tolerant to biotic and abiotic stresses.
- The development an effective extension service for Omani date palm growers.

سلطنة عمان

تعتبر زراعة أشجار النخيل من أهم محاصيل السلطنة و تبلغ عدد الأشجار حوالي 8 مليون نخلة مزروعة فى مساحة 35630 هتكار (48.1% من إجمالي المساحة المزروعة).

إدارة عمليات زراعة النخيل هي إدارة متوارثة منذ القديم. وقد اهتمت السلطنة بالتطبيقات البحثية في مجال إنتاج التمور منذ عام 1995 وذلك فيما يخص إدارة وخدمة أشجار النخيل (الاحتياجات المائية وكفاءة استخدام المياه ، متطلبات التسميد و كذلك الخدمة أثناء نمو وتطور الثمار التي تشمل التقليع ولتفريد وجمع المحصول). يواجه النخيل بعض العقبات التي تؤثر على الإنتاج والتي تشمل الظروف البيئية غير المناسبة مثل نقص المياه ، تربة فقيرة ، ضعف عقد الثمار، صغر حجم المزارع ، نوعية الثمار غير الجيدة وكذلك نقص العمالة المدربة.

تعمل وزارة الزراعة والثروة السمكية في السلطنة على جمع الأصول الوراثية للتمور والعمل على تحسين و تطوير أصناف التمور للتأقلم مع ظروف البيئية . كما تعمل جاهدة على الحفاظ على الطرق التقليدية لزراعة أشجار النخيل. تم إنشاء مختبرين الأول لزراعة الأنسجة عام 1992 والثاني مختبر البيوتكنولوجي في عام 2000 لغرض زيادة الإنتاج و دراسة الخصائص الجينية لأصناف التمور المختلفة. ومن جهة أخرى عملت الدولة على إنشاء محطة بحوث النخيل في عام 1998 و إحلال بعض الأصناف الجيدة محل الأصناف ذات الإنتاج المنخفض.و تنتج محطة البحوث 30000 فسيلة سنويا، كما عملت على تحديد الصفات المورفولوجية ل45 صنف. إلا أن هذه المحطة تواجه بعض الصعوبات

الفنية و الإدارية في تطوير زراعة النخيل والتي تعكس عدم انتظام العمل في مجال توسيع زراعة النخيل.

كما أن زيادة انتشار الإصابة بالآفات يعود إلى الزراعة المكثفة بالإضافة إلى زيادة الري. يتعرض النخيل لآفات اقتصادية تؤثر على النمو الخضري مما يودي إلى قلة الإنتاجية ومن هذه الآفات حشرة الدوباس وسوسة النخيل الحمراء وسوسة التمور .

تسعى الدولة إلى تحسين إنتاجية التمور والأهتمام بعمليات ما بعد الحصاد وذلك لزيادة تسويق التمور محليا ودوليا.

أن افتقار برنامج الجودة وتحسين نوعية التمور أدى إلى عدم اهتمام المزارع بنصائح الإرشاد الزراعي و توجيهاته.

التطلعات المستقبلية للتمور تتمثل في:

- تطوير إدارة مزارع التمور مع إتباع طرق الجودة في الإنتاج و كذلك تنمية القدرات البشرية للتخفيف من كلفة الإنتاج .
- دعم برامج البحوث المتعلقة بالنخيل وزراعة الانسجة لاستبدال أشجار النخيل القديمة وبعض الأصناف القليلة الإنتاج بأصناف جديدة ومحسنة.
- تصنيف وتعريف الآفات المختلفة التي تصيب التمور في مراحله المختلفة وكذلك وضع برامج مكافحة متكاملة لها.
- إنشاء بنك للجينات ووضع خرائط وراثية لأهم أصناف التمور العمانية والعمل علي إنتاج بعض أصناف التمور التي تتحمل الظروف البيئية .
- إنشاء برنامج إرشادي فعال لخدمة مزارعي التمور في السلطنة.

State of Qatar

In Qatar, date palm plantations represent 71% of the total area planted with fruit trees. The total area cultivated with date palm is, approximately, 1366 ha (containing 335,765 fruit-bearing trees and 146,955 unproductive trees). Most trees cultivated are found in the north and in the middle of the state, where environmental conditions are favorable, and where the soil is deep with a low salinity in comparison to that in other parts of the country.

A tissue culture laboratory has been established under the aegis of the Agriculture and Water Research Directorate (AWRD) and the Ministry of Municipal Affairs and Agriculture. The main objective behind the establishment of this laboratory was to ensure the provision of date palm transplants and the preservation of Qatar's natural resources. A survey of the morphological and physiological diversity present in Qatar's different date palm species has been carried out. Moreover, different propagation methods, the physiological behavior of explants and the ability of transplants to acclimatize are all being evaluated.

Major constraints facing the new laboratory are (1) the fact that the date plant explants are exhibiting a low ontogenic response in the media being used, (2) difficulties in differentiating between the different species at early stages in culture process and

before fruiting and (3) a low percentage of success in rooting and in the acclimatization of the new transplants. Most of the agricultural management practices used depend on knowledge passed down from generation to generation and the recommendations made by those growing date in other areas, which may have conditions which are different from those found in Qatar. The water requirements of date palm in Qatar are calculated, by the Water Research Department (AWRD), according to equations that take into consideration environmental areas, soil type and water salinity. However, no research has been done on pests and diseases, due to the lack of a special department for pests and diseases in the AWRD. Post-harvest management and the handling, marketing, packaging and utilization of by-products are constrained by seasonal consumption, low productivity and marketing. Future prospects for the improvement of date palm production include the development of research tools for

- The agricultural management of date palm, especially in terms of the tree's fertilization, irrigation, and water requirements and adaptation to salinity, mechanization of tree services, pollination, fertilization and fruiting.
- Improving the efficiency with which date palm explants are produced when cultured, and identifying genetic variation between different species.
- Identifying which IPM techniques should be used to combat the various pests and diseases that attack date palm and establishing methods for identifying and controlling the weeds that affect date palm cultivation.
- Establishing favorable storage conditions, increasing the length of time over which the products can be consumed, and developing techniques which will allow the best use to be made of the different products derived from the date palm tree.

دولة قطر

تمثل زراعة النخيل حوالي 71 % من مجمل مساحة الأشجار المثمرة والتي تقدر بحوالى356 ألف شجرة) وتقدر المساحة الكلية للزراعة بحوالي 1366 هتكار.

تنتشر أكثر الزراعات في شمال الدولة نتيجة للمناخ المناسب في تلك المنطقة. و تربتها التى تتميز بعمق القطاع والملوحة المنخفضة.

أنشأت وزارة الشؤون البلدية والزراعة مختبر لزراعة الأنسجة بهدف إكثار النخيل والمحافظة على الموارد الطبيعية. كما عملت إدارة البحوث الزراعية\والمائية التابعة للوزارة على حصر ودراسة الأصناف المختلفة للنخيل .

تعتمد زراعة النخيل على التقاليد المتوارثة والتي تعمل على خدمة جيدة لمزارع النخيل والتي قد تختلف عن مثيلتها في الدول الخليجية الأخرى.

لا توجد بحوث على امراض وآفات النخيل كما لا يوجد قسم مختص لهذا الغرض فى الوزراة.

لا يتم الاهتمام بمرحلة ما بعد الحصاد بالشكل المناسب إذ يعانى بعض المزارعين من سوء التخزين والتسويق.

التطلعات المستقبلية لزراعة النخيل:

- إدارة جيدة لمزارع النخيل وإجراء المعاملات الزراعية بصورة جيدة بما فيها التسميد والري واستخدام الميكنة الزراعية.

- تحديد افضل الأصناف لتحسين الإنتاجية .
- اتباع طرق المكافحة المتكاملة للوقاية من الآفات المختلفة التي تصيب أشجار النخيل.
- تحديد المعاملات المناسبة لإطالة فترة تخزين وحفظ التمور وتقنيات تصنيع التمور.

Kingdom of Saudi Arabia

In the Kingdom of Saudi Arabia (KSA), date palm production is, economically, the most important activity in the agricultural sector, and provides a major part of the incomes of both farmers and those working in associated industries. In KSA, date palm plantations cover around 141,000 ha (15% of the total area planted with dates worldwide in 2002) and support 18 million date palm trees. The total amount produced is estimated at approximately 829,000 tonnes (13% of the total produced worldwide in 2002). Around 33,000 tonnes of this is exported, providing a revenue of about US$20,000,000.

Only a limited amount of research has considered the agricultural management practices used with date palm trees (i.e., NPK fertilization and tree services such as pollination, pruning and thinning) or has attempted to identify the water requirements of date palm in the different regions of the kingdom. Considering the importance of date palm, it must be concluded that the agricultural management practices associate with date palm have not received appropriate attention. This is due to a shortage of trained and qualified personnel and laborers able to apply modern date palm tree services. Only a limited number of good commercial varieties exist, despite the large number of local varieties. Mechanized date palm production is lacking and date palm research is localized to certain areas of the country. One of the most serious problems facing date palm production is the fact that farmers believe that the date palm does not require fertilization and/or irrigation. However, the production of transplants derived from different commercial varieties (i.e. Agwa, Anbara, Sheishi and Al-Khalas and Al-Sokary) has received considerable attention both from the government and from private companies (e.g., Al-Raghy BioTech and Sabad Al-Gomez) which are producing a considerable number of transplants.

The most important pests and diseases affecting date palm in KSA have been identified as the red palm weevil (RPW), the longhorn date palm borer, the lesser and greater date moths; the fruit stalk borer, the almond moth, a dust mite, *Fusarium* wilt and *Al wijam* disease. Insufficient knowledge of the behavior and life cycle of most of these pests and diseases, coupled with a lack of efficient IPM control programs, has resulted in the spread of these pests and diseases to different regions of the kingdom.

The major constraints limiting biotechnological improvement in date palm production in KSA are the absence of a germplasm conservation bank (which means that the germplasm of most KSA varieties has not been stored) and a lack of research aimed at (1) developing improved varieties tolerant to environmental stresses, (2) testing existing varieties for their potential for improvement, (3) identifying methods of

controlling the amount of male trees produced and (4) undertaking the genetic fingerprinting of date palm varieties.

Future prospects for the improvement of date palm production include the development of research tools for

- Building the capacity of the national institutions and personnel concerned with the agricultural management of date palm (especially those dealing with date-palm orchard and tree services) and providing new ways to develop the market for date palm products.
- Developing techniques that will improve the transplants produced from tissue cultures, help in the identification of true-to-type varieties, facilitate the production of male pollinators with a higher Metaxenia ability and improve the technical supply of the national institute.
- Increasing people's awareness of the harmful effects that different pests and diseases have on the date palm tree, and developing an IPM program for the control of major pests and diseases.
- Improving the technical competence of personnel working in the sector.
- Identifying, classifying, and fingerprinting local varieties, in line with the establishment of a gene bank. This would allow the use of new techniques for varietal improvement (i.e. gene transfer which could be used to improve, in particular, date palm's ability to adapt to salinity, drought and pests.
- The development of a management database and an expert system that will cover all areas of date palm production.

المملكة العربية السعودية

يعتبر إنتاج التمور في المملكة العربية السعودية من أهم المصادر الاقتصادية للقطاع الزراعي حيث تبلغ المساحة المزروعة بأشجار النخيل حوالي 141000 هتكار مزروعة بحوالى 18 مليون نخلة (تمثل 15% من مجمل مساحة النخيل في العالم حسب إحصائيات 2002). يبلغ الإنتاج الكلى من التمور 829000 طن (يمثل13% من الإنتاج العالمي من التمور حسب إحصائيات 2002) , كما تمثل نسبة التصدير حوالي 33000 طن بأرباح تقدر بحوالي 20 مليون دولار أمريكي.

جرت بعض البحوث التطبيقية لإدارة مزارع النخيل ، وأجراء المعاملات الزراعية المختلفة ، بالإضافة إلى تحديد المتطلبات المائية للنخلة في مختلف مناطق البيئية للمملكة .

لم يتم التوسع في عمليات خدمة مزارع النخيل بالقدر المطلوب وذلك لقلة المزارعين المهرة والعائد الاقتصادي المحدود وذلك على الرغم من وجود الكثير من الأصناف الجيدة.

اقتصر استخدام الميكنة الزراعية على بعض المناطق و بعض مراكز البحوث في المملكة. ومن الأخطاء الشائعة بين المزارعين هي الاعتقاد بأن النخيل لا يحتاج إلى تسميد أو الري .

تشجع الدولة حاليا وكذلك القطاع الخاص ممثلا في مجموعة الراجحى و شركاة على نشر زراعة الأصناف الجيدة. كما تم حصر الآفات التي تهاجم أشجار النخيل الا ان نقص وعى المزارعين بالآفات والأمراض أدي إلى انتشار العديد منها في البلاد.

هناك افتقار لحفظ الأصول الوراثية وتقيمها وبرامج التربية وتحسين الأصناف وغيرها مما أدى إلى الكثير من المعوقات التي أدت إلى ضعف الإنتاج .

مستقبل تطوير زراعة النخيل في المملكة العربية السعودية

- تنمية القدرات البشرية للباحثين الوطنيين في مجال زراعة النخيل
- إدارة جيدة لمزارع النخيل و تطوير طرق تسويق التمور.
- تطوير طرق إنتاج فسائل النخيل عن طريق زراعة الأنسجة .
- إرشاد المزارعين بأفضل أساليب مكافحة الآفات و الأمراض.
- إنشاء بنك جينات و استخدام الطرق الحديثة لتحديد البصمة الوراثية للأصناف.
- إعداد قاعدة بيانات لأصناف النخيل المختلفة في البلاد.

Abstracts of Scientific Papers

1. Date Palm Propagation and Crop Management

Management of Soil and Water in the Date Palm Orchards of Coachella Valley, California

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In the United States, the date palm (*Phoenix dactylifera)* occupies approximately 6000 acres of land in Coachella Valley, southeast California, and 900 acres in Bard, near Yuma, Arizona. The date palm tree was introduced into the Western Hemisphere in the early part of the 20th century. During the early years of its establishment, the adaptability and performance of over 100 varieties were evaluated in Texas, Arizona, and California. The varieties presently grown include Deglet Noor, Mejhool, Khadrawi, and Zahidi. Annual rainfall in the date production areas averages about three inches (75 mm). Consequently, all orchards depend on irrigation from the Colorado River. The two commonly used methods for water delivery are flood-basin irrigation and drip irrigation. The former is used for orchards of fruit-bearing age, and the latter for date nurseries and newly planted orchards up to five years old. Water management is governed by many important factors, including orchard age, the availability of water and soil properties (including texture, compaction, stratification, and fertility and salinity levels). Soil management operations are designed to overcome major problems that limit tree growth and yield. The management options used include slip plowing before an orchard is planted, the reduced use of heavy machinery in field operations, the maintenance of adequate levels of soil fertility, the control of weeds, and the leaching of excessive salinity. All these operations have an impact upon tree vigor, yield, and fruit quality.

إدارة المياة و خدمة التربة بمزارع النخيل في وادي كوتشيلا بولاية كاليفورنيا

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يشغل النخيل (*Pheonix dactyliphera*) في الولايات المتحدة الأمريكية / مساحة تقدر بحوالي 6000 فدان في منطقة وادى Coachella في جنوب كاليفورنيا و 900 فدان في منطقة Bard بالقرب من Yuma في اريزونا. و قد ادخل هذا المحصول في بداية القرن العشرين . في هذه الفترة قد تم تقييم

حوالي 100 نوع في تكساس و أريزونا و كاليفورنيا و ذلك لمعرفة مدى تأقلمها مع البيئة. تنتشر الأصناف مثل Deglet Noor و Khadrawi و Mejhool و ال Zahidi .

يبلغ متوسط الأمطار في مناطق زراعة النخيل حوالي 75 مم/سنة ومن الطبيعي فأن جميع الأشجار تحتاج لرى ويتم ذلك من نهرColorado والرى في الحقول أما بالرى السطحي وهو السائد في الحقول القديمة اوالري بالتنقيط في المشاتل والحقول الحديثة (عمرها أقل من خمسة سنوات) .

إدارة المياه تخضع لعدة عوامل منها عمر النبات ، توفر المياه ، نوع التربة الخصائص (الفيزيائية والكيميائية) .

النظام المتبع في إدارة و خدمة التربة في وادى كوتشيلا يهدف الي معالجة المشاكل الأساسية التي تعوق نمو وإنتاجية النخلة. المتمثلة في توفير الخصوبة المناسبة في التربة ، مكافحة الحشائش والتخلص من الأملاح الزائدة التي تؤثر على نمو أشجار النخيل ونوعية الثمار.

Date Palm Head Management Practices

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The management of the head of the date palm is a very important aspect of production, since it affects the quantity and quality of the fruits produced. Head management practices include the following:

1. Pruning. This involves the removal of dry or diseased leaves and old leaves with a reduced photosynthetic capacity, as well as the removal of the thrones of leaf bases and any old, dry leaf bases that that remained after the tree was last pruned.
2. Pollination. This practice may be carried out either by hand or using machines. The preparation of pollen, storage, pollination practice, importance of pollen source and factors affecting pollination efficiency are discussed below.
3. Fruit thinning. This technique is usually practiced on high-value cultivars. Different methods of fruit thinning are carried out either by hand or using growth regulators. The effects of fruit thinning on yield quantity and quality, as well as the timing of this practice, are discussed below.
4. Spathe positioning: The importance, timing, and different methods of carrying out this practice are discussed below.
5. Spathe covering. This is done either to protect the fruits produced from unsuitable environmental conditions or insect or bird damage, or to facilitate harvest. The different materials used for each purpose are discussed below, as are the benefits that can be achieved.
6. Harvesting Methods. The different stages of fruit growth are discussed below, along with how to determine at what stage different types of dates (soft, semi-dry or dry) should by harvested.

العمليات الزراعية لخدمة رأس النخلة

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تعتبر عمليات خدمة رأس النخلة من العمليات الزراعية الهامة والتي تؤثر على إنتاج التمور كما ونوعاً. وتشمل هذه العمليات ما يلي:

1- التقليم: تجري هذه العملية لإزالة الأوراق المسنة والتي انخفضت مقدرتها على التمثيل الضوئي أو التي جفت أو المصابة بالآفات وكذلك إزالة الأشواك من قواعد السعف بالإضافة إلى إزالة قواعد السعف الجافة (التكريب) والتي تترك عند التقليم.

2- التلقيح: تجري عملية التلقيح يدوياً أو ميكانيكياً وسوف يناقش كيفية تحضير اللقاح وكيفية حفظه وطرق التلقيح وأهمية مصادر حبوب اللقاح والعوامل التي تؤثر على نجاح إتمام عملية التلقيح .

3- خف الثمار: تجري عملية خف الثمار بوجه خاص للأصناف غزيرة المحصول وسوف تناقش طرق الخف المختلفة (يدوياً أو باستخدام منظمات النمو) وكذلك تأثير خف الثمار وموعد اجرائها علي كمية وخواص الثمار.

4- التدلية أو التقويس: سوف تناقش أهمية هذه العملية من حيث الميعاد الملائم والطرق المختلفة لإجرائها.

5- تغطية العذوق: وتجري هذه العملية لحماية الثمار من بعض الظروف البيئية الغير ملائمة وكذلك لحماية الثمار من الإصابة ببعض الحشرات أو الطيور وكذلك لتسهيل عملية جمع الثمار وسوف تناقش المواد المستخدمة في هذه العملية وموعد إجراؤها.

6- طرق القطف: سوف يتم مناقشة المراحل المختلفة لنمو الثمار مع الاهتمام بتحديد المرحلة الملائمة لقطف الأنواع المختلفة من التمور (الرطب - النصف جاف -الجاف).

Nutrients Requirements of Date Palm and Fertilizer Use

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Careful attention should be paid to agricultural operations (especially irrigation and fertilization) in order to maintain good palm growth and ensure that the fruit yielded is of the best quality. Physiological stresses should be avoided.

Although numerous and valuable scientific investigations have been conducted over the last 40 years, it is apparent that most of the information gathered has not been used to improve the crop at the grower level. The logical way to rapidly increase production is to improve production in existing plantations by making use of following different types of fertilizers:

Organic manures. Animal manures are widely used, and are applied in most of the date gardens found on the Arabian Peninsula and in North Africa. Naturally, the quantities of animal manure used vary a great deal. In many date-producing districts, the amount of manure applied is reported to range from 5 to 15 tonnes per acre (4000 m3). Sheep manure is preferred, because it consists of about 2.0% nitrogen, and therefore contains more nitrogen than cow or horse manures (0.5% to 1.0% nitrogen). Chicken manure, however, has an even higher nitrogen content (from 3% to 5%), and is used when it is available.

Inorganic nitrogen. Recently, inorganic chemical fertilizers have been widely accepted as a major source of nutrients that can be used to improve and maintain soil fertility. Palm trees need sufficient nutrients, in the proper balance, if they are to grow and develop normally. Sixteen chemical elements are known to be essential for date palms. Thirteen of these elements (excluding carbon, hydrogen, and oxygen) are taken up from the soil by the plants during their development and during crop production. The amount of fertilizer applied should be determined on the basis of whether it is used alone or in combination with manure or cover crops.

Microelements. The results of some studies clearly show the vital role that microelements (such as Zn, Cu, Fe, b, and Mn) play in improving the total yields and fruit quality of date palm. Their benefits are felt whether they are applied in an organic or inorganic form.

Recent trends in the fertilization of date palm

Developments in irrigation and fertilizer technologies have improved plant nutrition by allowing 'fertigation' (the addition of fertilizers in conjunction with irrigation water. Obviously, a fertigation system is affected by all the factors that affect irrigation systems, as well as by those that affect fertilizer systems. The kinds of fertilizers used and the time at which they are applied in combination with irrigation water have all proved to play a major role in increasing the growth, yield and fruit quality of date palms. However, much more work is needed to study nutrient concentrations in soil solutions, to formulate labor- and energy-saving techniques, and ensure that applications are flexible and reflect the demands of the crop, according to the growth stages of the palm or its fruits.

Another recent trend is the increased use of micro-organisms in biofertilizers to ensure that plants are properly nourished. Biofertilizer use is very important in case of the huge new projects being implemented on sandy soils, which lack the biological activity necessary for plants to flourish. Many investigators are now working to increase the populations of such bacteria in the soil, to ensure that nutrients are more readily available to plants and so increase crop yields. Moreover, elemental fertilizer application would be reduced, which would reduce both the costs of crop production and environmental pollution.

The use of slow-release fertilizer has been shown to improve the growth and nutritional status of date palm trees, as well as fruit set, yield and fruit quality. However, little work has been done on such slow-release N fertilizers, and much more information is needed if researchers are to determine which sources are most

appropriate and what rates and times of application lead to the maximum level of productivity in date palm trees.

Future research

Special attention should be given to determining what fertilizers should be used under the environmental conditions prevailing in each region and what the water requirements of date palm are under such conditions. Such research should place emphasis upon determining which methods of irrigation and fertilization minimize water consumption and the loss of minerals.

It is also important to study the recent trends in the fertilization of date palms (i.e. the use of biofertilizers, fertigation, and slow-release N fertilizers) and the effects these techniques have had in terms of reducing the rates at which mineral fertilizers are used, and so lowering the rate at which water resources and soils are polluted.

Finally, however, research is not in itself enough. Emphasis should also be placed on the importance of agricultural programs and efforts should be made to promote them. Courses should be offered to provide information to those associated with date palm production and to train them in the modern agricultural techniques used with date palms.

التسميد والاحتياجات السمادية لنخيل التمر

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بالرغم من أن نخيل التمر قد عرف منذ اقدم العصور ،إلا انه لم يحظى كغيره من الحاصلات البستانية بأجراء الأبحاث والدراسات اللازمة لتحسين إنتاجية وصفات ثماره ويرجع ذلك بسبب الاعتقاد الذي كان سائدا بين مزراعي النخيل وخاصة في البلدان العربية بأن النخيل يمكن أن ينمو ويثمر تحت أسوا الظروف دون الحاجة إلى تسميده لذلك أهمل الغالبية تسميد النخيل أو اقتصروا في تسميدهم له في احسن الظروف على إضافة الأسمدة العضوية مرة واحدة كل سنة أو سنتين أو ثلاثة دون إضافة أي أسمدة كيماوية أخرى .

وقد أثبتت الدراسات والأبحاث الحديثة خطا هذا الاعتقاد واتضح أن للتسميد دورا كبيرا في زيادة نمو النخيل وتحسين إنتاجه وصفات ثماره وان احتياجات أشجار نخيل التمر من العناصر الأساسية قد لا تقل عن أي محصول أخر وتوسعت الدراسات في هذا المجال وقد تم حساب كمية العناصر الأساسية التي تمتصها النخلة الصغيرة أو المثمرة من العناصر السمادية المختلفة سواء عن طريق النموات الخضرية او عن طريق الثمار .

وقد كانت النتائج السابقة أساسا بنيت عليه برامج التسميد لنخيل التمر فيما بعد واتجهت البحوث والدراسات بعد ذلك بجدية كبيرة لتوضيح مدى أهمية إضافة السماد الكيماوي لتعويض النقص في عناصر التربة مع مراعاة نوعية التربة والظروف البيئية الأخرى المحيطة . وتتعرض هذه الورقة لبرامج التسميد الحديثة والتي لا تكتفي بالسماد العضوي بل توصى بضرورة إضافة السماد الكيماوي لتعويض النقص في عناصر التربة والمبنية على دراسات علمية تم تطبيقها أثبتت أثرها الإيجابي على نمو النخلة واثمارها حسب نوعية السماد والذي أوضحته هذه الورقة فيما يلي:

- البرامج المبنية على الأسمدة العضوية .
- البرامج المبنية على التسميد الكيماوي وتشمل:
  1. الأسمدة الأزوتية أو النيتروجينية.
  2. الأسمدة الفسفورية والبوتاسية .
  3. المعادن الثانوية (العناصر الصغرى)
- التسميد الحيوي .
- كما تشمل الورقة ما يلي :
  1. بعض النقاط التي يجب مراعاتها عند تسميد نخيل التمر .
  2. علاقة برامج التسميد بعمر النخلة والظروف البيئية المحيطة بها حيث تم شرح البرامج المتعلقة بعمر النخلة طبقا لما يلي :

     -تسميد الأشجار حديثة الغرس

     - تسميد الأشجار البالغة والتي وصلت مرحلة الأثمار .
- كما تلقي الورقة الضوء على الري التسميدى (الرسمدة) fertigation وكميات ونوعية المركبات السمادية التي يمكن أذابتها في ماء الري وخاصة في نظام الري بالتنقيط سواء بالنسبة للنخيل الصغير او بالنسبة للنخيل البالغ او المثمر .
- وتلقي الورقة أيضا الضوء على العوامل التي تؤثر علي عملية تسميد أشجار النخيل وامكانية تجنبها.

Agricultural Water Use in the Arabian Peninsula with Extreme Scarcity

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The dry areas suffer the most severe water shortages in the world, and the problem is worst on the Arabian Peninsula. Because they receive very limited amounts of rainwater and their groundwater reserves are being depleted, most of the countries in the dry areas are becoming increasingly dependent on the desalination of sea water. Agriculture and the demand for fresh water are growing in this region. Increasing the amount of water obtained from groundwater reserves and via desalination brings with it high costs and serious environmental consequences. Agricultural strategies under extreme water scarcity should be based on maximizing, in a sustainable way, the economic and environmental returns obtained per unit volume of water. Crops that satisfy this criterion should be carefully selected, and grown using water and agricultural management packages that ensure that water losses are minimized and water productivity optimized. Drought- and salt-tolerant high-value crops and plants indigenous to the local environment are most suited to the dry areas. Date palm is a viable option in this region; however, current irrigation practices are inefficient. Adaptive research at the local level is required to develop options which can be used to minimize irrigation water losses and improve plant productivity. Effective extension and capacity building for efficient water use are also essential.

ندرة المياه واستخداماتها الزراعية في شبة الجزيرة العربية

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في المناطق الجافة المختلفة من العالم تعتبر ندرة المياه من الأمور الهامة التي يجب مراعاتها خاصة في منطقة شبة الجزيرة العربية ذات الأمطار القليلة جدا والتى تعتمد زراعتها على الري من مياه الآبار التي بدورها تنقص مستوياتها نتيجة لزيادة الضخ. ونتيجة للتوسع الزراعي فلقد اتجهت الدول إلى تحلية مياه البحر لسد حاجة الإنتاج الزراعي والتى تعتبر عملية مكلفة وذات تأثيرسلبى على البيئة.

أن استراتيجيات الزراعة في المناطق ذات مصادر المياه القليلة يجب أن تعتمد على الترشيد الزراعي في الإنتاج . في مثل هذه الظروف يجب اختيار المحصول المناسب الذي يتأقلم مع هذه البيئة الجافة بأقل كمية من المياه المستخدمة و ذلك ضمن تطبيق منظومة زراعية متكاملة تتحمل الجفاف و الملوحة. وتعتبر النباتات المحلية هي أفضل النباتات المتأقلمة والتي يمكن استخدامها في مثل هذه البيئات.

يعتبر نخيل البلح من أهم محاصيل هذه المنطقة إلا أن العمليات الزراعية لهذا المحصول تعتبر غير مناسبة.

أن تطبيق بعض التقنيات الزراعية مثل كفاءة استخدام المياه هي ضرورة للتخفيف من فقد المياه المستعملة في ري الأشجار كما أن تنمية القدرات البشرية في المجال الزراعي تعد ذات أهمية كبيرة في ترشيد كفاءة استخدام الري.

The Date Industry in Iran

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During 2002, about 875,000 tonnes of dates were harvested from Iran's 183,500 hectares of date plantations. Of this, 113,500 tonnes were exported at an average price of US$243 per tonne. Date palms have been cultivated for more than 4000 years in Iran. Date palm is now cultivated in 13 provinces including, Kerman, Hormozgan, Fars, Bousher, Khuzestan and Sistan and Blouchestan. Accounting for 99% of the country's total cultivated area and production, these are the main date-producing regions in the country.

Iran has 400 different types of cultivar, which means that it has the largest variety of date germplasm in the world. At least 25 of these cultivars have commercial value. Mozafti, Kakab, Shahani, Mordaseng, and Shahabi (which produce soft fruits) and Sayer, Zahdi, Diri, Rabi and Piarom (which produce dry or semi-dry fruits) are the main commercial dates produced in Iran.

Nearly all the practices applied during cultivation, maintenance and harvesting are traditional methods. The use of off shoots is the conventional method of date

propagation. In recent years, however, about 40,000 plantlets have been produced using the tissue culture technique and released to date plantations.

About 94% of date plantations are under shallow irrigation. Pressure systems (especially dripping and babble systems) have been introduced in recent years, and now cover more than 6,500 hectares of date plantations.

Most of Iran's date growers use only manure to fertilize their date plantations. However, based on soil and leaf analysis, some of the leading date growers do use chemical fertilizers to fertilize their plantations. Most existing date plantations are old plantations. Due to the traditional structure of these plantations, mechanized equipment cannot be used.

Date spider mite, lesser date moth, date hopper, trunk borers, and red palm weevil (which occurs only in Saravan) are the important pests of date in Iran. Date bunch wilting, inflorescence rot (khamedge) and date leaf spot are the important diseases. Weeds, which are very difficult and costly to control, have also caused many difficulties in date plantations.

Agricultural management (pollination, thinning, bunch bagging, and the timely control of pests, diseases, and weeds) is relatively weak in most date plantations, due to a lack of knowledge among date growers, a lack of skilled laborers (who are expensive when they are available), and the low income provided by date plantations. Approximately all plantations are harvested using traditional methods; the rate of wastage after harvesting is about 30%.

Annually, 10-13% of the dates harvested are exported to foreign countries, especially Middle Eastern countries, for a low price (less than US$400 per tonne on average). Bulk packing is applied to more than 80% of exported dates, due to a lack of advanced packing houses and a lack of knowledge about processing procedures and marketing. Date marmalade, date nectar, liquid sugar and vinegar are new products which are now being produced by advanced by-product factories.

The important constraints limiting different stages of date production in Iran can be summarized as follows.

1- Constraints at the production stage

- A low yield per hectare
- The low quality of the date fruits produced - due to the cultivation of inferior cultivars and the lack of consideration given to agricultural management
- The traditional structure of date plantations and a lack of mechanization
- The lack of skilled labor and the fact that it is expensive when it is available
- The high level of damage done by pests, diseases, disorders (especially date bunch wilting) and weeds
- The lack of fertile soils and the fact that date palms are being cultivated on poor soils
- A lack of sweet water resources and the fact that date palms are being irrigated with low quality water
- A lack of offshoots from some outstanding cultivars
- The high cost of tissue cultured plantlets.

2- Constraints at the harvesting stage

- The low quality of harvested fruits
- The fact that harvesting has not been mechanized
- The small size of plantations and the large distances between them
- The fact that there is a high level of wastage and, in some cases, a lack of attention to hygiene.

3- Constraints at the post harvesting and marketing stages

- The fact that traditional export methods are still being used, due to a lack of technology, low standards, and a lack of suitable processing facilities.
- A lack of advanced packing houses, cold storage facilities, and by-product factories
- The low prices commanded by exported dates
- The high expense of marketing dates in target countries
- A complete lack of coordination among exporters
- A lack of knowledge and the financial weakness of the exporters
- The lack of an information system for marketing
- The fact that there is no suitable transportation system.

صناعة التمور في إيران

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فـي العـام 2002 بلـغ إنتـاج التمـور 875 ألـف طـن مـن مسـاحة 183500 هكتـار. وقـد تـم تصـدير حوالي114 طن بقيمة 243 دولار للطن. يتم زراعة النخيل في 13 محافظة اهمهم كرمان، هورمزان ، فارس ، بوشار، خوزستان، سستان و بلوشستان والتي تمثل حوالي 99% من المساحة المزروعة والإنتاج في إيران.

يوجد في إيران حوالي 400 صنف من التمور مما يجعل إيران من أكبر المصادر الوراثية للتمور في العالم وهناك ما لا يقل عن 25 صنف من التمور الإيرانية ذات القيمة التجارية من الأصناف الرطبة والجافة وشبة الجافة.

المعاملات الزراعية السائدة تقليدية بما فيها استخدام الفسائل لإكثار النخيل. غير أنه في السنوات الأخيرة تم إنتاج حوالي 40 ألف شتله عن طريق زراعة الأنسجة وتم توزيعها على المزارع .

من اهم الافات عنكبوت الغبار Date Spider Mite والحميره Lesser Date Moth والنطاط Date Hopper وحفار الساق Trunk borer وسوسة النخيل الحمراء Red Palm Weevil.

ومن اهم الامراض السائدة: مرض الذبول Date bunch wilting وتعفن التاج الزهرى Inflorescence rot وتبقع الأوراق Date Leaf Spot

الحشائش أيضا تعتبر من المصاعب التي تعانى منها مزارع النخيل و تعتبر مكافحتها ذات تكلفة عالية.

العمليات الزراعية التي تعنى بالتلقيح (Pollination) والخف (thinning) وتغطية الثمار (bunchbagging) ومكافحة الآفات و الحشائش من الأمور المطلوبة في معظم المزارع.

كما يجب العناية بعملية الحصاد والذي يتم حاليا بالطرق التقليدية والتي قد يصل الفقد فيها الي 30%.

يبلغ مقدار التصدير سنويا من 13 إلى 15 % من الحصول ويذهب معظم الصادر إلى دول الشرق الأوسط (أقل من 400 دولار للطن). تعتبر التعبئة من المشاكل التي تواجه التصدير وتسويق التمور الإيرانية. هناك بداية لبعض الصناعات التي تعتمد على التمور مثل : المربى ، السكر ، العسل والخل.

أهم المشاكل التي تواجه زراعة النخيل في إيران:

1- في مجال الإنتاج

- إنتاجية متدنية من وحدة المساحة
- نوعية الثمار رديئة بالاضافة الي سوء الإدارة في المزارع.
- الاسلوب التقليدي في الزراعة وانعدام الميكنة الزراعية.
- قلة الأيدي العاملة المدربة والتكلفة العالية أن وجدت.
- الأضرار الكثيرة التي تسببها الأفات والأمراض خاصة مرض الذبول
- ضعف خصوبة التربة (إذ يزرع النخيل في الأراضي الفقيرة).
- قلة المياه (إذ يزرع النخيل بمياه ذات نوعية رديئة).
- قلة الفسائل من بعض الأصناف الجيدة.
- التكلفة العالية للفسائل المنتجة عن طريق زراعة الانسجة .

2- في مجال الحصاد

- نوعية الثمار رديئة.
- عدم استخدام الميكنة في الحصاد.
- صغر حجم المزارع وبعد المسافة بينها.
- ارتفاع نسبة الفقد أثناء الحصاد.

3- في مجال معاملات ما بعد الحصاد و التسويق

- الطرق التقليدية في التصدير وانعدام التقنيات الحديثة.
- عدم وجود مرافق حديثة للتعبئة والتخزين والتصنيع.
- تكلفة التصدير العالية وانخفاض اسعار التصدير.

2. Biotechnology and Germplasm Conservation

Genetic Diversity and Germplasm Conservation Using Molecular and Genomic Techniques

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Three types of markers have been generally used in the assessment of genetic diversity in plant species: morphological markers, protein-based markers, and DNA-based markers. DNA-based markers provide useful information about genetic diversity and the relationships that exist between accessions, as they remain unaffected by environmental factors and the developmental stage of the plants. They also have the advantage of being abundant and highly polymorphic. Of the various kinds of DNA-based markers characterized so far, restriction fragment length polymorphism (RFLP) was the marker which was first used to estimate genetic diversity in plant species. Until recently, it was also the marker which was most commonly used for this purpose; however, the RFLP assay is time-consuming and labor-intensive. The recently developed polymerase chain reaction (PCR) marker techniques, which include random amplified polymorphic DNA (RAPDs), simple sequence repeats (SSRs), and amplified fragment length polymorphism (AFLPs), are playing an increasingly important role in DNA fingerprinting and pedigree analysis.

Efficient genotyping technologies are going to play an increasing role in future breeding. However, widespread use of current genotyping technologies is limited by their low throughput and high costs. There exists the opportunity to by-pass the sequencing paradigm and improve useful traits in agricultural species by improving our knowledge of genomic diversity and by developing better tools which can be used to recombine that diversity productively. This will allow us to generate improved individuals with superior characteristics. Efficient genotyping tools play a key role in this strategy.

In the early 1990s the development of automated sequencers and computer programs capable of analyzing lots of DNA made possible two new approaches to obtaining sequence information. Instead of going specifically after a gene of interest, people created rich cDNA libraries (containing many of the expressed genes of an organism), picked cDNA clones randomly, and rapidly determined some of the sequence of nucleotides from the end of each clone. These expressed sequence tags (or ESTs) could then be compared to all known sequences using a program called BLAST. An exact match to a sequenced gene meant that the gene encoding that EST was already known. If the match was close but not exact, one could conclude that the EST was derived from a gene with a function similar to that of the known gene. Although the most recent methods of hybridization based analysis (DNA microarrays), using immobilized cDNAs (Schena *et al.*, 1995), or oligonucleotide microarrays (Lockhart

et al., 1996), could potentially examine the expression patterns of a relatively large number of genes, these methods can only examine expressed sequences that have already been identified. By contrast, SAGE allows the quantitative and simultaneous analysis of a large number of transcripts in any cell or tissue without prior knowledge of the genes (Velculeseu *et al.*, 1995). Another of the most effective techniques (which was developed by Kilian and coworkers in 2002) is the Diversity Arrays™ Technology. This novel genotyping method, which was originally developed using plant genomes as models, allows low-cost, high-throughput, sequence-independent genotyping.

These techniques are being used, in genomic studies, to characterize extensively, at a structural and functional level, the vast genetic resources available. In combination with the genes discovered through comparative genomic studies, this functional and structural characterization of diversity will provide the raw materials (i.e., the genes) needed for novel solutions to virtually any breeding objective.

التقنية الحيوية و حفظ الأصول الوراثية باستخدام البيولوجيا الجزينية وال genomic techniques

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استخدمت ثلاث طرق في الكشف عن الاختلافات الوراثية في التعرف على أنواع النباتات و هي الصفات المورفولوجية والواسم البروتيني و DNA . يعتبر اختيار DNA هو الأفضل لأنه لا يتأثر بالظروف البيئية ومراحل تطور النبات و هو يعمل على كشف الاختلافات الوراثية في أنواع النباتات و بالتالي يمكن التميز بينها خاصة عند استخدام طريقة RFLP و التي تعمل على الوضوح في التمييز بين الأنواع. و حديثا تم تطوير طريقة PCR وهي طريقة معدلة من طريقة RAPD في التمييز بين أنواع النباتية المختلفة . و تعتبر طرق SSRs و AFLP في التمييز بين أنواع النباتات ذات أهمية في تحديد البصمة الوراثية للنباتات. في بداية التسعينات من القرن الماضي تم تحليلDNA بواسطة برنامج الكومبيوتر مما سهل التعرف علىالصفات الوراثية . وقد تم وضع CDNA المعنى بالمعلومات (يتضمن معلومات وافية عن الجينات المتوارثة) ويأخذ عينة عشوائية منCDNA للاستنساخ يمكن التعرف على نوعية الاستنساخ التابع في نهاية العملية. أن هذه الطريقة المسماة EST يمكن مقارنتها مع الطرق الأخرى بواسطة برنامج BLAST .و إذا لم يحدث التطابق فان الاختلاف يعود إلى جين أخر بالإضافة إلي طرق عملية تحليل الهجن (DNA المنظم الصغير) فأن استعمال طريقة immobilized CDNAS (Schena etal., 1995) ، أو طريقة Oligonucleotide (Lockhart Etal 1996) يمكن فحص العينات التي تم التعرف عليها سابقا. و بالمقارنة طريقة SAGEتوهلنا للتعرف على تحليل أكثر لعينات الجينات دون معرفة هذه الجينات سالفا (Velculeseu Etal 1995) بالإضافة لذلك فقد عمل Kilian,2002 على تطوير طريقة أكثر كفاءة لدراسة الاختلافات الوراثية هي Diversity Arrays Tm technology والتي تتميز باستخدام نموذج الجينات النباتية والتي تعتبر أقل تكلفة وأفضل تقنية للتعرف على الأنواع النباتية المختلفة.

Genotyping Egyptian Date Palm Cultivars Using RAPD, ISSR, and AFLP Markers and Estimation of Genetic Stability among Tissue-Culture-Derived Plants

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Date palm (*Phoenix dactylifera* L.) is one of the most important fruit crops in North Africa and the Middle East. Of the Arab countries, Egypt is the largest date producer. However, little is currently known about the molecular characterization of date palm cultivars. Determination of the genetic variability of date palm, as well as proper cultivar identification, would be of major importance in improvement programs and in the characterization and conservation of germplasm, both of which aim to control genetic erosion. In an attempt to determine a molecular fingerprint that characterizes each of the Egyptian date palm cultivars, three types of PCR-based markers (i.e., RAPD, ISSR and AFLPs) were applied to two sets of five cultivars cultivated in two different regions: Delta and Upper Egypt (each set corresponded to one region). Intravarietal variations were investigated using ten random decamer primers on seven to ten individual trees representing each of the five cultivars in the two sets.

All the primers tested exhibited intravarietal polymorphism among the Delta set. By contrast, the Upper Egypt set revealed negligible intravarietal polymorphism. To assess the level of genetic polymorphism and to develop fingerprints for each of these cultivars, RAPD, ISSR and AFLP analyses were conducted on bulked DNA samples composed of the DNA of the different trees representing each cultivar. Fingerprinting of the Delta cultivars (Zaghloul, Samany, Hayani, Siwi and Amhat) was conducted using 8 ISSR and 6 AFLP primers/primer combinations. This revealed a total of 53 and 433 amplicons, respectively, and a level of polymorphism of 64.1% and 53.81%, respectively. DNA profiling of the five Upper Egypt cultivars (Bertmoda, Gandila, Malikaby, Shameia and Sakkoty) was carried out using 41 RAPD, 19 ISSR and 28 AFLP primers/primer combinations; this resulted in 259, 159 and 1135 amplicons, representing a level of polymorphism of 18.9%, 34.6% and 41.6%, respectively.

Genetic similarity matrices were estimated for the two sets and used to develop dendrograms revealing the genetic relationships among cultivars. Importantly, unique markers characterizing each cultivar were identified. Furthermore, the genetic stability of tissue-culture-derived plants from the Zaghloul (Delta) Bertmoda, Gandila, and

Sakkoty (Upper Egypt) cultivars was studied using RAPD and AFLPs. The DNA profiles exhibited non-significant polymorphism, indicating the true-to-type nature of these plants.

التوصيف الجزيني لأصناف نخيل البلح المصرى باستخدام الواسمات الجزينية RAPD, AFLP , ISSR ودراسة الثبات الوراثى للنباتات الناتجة من زراعة الا نسجة .

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يعتبر نخيل البلح (*Phoenix dactylifera L.*) من أهم محاصيل الفاكهة فى شمال ا فريقيا و الشرق الاوسط و تعتبر مصر من الدول الكبرى المنتجة للتمور. المعلو مات المتوفرة عن التو صيف الجزيئ (Molecular characterization)لأصناف نخيل البلح محدودة للغاية وفى نفس الوقت غاية فى الأهمية لبرامج التحسين الوراثي والمحافظة علي الأصوال الوراثية من التدهور في برامج تربية النخيل.

وفي محاولة لعمل البصمة الوراثية باستخدام الواسمات الجزينية لتمييز كل صنف من أصناف النخيل المدروسة علي المستوي الجزيني تم استخدام ثلاث أنواع من الواسمات الجزينية الحديثة وهم RAPD , AFLP , ISSR ,علي مجموعتين من منطقتين مختلفتين (الدلتا والوجة القبلي) كل مجموعة تمثل أهم خمسة أصناف نخيل بالمنطقة .

أولا: تم دراسة الأختلافات الوراثية داخل الصنف الواحد (Intravarietal polymorphism) علي العشرة أصناف من نخيل البلح . خمسة أصناف من الدلتا (زغلول , سماني , حياني , أمهات , سيوي) وخمسة أصناف من الوجة القبلي (برتمودا , شامية , سكوتي , جنديلة , ملكابي) أظهرت نتائج استخدام عشرة بادئات من الرابد اختلافات وراثية داخل الصنف الواحد لمجموعة الدلتا بينما لم تظهر أصناف الوجة القبلي اختلافات داخل الصنف الواحد (7 - 10 اشجار لكل صنف) . ولعمل البصمة الوراثية تم تجميع عينات ال DNA من 7- 10 اشجار مختلفة من الصنف الواحد لكلا المجموعتين . تم استخدام 8 بادئات ISSR (Inter - Simple Sequence Repeats) و 6 توليفات من بادئات ال AFLP (Amplified Fragment Length Polymorphism) على 5 أصناف نخيل الدلتا و انتج هاذين الواسمين 53 , 433 شظية كروموسومية بنسبة تباين وراثي 64.1 % , 53.81% على التوالي .

أما 5 أصناف الوجة القبلى (برتمودا , شامية , سكوتي , جنديلة , ملكابي) تم عمل التوصيف الجزيني لكل صنف باستخدام 41 بادئ من الرابد و 19 بادئ من ال ISSR و 28 توليفة من ال AFLP وتقدر عدد الشظايا الكرموسومية ب 259 , 159 , 1135 شظية كرموسومية تمثل مستوى من التباين الوراثي كنسبة منوية بـ 18.9 , 34.6 , 41.6 على التوالي . وباستخدام معامل التشابة الوراثي لمجموعة اصناف الدلتا والوجة القبلي في بناء شجرة العائلة (Dendrogram) لقياس درجة التقارب والأختلاف و علاقة الأصناف ببعضها . علاوة على ذلك تم تحديد واسمات جزينية فريدة تميز كل صنف نخيل عن غيرة من الأصناف الأخرى .

أيضا كانت هناك دراسة غاية في الأهمية في المجال التطبيقي و هي دراسة الثبات الورثي للنباتات الناتجة من زراعة الأنسجة (Tissue cultures) للنباتات الأم من اصناف زغلول (دلتا) و برتمودا و جنديلة وسكوتي (وجة قبلي) باستخدام تكنيكي ال AFLP, RAPD و لم تظهر النتائج اختلافات معنوية لنباتات زراعة الأنسجة عن النبات الأم في الأصناف الأربعة المدروسة.

3. Crop Protection and IPM

Pests of the Date Palm (*Phoenix dactylifera*)

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This paper includes the results of surveys and studies made, over the last two decades, of the arthropod pests of the date palm in UAE. These surveys should be considered to be, more or less, representative of the whole region, because the terrain, growing conditions, and development of planting material throughout the year are all similar.

The studies revealed the indigenous occurrence of

- the dubas bug (*Ommatissus lybicus*)
- two types of scale insect (*Parlatoria blanchardi* and *Phoenicococcus marlatti*)
- the giant mealy (*Pseudaspidoproctus hypheniacus*)
- the trunk borer (*Jebusaea hammerschmidtii*)
- two types of rhinoceros beetle (*Oryctes agamemnon* and *O. elegans*)
- two types of date moth (*Batrachedra amydraula* and *Aphomia sabella*)
- the date mite (*Oligonychus afrasiaticus*)
- the frond crimson mite (*Raoiella indica*)

Over the years the author has also witnessed the arrival of the following more exotic pests, which have been imported with planting material

- the red palm weevil (*Rhynchophorus ferrugineus*)
- a third type of rhinoceros beetle (*Oryctes rhinoceros*)
- a third type of scale insect (*Fiorinia phoenicis*)

The author also discovered and described a new pest, the inflorescence beetle (*Macrocoma sp. nov*).

Recently, the importance of some of these pests has been growing, and attention needs to be paid to this. Attention also needs to be paid to *Al wijam* disease, which is spreading slowly. The etiology of this disease has not yet been determined.

The author also recorded the most important common fungal diseases affecting date palm in the UAE. The paper discusses the morphology, life cycles and of different pests, as well as the management practices appropriate for each.

وقاية المزروعات و المكافحة المتكاملة آفات نخيل البلح

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خبير وقاية المزروعات (حشرات)
الإمارات العربية المتحدة

تتضمن ورقة العمل هذه حصر و دراسة آلافات التي تصيب أشجار النخيل في دولة الإمارات العربية

المتحدة . تتضمن هذه الدراسة آفات النخيل في المنطقة و هي تشمل :

- الدوباس The dubas bug *Ommatissus lybicus*
- الحشرة القشرية البيضاء The Scale insects *Parlatoria blanchardi* & *Phoenicococcus marlatti*
- البق الدقيقى العملاق The giant mealy *Pseudaspidoproctus hypheniacus*
- حفار الساق The trunk- borer *Jebusaea hammerschmidtii*
- الخنافس وحيدة القرن (حفارة العذوق) Two rhinoceros beetles *Oryctes* agamemnon & *O.elegans*
- الحميرة The two date months *Batrachedra amydraula* & *Aphomia sabella*
- عنكبوت الغيرة (عنكبوت البلح) The date mite *Oligonychus afrasiaticus*
- عنكبوت النخيل القرمزى The frond crimson mite *Raoielle indica*

أيضا ساهم الباحث عبر السنين عن كشف بعض الحشرات الواردة إلى الإمارات العربية المتحدة من خلال النباتات المستوردة وتشمل : حشرة سوسة النخيل الحمراء The Red Palm weevil ى الخنافس وحيدة القرن *Oryctes rhinoceros* والحشرة القشرية المستطيلة *Fiorina phoenicis*

Opportunities for Development and Use of Entomopathogenic Fungi

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Modern agricultural systems and the trade in agricultural commodities have created conditions which favor the rapid establishment and spread of various noxious insects. This has promoted a heavy reliance on synthetic insecticides, which are used to control, limit, and contain the spread of these insects. Concerns over environmental pollution, human-health risks, and insect resistance have stimulated both the search for alternative control strategies and the use of such control strategies within integrated pest management (IPM) programs. This approach emphasizes the need to use population monitoring to guide pest management decisions, as well as the use of cultural and biological controls, and the limited use of insecticides. Biological control is considered a major component of IPM, but is frequently under-utilized. Microbial biocontrol agents, and fungi in particular, can play a significant role in the regulation of many insect pests: mycopathogens such as *Beauveria bassiana* and *Metarhizium anisopliae* infect many insects over a wide range of environmental conditions. Some notable successes have been achieved when fungi have been used to control major pests (such as desert locusts, tsetse flies, and Colorado potato beetle) under what may be considered to be less-than-favorable conditions. Novel delivery systems have also proved to be successful when used to control pests that are difficult to reach with conventional sprays. To achieve similar progress against the pests of date palm, a series of steps need to be taken. First, to obtain candidate strains for testing, an extensive survey of the pest population throughout its range is necessary, as this is likely to yield indigenous pathogens from infected adult and larval stages, as well as from soils in the date palm groves sampled. Isolates recovered from or known to be

active against related pests found in similar climatic/agroenvironmental zones should also be acquired. Many pests live in cryptic environments, so pathogenicity trials should initially be directed against developmental stages that can be realistically targeted with fungi. Assays should be run at temperatures which replicate those that occur when the insect is active, in order to identify which strains are capable of infecting and killing the pest under such conditions. But virulence should not be the sole criterion for selection; active strains need to be characterized according to their spore production capacity (for mass-production purposes), and environmental competence (i.e., their ability to persist, germinate, grow, and infect insects in the environment in which they will be used). These are essential if the most suitable strains are to be selected. Once suitable strains have been selected, efficient mass production and delivery systems must be developed, as must effective use strategies. The ability to produce and formulate, in a cost-effective manner, large quantities of stable, virulent inoculum of a consistent quality is vital. However, the complexity of the process is often underestimated; critical issues relevant to mass-production and formulation are covered in this paper. Researchers must also ensure that the fungi used are compatible with all other IPM components and non-target organisms. Field efficacy has to be demonstrated through scale-up trials, and the technology refined into a form that can be readily implemented and (with appropriate support and guidance) transferred to the farming community. Fungi have the potential to be developed into effective microbial control products; but, their successful development depends upon the above factors being addressed.

فرص استخدام الفطريات ضمن نظام المكافحة المتكاملة

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النظم الزراعية الحديثة وتجارة السلع الزراعية كونت ظروف مناسبة أدت إلى ظهور وانتشار آفات حشرية واسعة . هذه الظاهرة أدت إلى الاعتماد على المبيدات الزراعية و ذلك للقضاء على تلك الآفات إلا أن المبيدات الكيميائية تؤدى إلى التلوث في البيئة و كذلك فأنها خطر على الصحة العامة و نتيجة لاستخدامها فإن الحشرات تطور بعض المناعات ضدها . لذا عمل الباحثون في مجال الوقاية إلى وضع برنامج مكافحة متكاملة (IPM) يتضمن مراقبة كثافة الحشرات من الناحية العددية وذلك لوضع خطة لمكافحتها بواسطة الأعداء الحيوية المتخصصة لكل حشرة وأيضا مع التقليل من استخدام المبيدات.

المكافحة الحيوية تعتبر أهم مكونات المكافحة المتكاملة كما تعتبر بعض الميكروبات و كذلك بعض الفطريات من العوامل الفعالة في القضاء على العديد من الحشرات فمثلا mycopathogens مثل *Beauveria bassiana* و *Metarhisium anisopliae* حيث تهاجم الكثير من الحشرات في البيئات المختلفة. لقد تم بنجام استخدام بعض الفطريات في مكافحة حشرة الجراد الصحراوي كذلك حفار البطاطا أما فيما يخص آفات النخيل فيجب الحصول على سلالات عديدة من مختلف مناطق زراعة النخيل.يتم عزل الميكروب من اليرقات المصابة و كذلك من التربة الزراعية في حقول النخيل.

أن المسبب المرضي الذي يتم الحصول عليه يكون متأقلم مع البيئة وبالتالي يمكن الحصول على مكافحة فعالة ضد الحشرات. أيضا يجب أن نميز هذه الفطريات و قدرتها على التكاثر السريع لاستخدامها ضد الحشرات في ظروف معينة. تتناول الورقة تفاصيل العلاقات المعقدة لإنتاج الفطر بكميات كبيرة.

4. Post Harvest, Marketing and Processing of Different Date Palm Products

Development/Improvement of Date Palm Post-harvest Handling

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Dates (*Phoenix dactylifera* L.) were and still are an important crop in the Arabian Peninsula (AP). Many advances have been made in date palm production and the fruit are processed, shipped, and enjoyed throughout the world. However, in some date-growing areas there is room for the industry to be improved. Harvesting, post-harvest handling and processing, storage and food safety considerations need to be reviewed and developed. The post-harvest ripening procedures currently applied and possible ways to improve them are considered in this paper, as are organically produced dates and value-added treatments. As well as considering these issues, this paper also proposes relevant problem-solving research approaches.

تطوير وتحسين عمليات ما بعد الحصاد للتمور

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تعتبر التمور من المحاصيل المهمة في منطقة شبة الجزيرة العربية. و قد تمت دراسات عديدة في مجال زراعة أشجار نخيل البلح و إنتاج الثمار و عمليات تسويقها . وهناك مجال واسع لتحسين إنتاج وتصنيع التمور في المنطقة و ذلك من خلال اهتمام أكثر بعمليات الحصاد و التخزين و التسويق. تتناول الورقة معاملات ما بعد الحصاد المتبعة حاليا وإمكانية تطويرها و كذلك الإنتاج العضوي للتمور ومعاملات أخرى لتحسين القيمة الاقتصادية للتمور كما تتناول الورقة بعض مجالات البحوث التطبيقية.

Date Post-harvest Valorisation in Morocco: Present Status and Research Activities

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In Morocco, date palm production is the foundation of agricultural activity in the country's oases, due to its environmental, economic, and social influence. Indeed, the

date palm is an important part of the Saharan environment, since it plays an important role in protecting intercrops within intercropped systems and stabilizing ecological systems. With regard to its economic value, the date palm sector is important at the national level, since date production (estimated to be 93,000 tons), generates 744 million dirham annually (on average, during the period 1989/90–1997/98). Date production also contributes between 40% and 60% of individual farmers' incomes, and is an important commercial activity in both the north and the south of the kingdom. In addition to providing food and animal feed, the date palm produces a wide range of useful products.

Despite its economic importance, the date sector is limited by several production problems which occur as a result of the pre- and post-harvest techniques used. These are mainly the result of traditional production practices (little care is taken when applying management regimes or conducting harvesting operations), inadequate packaging, inappropriate preservation methods, the absence of processing industries which could make use of low quality dates, the unhygienic conditions in which dates are stored and the fact that the current production cycle is inadequate.

In order to minimize the effects of the above-mentioned constraints, the National Agronomic Research Institute (INRA) is conducting research projects that aim to develop post-harvest technologies adapted to the national and international market. This entails the preliminary characterization of Moroccan dates and the techniques of preservation, packaging, storage and processing currently being used. Research has also focused on the commercialization of date palm production.

Results have shown that date varieties differ greatly in terms of their physical, chemical, and biochemical properties (such as specific density, fibrousness, pulp importance, acidity, level of water activity, sugar content, aromatic components). The research undertaken has provided some important information about the commercial, nutritional, and organoleptic qualities of different date varieties, as well as information about the technologies used in date production. The results obtained have also allowed researchers to classify varieties into different homogeneous groups according to their specific features. They have also allowed researchers to suggest in what ways different varieties could best be used.

Three main techniques for preserving dates have been investigated: (1) date pasteurization, (2) heat treatment using a "Gonet" oven, and (3) ionisation. The effect of the removal of insect pests (date moth) on the fruit was also studied, as was the preservation method in relation to the quality of the product. Preliminary studies on date processing have also been conducted by INRA: these have produced different products (such as jam, paste, flour, and juice). Ongoing studies are gathering information concerning traditional technologies, particularly the methods traditionally used to process dates. Three major studies have been conducted on date marketing. These considered all the levels of the commercialization cycle (agronomic, technological, and commercial). Indeed, two major aspects were studied: these involved (1) the description and analysis of the present situation, with regard to production, valorization and commercialization, and (2) an investigation of the date

marketing system within the country (at both the consumer and merchant level). These studies have allowed an integrated plan of action to be devised in order to address the problems and constraints that hinder the development of the date sector in Morocco. One of these studies is published in French under the title "Valorisation et commercialisation des dattes au Maroc".

معاملات ما بعد الحصاد لتمور المغرب : الوضع الحالي والأبحاث

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تمثل أشجار النخيل في المملكة المغربية العمود الفقري لنشاط القطاع الزراعي في الواحات نظرا للظروف البيئة المناسبة بالإضافة للظروف الاقتصادية والاجتماعية.

في الواقع تعتبر أشجار النخيل ذات أهمية كبيرة في منطقة الصحارى بالمغرب لأنها أساس النظام الزراعي و الذي يقوم علي أشجار النخيل حيث تتوفر له الظروف البيئية المناسبة. و في المجال الاقتصادي تمثل التمور عائدا مناسبا على مستوى الدولة و هي تنتج ما يقارب 93000 طن و تقدر بقيمة 744 مليون درهم سنويا (متوسط للأعوام 90-1989 - 98-997). كما يساهم محصول التمور موردا اقتصاديا للمزارعين يقدر بين 40- 60 % من مجمل الدخل لهم خاصة في مناطق الشمالية و الجنوبية من المملكة. كما تعتبر التمور من الثمار الجيدة في تغذية الإنسان و كذلك بعض الأنواع منها تستعمل في علف الحيوانات.

تواجه زراعة التمور في المغرب بعض المعوقات: منها ما يتعلق بمعاملات ما بعد الحصاد و(التعبئة والتغليف التخزين) . قدم مصانع التمور و طرق التصنيع أصناف التمور ليست عالية الجودة

أظهرت الاختبارات أن هناك كثير من الأصناف مختلفة فيما بينها فيما يخص الخصائص الفيزيائية و الكيميائية و كذلك صفة الكثافة و نسبة الماء أو الملوحة و الحموضة و السكر. كذلك أظهرت الدراسة أهمية تصنيف و تقييم أنواع و أجناس التمور في البلاد للوصول لأفضل الأنواع و محاولة نشرها بين المزارعين.

أما فيما يتعلق بعملية حفظ التمور بعد الحصاد فتتبع عدة طرق منها بسترة التمور ، التعرض للحرارة بتقنية ionization , Gonet كذلك تمت دراسة معالجة التمور المصابة بالحشرات وتحسين نوعيتها. كما عمل مركز البحو INRAعلي إنتاج مربى التمور ، والدبس والعجين وكذلك عصير التمور.

درست ثلاثة مراحل للتسويق و التي بها يمكن تحسين الإنتاج و التسويق التجاري كما درست

مرحلتين لتحسين الإنتاجية و ذلك من خلال تقييم واقع حال التمور و إنتاجيتها. أن هذه الدراسة تدعو إلى تشكيل خطة متكاملة لمعالجة مشاكل و معوقات التمور من الزراعة حتى التسويق في المغرب.

Studies on Water Evaporation from the Tunisian Deglet Noor Date During Storage

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Deglet Noor is the most important variety of date exported by Tunisia. About 80% of the Deglet Noor dates that are exported are first treated in packaging units, the majority of which still use traditional methods. Efforts must be made to review the methods used, especially those used to dry the produce, in order to ensure that production is more efficient, costs are lower and storage conditions are optimized, to preserve the quality of the stored dates.

For that purpose sorption isotherms were designed for Deglet Noor dates at 5°C, 30°C, and 40°C and were described by the theoretical model of GAB. Parameters and constants of this model were evaluated, as was the moisture content of the monomolecular layer. The necessary drying energy and shelf life were discussed.

دراسة مج البخار الماني عند تمور "دجلة نور" التونسية

حبيب البوعبيدي و عبد القادر نبيلي
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تعتبر التمور من أهم المواد الفلاحية المصدرة من تونس إلى الأسواق الخارجية و يعتبر الصنف "دقلة النور" من أصناف التمور الأكثر شهرة والأكثر تصديرا. حوالي 80 بالمائة من هذه التمور يصدر بعد معاملتها داخل وحدات التكييف التي لا يزال العديد منها يتبع أساليب شبه تقليدية مما يحتم بذل المزيد من الجهد للسيطرة على الطرق المتبعة, و خاصة عمليات التجفيف, وجعلها أكثر جدوى و أقل كلفة وكذلك التحكم في الظروف المناسبة للمحافظة على نوعية التمور أثناء الخزن.

لذلك تم تصميم منحنيات مج البخار الماني متساوية درجة الحرارة لتمور "دجلة نور" على درجات حرارة : 5 , 30 و 40 درجة منوية و تم وصف هذه المنحنيات بمعادلة GAB كما تم تقييم ثوابت هذه المعادلة ومحتوى طبقة الامتصاص الأولى من الماء. حسبت الطاقة اللازمة للتجفيف والعمر الافتراضي لهذه التمور.

5. *Information* Technology and Expert Systems

Knowledge Management and Transfer Using Information Technology and Expert Systems

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The transfer of knowledge from consultants and scientists to extension workers and farmers represents a bottleneck that limits the development of agriculture in any country. The current era is witnessing huge developments in all fields of agriculture. Therefore an unconventional method is required that can be used to transfer the knowledge of experts working in certain domains to farmers. This is especially true when the number of experts conversant in a new technology is insufficient to meet the demand exerted by a certain field.

Information technology (IT) has played an important role in information and knowledge dissemination over the last decade. The use of IT to transfer information and knowledge pertaining to agriculture is an area that has been investigated by many institutions. Most of the Schools of Agriculture in well-known universities have built sites on the World Wide Web which are used to disseminate agricultural information to extension services and growers. The Central Laboratory for Agricultural Expert Systems (CLAES) was established in 1991, within the agriculture research center in the Egyptian Ministry of Agriculture and Land Reclamation. Its purpose is to conduct research into how the knowledge and expertise accumulated by agricultural research can be communicated to extension workers and growers using information technology in general, and expert systems in particular.

Expert systems are simply computer software programs that mimic the behavior of human experts. They are one way in which researchers have successfully applied the discoveries made in the field of artificial intelligence - a branch of computer science that investigates how to make machines that think like humans or that can perform the tasks performed by people. The agricultural expert systems developed so far cover most of the knowledge areas of crop management, including strategic decision making (such as variety selection, land preparation, planting, irrigation, fertilization, and harvesting) and tactical decision making (such as disorder diagnosis, control, and treatment). A typical agricultural expert system will ask the user about his/her plantation, gathering data about the soil, the water available, and the weather conditions experienced, as well as about any other abnormal occurrences that have been observed and/or any specific requirements. It will then use this data to produce a specific recommendation. Such a system acts like a plant doctor, giving specific advice about a certain plantation. It is not like a book or a web site, wherein a user can find a lot of information and it is up to him/her to decide what to do.

In the last ten years CLAES has developed a dozen expert systems, for use with

different crops and for animal health care. Experiments have been conducted to measure the economic and environmental impact of using an expert system in the field. These experiments showed that net production increased by approximately 25% when an expert system was used. The impact such systems have on environmental conservation has also been assessed using two measures: (1) water savings and (2) reductions in the use of chemicals. It was found that the fields managed using expert systems used approximately 35% less water and approximately 16% less fertilizer. The extent to which the performance of the extension workers was enhanced by the use of an expert system has also been measured. A tangible enhancement was observed, ranging from 80% to 157% depending upon the expert system being used. The objectives of this paper are two-fold. First, it will show how expert systems, in conjunction with other forms of information technology, can be used to strengthen the link between research and extension. Second, it will report the progress made by two regional projects which are being implemented by CLAES in collaboration with ICARDA. These projects aim to build regional expert systems for tomatoes and cucumber grown under plastic tunnels in the Arabian Peninsula region and for wheat and faba bean grown in the WANA region.

Both projects can be used as models for future regional collaboration that aims to gather knowledge related to a specific commodity at the regional level, and use it to build up an electronic knowledge repository which can then be made available on the Web. The Virtual Extension and Research Communication Network (VERCON) is considered here as a successful example of how different information and knowledge systems can be integrated to serve researchers, extension workers and growers. Other stakeholders might also find the VERCON website very useful (see http//www.vercon.sci.eg). The site contains two expert systems for rice and wheat, as well as extension bulletins produced by research institutes and the central administration, statistical data produced by the economic sector, and a growers' problems system that enables extension workers to interact with researchers at different levels. The site also maintains a repository of all the problems raised and the solutions proposed, as well as of any unsolved problems which can be transferred to researchers so that they can solve them as part of their respective research programs. The site provides other services such as news and discussion forums.

The experience in adapting the cucumber expert system (which was developed under Egyptian conditions) to the Arabian Peninsula will be considered here. The prototype expert system for cucumber can be accessed through the Arabian Peninsula Research Program's web site (http://www.icarda.cgiar.org/APRP /IT.htm). A workshop was held at CLAES for one week, to allow researchers from Arabian Peninsula countries and developers from CLAES to fix the interfaces and incorporate knowledge extracted from the Egyptian version into the APRP expert system.

It was decided that regular reviews should be carried out, to update the information relating to disorders and pesticides. Further efforts are needed in this respect. Two other projects, on wheat and faba bean, are being implemented. The early results of those projects will be presented here. In this project CLAES designed forms to acquire information on varieties, agricultural practices, and disorders and their control, in the different sub regions in WANA. Most of this knowledge has been acquired and the systems are currently being implemented.

تكنولوجيا المعلومات والنظم الخبيرة

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يعتبر ضعف نقل المعلومات من الأخصائيين و الباحثين إلى المرشدين و المزارعين من أهم العوامل التي تعوق تطوير الزراعة في كثير من البلدان . في هذا العصر تتوفر المعلومات بشكل واسع خاصة في المجالات الزراعية.

لنقل هذه المعلومات يجب أن نبحث عن طريقة حديثة لتوصيل المعلومات و قد لعبت تقنية المعلومات دورا هاما في نقل المعلومات و نشرها في العقود القليلة الماضية و خاصة في مجال الزراعة. و قد عملت مراكز البحوث و الجامعات المختلفة على وضع مواقع على الانترنيت لنشر الوعي لهذه النظم لكل من المرشدين الزراعيين و المزارعين. تأسس مركز النظم الخبيرة (Claes) في عام 1991 في مركز وزارة الزراعة و الإصلاح الزراعي في جمهورية مصر العربية و ذلك لعمل أبحاث لنقل المعلومات المتعلقة بالمجال الزراعي و نشرها بين المرشدين الزراعيين والعاملين في القطاع الزراعي.

النظم الخبيرة هي برامج كومبيوتر بسيطة تعمل على محاكات الخبير الزراعي . و هي برامج ناجحة سهلة التداول وتسعى إلى نقل المعرفة بشكل مبسط للمزارعين و على سبيل المثال فهناك برنامج يعلم كيفية إدارة العمليات الزراعية للمحاصيل المختلفة و اختيار الأصناف و إعداد التربة للزراعة و طرق الزراعة و طرق الري و التسميد. هذه النظم الخبيرة تحتاج لإدخال معلومات عن التربة و المناخ و المياه و بعض العوامل الأخرى و ذلك كي تتنبأ بالعملية التي يمكن أن تقوم بها في المزرعة.

في السنوات العشرة الماضية عملت Claes إلى تطوير النظم الخبيرة في مجالات مختلفة منها المحاصيل الحقلية و الأشجار المثمرة و أيضا في مجال تربية الحيوان و العناية به. كما وصفت بعض التجارب الحقلية لمعرفة اثر هذه النظم الخبيرة في البيئة و المردود الاقتصادي. و قد أظهرت النتائج زيادة 25% في الانتاجية . أما في مجال حماية البيئة فقد أظهرت النتائج أيضا أن هناك توفير في استخدام المياه و المبيدات حيث بلغت نسبة 35% في توفير المياه ، 16% في توفير السماد مع الشاهد. وتراوحت نسبة كفاءتها بين 80-157% . ثانيا: تعمل CLAES بالتعاون مع إيكاردا على وضع نظام خبير في منطقة شبة الجزيرة العربية فيما يتعلق بمحصول الطماطم و الخيار و كذلك نظام آخر في مجال القمح و الفول في منطقة WANA .

أن وضع نظام خبير VERCON يساعد الباحثين و المرشدين الزراعيين و المزارعين لنقل و تداول المعلومات الزراعية لتغير العمل الزراعي و تطويره. كما يمكن وضع هذا النظام على موقع بحيث يمكن أن يكون له ربط مع مواقع أخرى لزيادة الكفاءة و المعرفة مثل موقع http/www.vercon.sci.eg هذا الموقع يحوى نظاميين خبيرين هما الأرز و القمح و طور هذا العمل في مركز البحوث الزراعي قسم الإرشاد الزراعي و قد جمعت البيانات الإحصائية من قسم الاقتصاد الزراعي ثم جمعت بيانات عن معوقات الإنتاج من قبل المزارعين بالإضافة إلى بيانات أخرى مختلفة. أن هذا البرنامج يعمل على إيجاد حلول و طرق لعلاج المشاكل التي قد تواجه الزراعة كما يعمل على إعطاء أفضل الطرق في المجال الزراعي. قد تم تطوير نظام خبير للخيار و هذا يمكن أن يجرى عليه بعض التعديلات ليعمل كنظام خبير في شبة الجزيرة العربية. و يوجد على موقع www.icarda.cgiar.org/APRP/LT.htmhttp// قد عقدت ورشة عمل في مركز Claes لمدة أسبوع للباحثين من منطقة إيكاردا في شبة الجزيرة العربية للتعرف على مهام و عمل هذه الأنظمة كما سيقوم مركز Claes بعرض تتابع النظام الخبير في مجال القمح و الفول . أن هذا النظام سبق استخدم في كثير من العمليات الزراعية المختلفة لتحسين كفاءة الزراعة في منطقة WANA .

Outcome of Panel Discussion on Priority Setting for Research Topics (Themes)

Chairmen	*Dr. William Erskine*	*ICARDA Assistant Director General (Research)*
	Dr Adel Aboul Naga	*Senior Advisor/Consultant*
Rapporteur	*Prof. Dr Richard Jones*	*Senior Research and Lecture Scholar, Yale University, USA*

- A group discussion involving the invited scientists, specialists, and representatives from the GCC countries was held at the end of the second day of the workshop. As a result, a list of priorities for future research was drawn up (Table 1). The group also highlighted the following as major areas requiring attention: The identification, classification and genetic fingerprinting of local date varieties
- The development of new techniques for use in variety improvement efforts, including gene transfer, to improve tolerance to salinity and drought and to improve resistance to pests
- The development of effective IPM programs
- The improvement of agricultural-management techniques, especially in the areas of irrigation, fertigation, pollination, fruiting and the mechanization of tree services
- The development of postharvest techniques to improve marketing during the off-season period, and the development of techniques for utilizing traditional and new value-added products derived from date palm
- The building of an expert system for date palm production
- Capacity building for NARS and growers in the area of date palm agricultural management
- Enhancing networking capabilities to facilitate the exchange of information, databases, and services derived from project activities

Table 1. Priority setting within the different research themes, as ranked by representatives from GCC countries (on a scale of 1 to 5, where 1 represents the highest priority)

Topic	Bahrain	Emirates	Kuwait	Oman	Qatar	KSA	Average
Propagation and Crop Management	2	1	3	3	3	2	2.3
Crop Protection and IPM	3	2	2	2	2	1	2.0
Postharvest and Processing	4	1	4	1	4	4	3.0
Biotechnology and Germplasm Conservation	1	2	1	Tool*	1	3	1.3
IT and Expert Systems	5	2	5	Tool*	5	5	3.66

*Suggested by Oman to be an important tool which should be included with all the other components.

The above panel recommendations were discussed further by separate specialized groups.

Outcome of Specialized Working Group Discussions

Participants were organized into two working groups. Group 1 discussed two themes:
1-1. propagation and crop management and

1-2. post-harvest, marketing and processing

Group 2 discussed another two themes:

2-1. crop protection and IPM and

2-2. biotechnology and germplasm conservation

Both groups considered the themes of information technology and expert systems, and capacity building and institutional strengthening, as cross-cutting issues.

Outcome of Group 1 Discussions

1.1. Propagation and Crop Management

Constraints

1. In the case of several cultivars, tissue culture techniques can efficiently produce large numbers of date palm transplants; however, techniques that can be used to determine the morphological characteristics of the resulting trees are lacking. Ways of producing additional cultivars need to be determined.
2. Offshoot propagation methods are inefficient and survival after planting is poor.
3. The influence of different environments and different watering and fertilization regimes on the uptake of nutrients at different stages of tree growth and fruit production is not known.
4. The actual water requirement of date palm is not known, and neither its response to deficit irrigation and low quality water.
5. Farmers do not know about, or do not implement, new water-management technologies that improve both the water-use efficiency and the productivity of date palm.
6. Optimal practices for date palm tree management and fruit production have not yet been defined.
7. The factors which determine whether pollination will be successful are not well known.
8. Various methods of mechanical and chemical thinning need to be improved.
9. An atlas of date palm is needed, which should include keys for the identification of different cultivars, as well as information on the growth requirements of those cultivars.

Based on the above constraints, the group identified the following issues, all of which should be addressed.

a. *Date Palm Propagation*

Tissue Culture Techniques

1. Improve techniques to produce true-to-type plants and verify these using genetic fingerprinting techniques.
2. Conduct further studies on the use of meristematic tissue as an explant in situations where no offshoots are available.

Off-Shoots Method

1. Extend the use of small offshoots to improve propagation efficiency.
2. Enhance treatments that could increase the number of off-shoots/date palm tree.

b. *Date Palm Crop Management*

Future work should focus on the following issues:

1. Water requirements and the use of irrigation methods with different qualities of water
2. Nutritional requirements and the judicious application of the correct types and quantities of fertilizers—the application of excessive amounts of fertilizer, which would contaminate the environment, should be avoided
3. Organic date farming
4. Palm head management—application of the technical package recommended for the palm head, with emphasis on fruit thinning (mechanically and/or chemically)
5. The mechanization of agricultural practices
6. The climatic conditions that affect the growth and maturation of fruit in commercial cultivars
7. The evaluation and selection of male palms
8. The determination of the appropriate stage at which to harvest different cultivars under different environmental conditions
9. The nature of the preharvest drop observed in some cultivars
10. Skinning (sloughing) - causes and treatments.

c. *Atlas of Date Palm*

A descriptive manual should be drawn up for date palm varieties, which should characterize them botanically, genetically, geographically and ecologically.

d. *Extension Services*

A priority is the need to ensure that existing and new information is made accessible to all growers, as quickly as possible, through the use of all available media.

1.2. Post-Harvest Issues, Marketing and Processing

Constraints

1. There is a lack of capacity with regard to both marketing and modern postharvest handling procedures.
2. Post-harvest losses are high.
3. Regionally produced dates do not conform to the international regulations and standards necessary for export.
4. The post-harvest sector has been largely neglected in AP countries.
5. Workers trained in post-harvest issues (e.g. harvesting, storage and marketing) are lacking, and people are uninformed about international regulations and standards.
6. Knowledge of the post-harvest technologies needed to manage the ripening of dates is rudimentary, and infrequently applied.
7. There is a lack of both personnel and institutions that specialize in the post-harvest aspects of date production.
8. In AP countries there has been a recent and dramatic increase in both the area planted with date palm and in date production; however, there has been little development of the post-harvest sector, so few advances have been made in reducing post-harvest losses and fostering exports.
9. There is a need to develop innovative and effective post-harvest date treatments that are safe and that comply with international requirements and regulations.

Based on the above constraints, the group identified the following issues that need to be addressed.

a. *Pos-tharvest Issues, Handling and Marketing*

   Work is needed in the following areas:

   1. The characterization of cultivars and the identification of those most appropriate to a specific geographical area
   2. The mechanization of harvesting
   3. The artificial ripening and preparation of dates in order to market them
   4. Packaging and storage technologies
   5. The development of date quality standards
   6. The marketing potential of dates, both regionally and internationally.

b. *Processing*

   Potential exists for:

   1. The production of high fructose syrup
   2. The production of high protein animal feed
   3. The production of citric acid
   4. The development of processing methods for date syrup and date vinegar
   5. Capacity building (to develop a country's processing capabilities).

Outcome of Group 2 Discussions

2.1. Crop protection and IPM

Constraints

1. In the Arabian Peninsula, the local and regional distribution of many insect pests of date palm, as well as their economic impact, has not been well documented. In addition, the natural enemies of these insect pests have not been surveyed or assessed to determine their potential for use as biological control agents.
2. The nature, distribution, and impact of date palm diseases are not well known.
3. Biological control strategies for these pests have not been studied.
4. IPM programs for insect pests of date palm have not been implemented at the farm level.
5. Pilot sites have not yet been established for the participatory implementation of IPM programs.
6. Farmers are not considered to be full partners in the implementation of IPM programs.
7. There is a lack of personnel trained in IPM techniques, and a lack of educational/outreach programs.

The group suggested the following areas as priorities for future work:

1. The need to determine (1) the importance and distribution of the lesser date moth and the dubas bug and (2) their natural enemies.
2. The need to determine the importance and distribution of the diseases of date palm.
3. The need to identify and evaluate the components of integrated management strategies targeting the lesser date moth and the dubas bug.
4. The need to compile and test options for the integrated management of the lesser date moth, the dubas bug, the red palm weevil and other pests.
5. The need to establish pilot sites for the participatory implementation of IPM programs.
6. The need to empower farmers so that they can adapt and adopt IPM technologies.
7. The need to strengthen the capacities of NARS to formulate and implement IPM options.

2.2. Biotechnology and Germplasm Conservation

Constraints

1. Currently, no simple, accurate technology exists for cultivar identification
2. Our knowledge of the genetic diversity of date palm is limited
3. Tissue culture protocols are limited to specific cultivars
4. There is a large amount of somaclonal variation in date palm
5. Disease detection (phytoplasms, fungal, bacterial)

6. There is no existing transformation system for date palm
7. There is a lack of trained personnel
8. Networking of Date palm Biotechnology Resources

Table2. Ranking of future activities, as decided by the Biotechnology and Germplasm Conservation group

Ranking (priority)	Activities/areas of work
High	• Training
Moderately High	• Tissue culture protocols • Genetic diversity
Medium	• Cultivar identification • Somaclonal variation • Disease detection
Low	• Networking • Transformation

المناقشات والتوصيات التي توصلت الها مجموعات البحوث المتخصصة

الرئيس: ***د. ويليم أر سكين مساعد المدير العام للبحوث بإيكاردا***
الرئيس المساعد: ***د. عادل أبو النجا مستشار علمي أول – إيكاردا***
المقرر: ***أ.د. ريتشارد جونز جامعة بيل- أمريكا***

عقدت جلسة لمناقشة البحوث التي تم عرضها وقد تضمنت باحثين من دول مجلس التعاون الخليجي في نهاية اليوم الثاني لورشة العمل كما يبينها الجدول التالي :

جدول رقم (١) يبين اولويات البحث العلمي من منظور دول مجلس التعاون الخليجي

الموضوع	بحرين	الإمارات	كويت	عمان	قطر	السعودية	المتوسط
الاكثار وخدمة المحصول	2	1	3	3	3	2	2.3
الوقاية والمكافحة المتكاملة	3	2	2	2	2	1	2
معاملات ما بعد الحصاد والتصنيع والتسويق والاستفادة من مخلفات النخيل	4	1	4	1	4	4	3
التقنيات الحيوية وحفظ المصادر الوراثية	1	2	1	تقنيات	1	3	1.3
تكنولوجيا المعلومات والنظم الخبيرة	5	2	5	تقنيات	5	5	3.11

يشير الرقم ١ الى الابحاث الاكثر اهمية كما يشير معنى (تقنيات) الى انها تعتبر تقنيات مهمة مشتركة

بالإضافة إلى ذلك فقد أشارت المجموعة إلى بعض الأسس المهمة في تحسين البحث العلمي

- تحديد البصمة وراثية للأصناف المحلية
- استخدام طرق حديثة لتحسين الأصناف و ذلك من خلال نقل الجينات لتحسين صفاتها (تحملها للملوحة و الجفاف و مقاومة الأفات المختلفة).
- تطوير برنامج متكامل لمكافحة الأفات.
- تحسين العمليات الزراعية (الري و التسميد و التلقيح و الحصاد الألي لخدمة الشجرة) .
- العناية بمرحلة ما بعد الحصاد لتحسين فرص التسويق.
- تطوير و بناء نظام خبير لأشجار النخيل.
- تنمية القدرات البشرية في العمل الزراعي لخدمة النخيل .
- تعزيز و تطوير تبادل المعلومات بين الباحثين.

النتائج التي توصلت اليها مجموعات العمل المتخصصة

مجموعة الأولى قامت بمناقشة ما يلي:

أ) ادارة المزارع وطرق الاكثار

ب) معاملات ما بعد الحصاد والتسويق

أ) ادارة المزارع وطرق الاكثار (المعوقات)

المعوقات:

1. تعطى زراعة الانسجة إنتاجا عاليا من الفسائل اما تقنيات التحقق من مطابقة مواصفات الفسائل للام غير متوفرة .
2. طرق التكاثر بالفسائل غير مشجعة.
3. لم يدرس تأثيرالاختلافات البينية على عمليات الري و التسميد و امتصاص العناصر في المراحل مختلفة من نمو النبات بشكل كافي .
4. استخدام طرق الري الحديثة لأشجار النخيل غير معروفة علي نطاق واسع بين المزارعين
5. الطرق الحديثة في إدارة العمليات الزراعية لأشجار النخيل وإنتاج الثمار غير معروفة بشكل كبير.
6. لم تدرس العوامل المؤثرة على نجاح عملية التقليح بشكل كاف.
7. تحتاج طرق التلقيح آليا أو ميكانيكيا إلى تطوير
8. هناك حاجة لوضع أطلس للأصناف المختلفة من النخيل واحتياجاتها في النمو.

بناء على المعوقات السابقة أوصت المجموعة بالتالي:

طرق التكاثر بالأنسجة

- تحسين طرق التكاثر بواسطة زراعة الانسجة للحصول على نباتات طبق الأصل للنخلة الأم و التحقق من ذلك باستخدام البصمة الوراثية.
- وضع دراسة متقدمة للأنسجة المريستماتية في حال عدم توفر فسائل

طرق التكاثر بالفسائل

- التوسع باستخدام الفسائل الصغيرة لتحسين قدرة التكاثر في أشجار النخيل.
- تحسين المعاملات الزراعية التي من شأنها زيادة إنتاج الفسائل

إدارة مزارع نخيل البلح

1- البحث في طرق الري واستخدام نوعيات مختلفة من مياه الري.
2- إيجاد أفضل السبل في التسميد والتي توفر احتياجات النخلة من المواد الغذائية دون الأضرار بالبيئة.
3- استخدام الأسمدة العضوية في إنتاج التمور.
4- استخدام الميكنة الزراعية في إنتاج التمور
5- البحث في الأحتياجات المناخية للأصناف الجيدة من التمور.
6- تقييم و اختيار الذكور من النخيل ذات المواصفات الجيدة.
7- تحديد مراحل الحصاد للأصناف المختلفة.
8- البحث في أسباب السقوط المبكر للثمار.
9- تقشر الثمرة: أسبابه وعلاجه

أطلس لأشجار النخيل

وضع أطلس نباتي للنخيل يتضمن وصف أنواع أشجار النخيل نباتيا ووراثيا وجغرافيا وبيئيا.

الإرشاد الزراعي

العمل على استخدام موسع للطرق الإرشادية المختلفة لتصل إلى المزارع بالوقت المناسب.

ب) مرحلة ما بعد الحصاد وعمليات التسويق

المعوقات

1- ضعف الإدارة لمرحلة ما بعد الحصاد و التسويق.
2- الفقد العالي في مرحلة ما بعد الحصاد
3- لا تتمتع التمور المنتجة إقليميا بمواصفات عالية تؤهلها للأسواق العالمية.
4- نقص خبرات العاملين خاصة في عمليات الحصاد والتخزين والتسويق ومتطلبات الجودة العالمية.
5- استخدام تقنية النضج الصناعي للثمار في معاملات بعد الحصاد لا تزال في بدايتها
6- هناك توسع في زراعة أشجار النخيل في دول شبة الجزيرة العربية أدت إلى زيادة في الإنتاجية إلا أن مرحلة ما بعد الحصاد للتمور بحاجة إلى اهتمام و رعاية أكثر.
7- البحث عن طرق فعالة و أمنة لتعقيم التموراثناء التصنيع لتتناسب مع المتطلبات و القوانين الدولية.

تمت مناقشة المعوقات السابقة تحت عنوانين هما:

مرحلة ما بعد الحصاد إدارة و تسويق

1- تصنيف الأنواع حسب البينات المختلفة.
2- استخدام الميكنة الزراعية
3- النضج الصناعي للتمور و إعداده للتسويق
4- تقنية التغليف والتعليب
5- تطوير طرق ومعايير نوعية التمور
6- دراسة محلية ودولية لتحسين فرص تسويق التمور.

المنتجات الاخري للتمور :

1- إنتاج أنواع مختلفة من عصير التمور
2- إنتاج علف حيواني من التمور غنى بالبروتين
3- إنتاج حمض الستريك
4- تطوير عصير التمور والشراب

المجموعة الثانية ناقشت ما يلي:

أ) وقاية المحصول والمكافحة المتكاملة.
ب) التقنيات الحيوية وحفظ الأنواع

أ) الوقاية و المكافحة المتكاملة

المعوقات

1- لم يدرس الضرر الاقتصادي الذي تسببة الآفات الحشرية التي تصيب أشجار النخيل بالشكل الكافي في منطقة شبة الجزيرة العربية كما لم تدرس الأعداء الحيوية لها لاستخدامها في المكافحة الحيوية.
2- لم تدرس الأمراض التي تصيب أشجار النخيل وانتشارها بشكل جيد كما أن بعضها غير معروف.
3- لم تدرس استراتيجية المكافحة المتكاملة بشكل كافئ
4- المكافحة المتكاملة في حقول أشجار النخيل معقدة و لم تطبق على مستوى المزروع.
5- لم يطبق مشروع راند في مجال المكافحة المتكاملة.
6- لم يشارك المزارع في تطبيق المكافحة المتكاملة .
7- نقص عدد الباحثين في مجال المكافحة الحيوية.

اقترح الحضور الأولويات المهمة التالية:

1- دراسة انتشار حشرة lesser Date Moth و الدوباس Dubas Bug و البحث عن الأعداء الحيوية لهما.
2- تحديد أهمية ودرجة انتشار الاصابة بالأمراض التي تصيب التمور.
3- تحديد وتقييم عناصر المكافحة المتكاملة لحشرة Lesser Date Moth و البق . Dubas bug
4- وضع مشروع راند للتعرف على تطبيقات المكافحة المتكاملة
5- مشاركة المزارع في التعديل ولتبني تقنية المكافحة المتكاملة.
6- تعزيز القدرات الوطنية في تطبيقات المكافحة المتكاملة.

ب) التقنيات الحيوية وحفظ المصادر الوراثية

المعوقات

- صعوبة التعرف علي مواصفات الاصناف.
- لم يدرس التنوع الجيني لأشجار النخيل بشكل كافئ.
- عدم التوسع في انتاج الفسائل بزراعة الأنسجة كما انها مركزة علي عدد محدود من الأصناف.
- الحاجة لشبكة معلومات عن أشجار النخيل

ترتيب النشاطات حسب ما أقره الحضور

النشاط	الترتيب في الأهمية
التدريب	عالي
زراعة الانسجة	متوسط إلى عالي
تنوع المصادر الوراثية	متوسط الى عالى
تحديد الأصناف	متوسط
الاختلافات الوراثية في الفسائل المنتجة من زراعة الانسجة	متوسط
تحديد واكتشاف الامراض	متوسط
شبكة معلومات	أقل
تبادل المعلومات	أقل

بالإضافة لذلك فأن المعلومات والنظم الخبيرة وتطوير الكوادر البشرية وبناء قدرات المعاهد البحثية في مجال زراعة النخيل قد حصلت على اهتمام كاف بين كل الباحثين.

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Arabian Peninsula
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About APRP, ICARDA and CGIAR

The **Arabian Peninsula Regional Program (APRP)** of ICARDA serves the seven countries of the Arabian Peninsula, namely, Bahrain, Kuwait, Qatar, Saudi Arabia, the Sultanate of Oman, the United Arab Emirates, and the Republic of Yemen. The Program addresses three priority themes (i) rangelands, forage and livestock; (ii) protected agriculture; and (iii) water resources management. These themes are supported by research in agroecological characterization and stress physiology. Emphasis is also placed on institutional strengthening and capacity building, human resource development, and promotion of the use of information technology. APRP is financially supported by the Arab Fund for Economic and Social Development (AFESD), the International Fund for Agricultural Development (IFAD), and, more recently, the OPEC Fund for International Development.

Established in 1977, the **International Center for Agricultural Research in the Dry Areas (ICARDA)** is one of 15 centers supported by the Consultative Group on International Agricultural Research (CGIAR). ICARDA serves the entire developing world for the improvement of lentil, barley and faba bean: all dry area developing countries for the improvement of on-farm water-use efficiency, rangeland and small-ruminant production; and in the West and Central Asia and North Africa (CWANA) region for the improvement of bread and the durum wheats, chickpea, and farming systems. ICARDA's research provides global benefits of poverty alleviation through productivity improvements integrated with sustainable natural-resource management practices. ICARD meets this challenge through research, training, and dissemination of information in partnership with the national, regional and international agricultural research and development systems.

The **Consultative Group on International Agricultural Research (CGIAR)** is a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural Centers that work with national agricultural research systems and civil society organizations including the private sector. The alliance mobilizes agricultural science to reduce poverty, foster human well being, promote agricultural growth and protect the environment. The CGIAR generates global public goods that are available to all. The World Bank, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), and the International Fund for Agricultural Development (IFAD) are cosponsors of the CGIAR. The World Bank provides the CGIAR with a System Office in Washington, DC. A Science Council, with its Secretariat at FAO in Rome, assists the System in the development of its research program.

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