



The Blessed tree

Volume No. 1, Issue No. 03, September 2009, KHALIFA INTERNATIONAL DATE PALM AWARD



**NAHAYAN MABARAK
GRANTS 10000 DATE PALM
SEEDLINGS TO THE PARTICIPANTS**

**DATE PALM
THROUGH THE EYES OF THE WORLD**



SULTAN KHALIFA AL HABTOOR

LOOK FORWARD
TO THE DAY WHERE
WE CAN FIND THAT
DATES IS THE MAIN
MEAL FOR OUR
CHILDREN AT
SCHOOLS

VIEWS OF AAAID ON
THE IMPACTIONS

REDUCING
INFESTATION (%)
OF PESTS ON DATE
PALM TREES





جائزة خليفة الدولية لنخيل التمر
KHALIFA INTERNATIONAL DATE PALM AWARD

OUR TREE

Date Palm ... unlimited giving tree



Talking about land blessings and the pharmacy of nature starts with date palm, the blessed tree, symbol of fertility and pride, the companion of man since old days and the food of our Prophet peace be upon him. The production of its dates is a complete nutrition and a cure from many health disorders. Date palm and all its derivatives, stem, fronds and dates carry good as it is unlimited giving tree.

Date Palm was known to man more than 5000 years ago. It is the parent tree, its cultivation was known in before Christ era and was mentioned in some ancient texts as the sacred tree with its fronds reaching the sky and its roots are deep in the soil. It is the tree which all people rely on for their sustenance and it is really the tree of life.

In the past, Date Palm was the first companion and the main backbone for the life of people and civilizations. From date palm was the nutrition, medicine, homes and life necessities. Dates were used as the basic nutrition by many people who lived in the Arab region and for thousands of years. Where Hammurabi law in ancient Babel in Iraq law articles stressed on protecting date palms and punish those dare to cut them. Archeology of ancient civilizations in UAE and other countries reflected in manuscripts and archaeologies the high importance of date palm and dates in the life of people and the booming of these civilizations. Moreover, Allah the Almighty honored date palm and its fruits by mentioning them in the Holy Quran in more than one place that certainly cherished its importance to the extent that it became an icon and a symbol of Arab and Muslims as God ordered date palm to be a source of good and blessing.

No doubt that date palm enjoys a special prestige in the concerns of Arab people and particularly during the Holy Month of Ramadan, date palm is famous for its nutritional value and economical importance and talking about the sacred tree is always amazing as it has distinguishing characteristics over the other fruits in its structure and morphological features and its ability to grow and adapt to the prevailing environment in its cultivating regions. It is really an unlimited giving tree.

Nahayan Mabarak Al Nahayan

Minister of Higher Education and Scientific Research
Chairman of Khalifa International Date Palm Award Board of Trustees

WELCOMEAn advertising invitation in The Blessed Tree Magazine

General Secretariat of Khalifa International Date Palm Award announces for economical activities owners, companies, factories in the Agriculture sector in general and date palm cultivation and production of dates in particular, to open the door to advertise at the pages of Blessed Tree Magazine according to professional criteria and standards.

Dear producer ... Dear Advertiser ...

Your advertising in the Blessed Tree Magazine will expose your products to officials in Ministries of Agriculture, Scientific Bodies, Societies, Specialised Factories, Universities, Scientific Research Institutes and parties concerned relevant to agriculture and date palm at UAE level and all Arab countries and some foreign countries in addition to influential figures from decision makers in the Arab region.

Those interested in more details, technical terms and advertizing prices can contact: Head of Media Committee at Khalifa International Date Palm Award at the following address:

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جائزة خليفة الدولية لحبيل التمر
KHALIFA INTERNATIONAL DATE PALM AWARD

OUR MESSAGE



Arab Date Palm Day

Arab countries celebrate the Arab Date Palm Day on 15/09/2009 every year. On that day the idea to celebrate and honor this sacred and giving tree was born during the First Arab Conference for Date Palm and Dates in Baghdad – Iraq in November, 1981 by establishing the Arab Federation for Food Industries (one of the Arab League organizations) and the Ministry of Agriculture and the project of Near East and North Africa Regional Center for Date Palm (FAO).

Due to the importance of Date Palm, the Arab Federation for Food Industries decided to commemorate it on 15/09 as the Arab Date Palm Day. All Arab countries endorsed that day as well as the Arab League in 1986 as a national day in addition to its activities. Every country initiated as per its ability to celebrate that day through organization from ministries and municipalities for a set of agricultural, scientific, cultural, heritage and media activities.

Date palm cultivation is wide spread across the world and its numbers exceeds 200 million and the Arab World has a great number of this blessed tree being considered one of the key plantation wealth in this region where the environment is conducive. The Arab World represents 75% from the total number of date palms worldwide and 65.6% from the international production.

On this occasion Khalifa International Date Palm Award while celebrating that day wishes to see further research and development from the parties concerned at the Arab level and we support and promote more cooperation and coordination among these organizations and exchange of information and advancing the standard of the technical employees involved in the date palm and production agriculture sector until the date palm receives what it deserves from attention scientifically, culturally, economically, socially and technical care.

It is our duty to take the initiative to honor this blessed tree and all society sections have to contribute to this honoring parents and grandchildren along the Arab region and to support and show the world the leading role of UAE under the wise leadership of H.H. Sheikh Khalifa bin Zayed Al Nahyan, UAE President (God Protects Him) in developing the scientific research for date palm and encouraging those involved in this vital sector.

In addition to the support of H.H. General Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi, Deputy Supreme Commander of UAE Armed Forces and the keen pursuit of H.H. Sheikh Nahayan Mubarak Al Nahayan, Minister of Higher Education and Scientific Research, Chairman of Board of Trustees of Khalifa International Date Palm Award.

Dr. Abdelouahhab Zaid

Secretary General of Khalifa International Date Palm Award
Editor in Chief.

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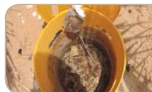
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Publication criteria in the magazine

1. The articles should be new, dedicated particularly to the Award's magazine, and have not published before.
2. Articles are to be in a soft copy, whether in Arabic or English, and should be supported by specialized sources and references at the end.
3. Researches and studies should be accompanied by the required scientific photographs of high quality (digital / high resolution).
4. Articles and photographs are to be submitted to the magazine by e-mail, or to be sent to the Award's P.O. Box on a CD with a typed and printed hard copy.
5. The magazine is not obliged to return the articles back, whether published or not, to the participants.
6. A writer of an article should enclose a personal photo with his CV including the full name, phone number, email and P.O. Box, in addition to the bank account number in English (Name, Name of the Bank, Account Number and Swift Code) in order to allow sending him the due amount in case the article is published, in compliance with the Magazine's financial system.
7. All Articles in the magazine necessarily reflect the views of their respective authors and do not oblige Khalifa International Date Palm Award.
8. Scientific subjects in the magazine are arranged according to technical considerations.
9. The Magazine welcomes readers from all the date palm lovers around the world, who contribute in deepening the knowledge and building a sustainable society.



مهرجان ليوا للدرطب
Liwa Date Festival

We are proud of Khalifa Bin Zayed's patronage of date palm tree

Nahayan Mabarak grants 10000 date palm seedlings to the participants



HH Sheikh Nahayan Mabarak Al Nahayan, Minister of Higher Education and Scientific Research, Chancellor of United Arab Emirates University, Chairman of Board of Trustees of Khalifa International Date Palm Award has donated 10 thousand tissue culture seedlings for winners and participants at the Fifth Liwa Date Festival 2009 in recognition of date palm lovers and the winners of the festival who worked hard and achieved the best results at the

different formal categories and levels of the contest. These seedlings are from the best quality varieties produced by the laboratories of Date Palm Research and Development Unit at the UAE University.

HH stressed that growing date palm tree in UAE is a corner stone of the comprehensive development process due to its important role to build and update the agricultural production capacities and revitalizing the related industries, as well.



The studies and researches confirmed that advancement in agriculture did not come from nothing but it carried a strategic dimension with a clear vision in relation to achieve food security. HH Sheikh

Khalifa Bin Zayed Al Nahyan, President of UAE (God Protect Him) realized what the agricultural development represents a real capital, that is why he spared no effort to offer all support to the advancement of date palm tree and to increase the cultivated area and achieve self-sufficiency in addition to income diversification where HH the president paid a special attention to the agricultural policy and reflected his care to the blessed tree pursuant to the approach of the Late Sheikh Zayed Bin Sultan Al Nahyan (May God Rest His Soul in Peace) by fulfilling the requirements of the unique agricultural experiment in the homeland.

HH pointed out that we at Khalifa International Date Palm Award are proud of the generous patronage of HH Sheikh Khalifa Bin Zayed Al Nahyan, President of UAE (God Protect Him) and the support of HH Sheikh Mohammad Bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces for the blessed tree and all its workers, we value high and bless the national efforts done by Abu Dhabi Authority for Heritage and Culture to revitalize this essential and cultural heritage of date palm tree and those involved in its field in our beloved country.

HH Chairman of the Board of Trustees of Khalifa International Date Palm Award expressed the intention to move forward in serving the comprehensive agricultural development and the blessed tree via thought and work under the wise leadership of HH Sheikh Khalifa Bin Zayed Al Nahyan, President of UAE (God Protect Him) in order to provide the food security, sustainable development, philanthropy, peace for communities and mankind across the world.

On the other hand, Obied Khalfan Al Mazroui, Liwa Date Festival 2009 Director General, has commended efforts of HH Sheikh Nahayan Mabarak Al Nahayan, Minister of Higher Education and Scientific Research, Chancellor of United Arab Emirates University, Chairman of Board of Trustees of Khalifa International Date Palm Award for his support to growers, producers and participants in the festival and praised his valuable gift where the festival organizing committee has set out a mechanism to distribute the seedlings where every participant has received 4 tissue culture seedlings from the best quality varieties produced by the laboratories of Date Palm Research and Development Unit at the UAE University.





مهرجان ليوا للترطب
Liwa Date Festival

The Award encourages producers of Ruttab and Dates to participate in the Award categories in its second session 2010

Khalifa International Date Palm Award has activated its participation at the Fifth Liwa Date Festival through educating growers and producers about the culture of competition and the mechanism of participating in the five different categories of the Award. H.E. Dr. Abdelouahhab Zaid, the Award Secretary General pointed out on the occasion of the participation of the Award in the Fifth Liwa Date Festival which took place during 17-26 July 2009 that the qualitative move of the festival quantitatively and qualitatively has contributed in the development of date palm sector across the nation through developing the tools of dealing with growers and producers and expanding the participation framework and developing the criteria of the official competition categories of Ruttab festival.

He added that Khalifa International Date Palm Award under the directives of HH Sheikh Nahayan Mabarak Al Nahayan, Minister of Higher Education and Scientific Research, Chairman of the Board of Trustees of the Award undertakes a great importance to encourage national

growers to participate in the Award different categories and presents all facilitations and technical potentials for them to compete in the Award second session particularly if we knew that the Award first session has recorded the highest percentage of participation from UAE.

Dr. Zaid indicated that the Award in its second session has added two new categories to compete in by date palm lovers across the world, they are; the best new technique and the best development project in the field of date palm cultivation and dates production. He noted that the last date to receive participation application is the end of coming September.

It is worthy to note that Khalifa International Date Palm Award was established by a generous patronage of HH Sheikh Khalifa Bin Zayed Al Nahyan, President of UAE (God Protect Him) with a presidential decree, Number 15/2007 in order to promote the conduct of researches and studies on date palm trees and its propagation around the



world and honoring those with great contributions in this field from individuals or institutions. This Award is independent and partial and is granted to scientists, producers and distinguished figures and institutions which contributed in the fields of research and development of date palm. The Award consists of five categories namely; Distinguished Research / Studies, Distinguished Producers, The Best New Technique, The Best Development Project, Distinguished Figure in the field of date palm cultivation and dates production.



The Award participates in the Exhibition of (Date Palm in our lives)

Organized by Family Development Foundation – Al Hayer – Al Ain



Khalifa International Date Palm Award participated in the Exhibition titled (Date Palm in our lives) with an invitation extended by the Family Development Foundation in Al Ain at Al Hayer region on Tuesday July 7, 2009 where the Award prepared a wing that suits the importance of the event. Special posters of the Award were in display and brochures have been distributed to VIP visitors in addition to some symbolic gifts to the public. The wing also played a promotional and media role to propagate for the Award conditions,

categories and its values and encouraged the growers to participate in it.

The wing of Khalifa International Date Palm Award received a large number of visitors and those attended praised it which represented a good chance to promote the Award and its different activities for the participants of the exhibition and its visitors as there were a significant turnout from growers to ask about the Award and how to participate in it.

مبروك

بمناسبة اختيار دولة الامارات. أبوظبي
مقرّاً للوكالة الدولية للطاقة المتجددة (إيرنا)



ابوعصرو



مهرجان ليوا للربط
Liwa Date Festival

Abu Dhabi: Liwa: Eng. Emad Saad

Under the patronage of HH Sheikh
Mansour Bin Zayed Al Nahyan

6000 visitors and 3000 participants in Liwa Date Festival 2009

Participants praise visits of Hamdan
and Hazza'a Bin Zayed Al Nahyan to
Liwa Date Festival

World chefs featured the most delicious
traditional dates cuisine

The big success has contributed to the tourist
flow at Liwa region and spelled out the pillars
of desert tourism



Under the patronage of HH Sheikh Mansour Bin Zayed Al Nahyan, Deputy Prime Minister, Minister of Presidential Affairs, the activities of Liwa Date Festival have been started in the morning of Friday July 17, 2009 in its fifth session amid a big turnout of public and different sectors interested in dates and date palm at UAE level. The inaugural ceremony included distinguished programmes and various activities that the participant admired too much.

HH Sheikh Hamdan Bin Zayed Al Nahyan, Ruler's Representative in the Western Region commended the big success and the remarkable development witnessed by Liwa Date Festival in the Western Region for the fifth consecutive year. His Highness said in his visit to the festival and the accompanying activities in the morning of Saturday July 18, 2009 that organizing the festival annually comes in consistent with UAE directives and the great interest shown by HH Sheikh Khalifa Bin Zayed Al Nahyan, UAE President (God Protect Him) and HH General Sheikh Mohamed Bin Zayed Al Nahyan, Crown Prince of Abu Dhabi, Deputy Supreme Commander of UAE Armed Forces to support growers and farmers and promote the date palm as a national asset.

Hazza'a Bin Zayed visits the festival

Hazza'a Bin Zayed Al Nahyan, National Security Advisor paid a special visit to Liwa Date Festival in the evening of Sunday 26 July, 2009, HH toured the stands in the festival and reviewed the contest of the best meal made of dates and the mechanism of jury committee which presented a number of date varieties. HH also visited the traditional market (souk) for women hand-crafted works and listened to their views about the festival and their achievements and works. HH also visited a number of national and governmental stands participating in the festival. HH stressed that holding such festival and in particular date festival represent one of



the development strategies to support the national economy.

Strategy to preserve heritage:

H. E. Mohammed Khalaf Al-Mazrouei, Director General of Abu Dhabi Authority for Culture and Heritage, and Chairman of the Organizing Supreme Committee that the Authority organizes this event which is close relevant to the authenticity and heritage of Emiratis in the context of implementing its strategy to preserve the heritage of Abu Dhabi financially and psychologically and particularly date palm and dates because they represent basic pillars in the authentic local heritage. Not only that but also represent an embodiment of human memory of the Emirati Society. This is in pursuit of the major development journey started by late Sheikh Zayed Bin Sultan Al Nahyan (God Rest His Soul In Peace) founder of the agricultural renaissance and fulfilling the directives of High Highness Sheikh Khalifa Bin Zayed Al Nahyan, UAE President and HH General Sheikh Mohammed Bin Zayed Al Nahyan, Crown Prince of Abu Dhabi, Deputy Supreme Commander of Armed Forces.

The new features of the festival:

On his part, Mr. Obied Khalfan Al Mazrouei, Project Manager of Liwa Date Festival

said that the increase in the number of participants to (60000 visitors) in this year reflects the extent of the big success from selecting the date, categories, and activities presented to the participants besides the conditions announced for each category. Number of participants this year reached more than 3000 participant contested to win the prizes of the competition which valued to more than AED 3.5 million. This year's session was distinguished because a new logo for Liwa Date Festival has been announced and website has been launched in addition to the competition of the heritage taste where the most famous chefs in the country hotels competed to prepare dried dates and ripe dates plates, further to the main competition of the festival, the ripe dates competition in its various varieties.

Sale market for dates

Liwa Date Festival, Organizing Supreme Committee has organized a new market to sell the dates products for nationals where growers can sell their products directly to the public wishing to buy its needs from different varieties of dates, in a new precedent in favor of the growers and contribute in their support and encourage them to enhance their products.



(Faza'a i.e. "Helping Others") brought the spirit of cooperation to life:

Young people of the Western Region induce what they inherited from ancestors from genuine values and traditions during fifth Liwa Date Festival. More than 15 young men aged between 14-20 years old formed a team and named it (Faza'a i.e. "Helping Others") its mission to help whoever needs assistance in the festival and give a hand to anyone who requests it. (Faza'a i.e. "Helping Others") derived its name from an old habit was and still known in UAE and the Western Region where a number of people cooperate to help and assist each other when doing work that necessitates a number of people such as digging a well, building or the like.

(Sougha i.e. "Jewelry" in terms of heritage):

(Sougha) program participates in the heritage popular market within fifth Liwa Date festival 2009. The visitor will notice the adequate care for the items of UAE heritage and national folklore rendered by working women from productive families and volunteers paying a great interest to the traditional popular heritage from Emirati young women enthusiastic to present all what they can offer to add a modern and temporary touch to heritage items which were on the verge of extinction unless the great interest shown to them. Also the attempt to revitalize of its usage not only to ornament camels, animals and cattle but also they will compete with the modern women

accessories because they enjoy the perfect manufacturing and high quality and precise hand-made workmanship.

Children Tent in Liwa:

The children tent erected by the Organizing Supreme Committee in fifth Liwa Date Festival succeeded in attracting more than 10 thousand kids during the period of the festival. The Committee provided different types of games and programs which the kids admired too much and made them very happy and content being there.

Documentary:

Abu Dhabi Authority for Heritage and Culture has shot a documentary for the fifth Liwa Date Festival in order to display it at more than different 600 Mass Media around the world for those could not be able to attend and explore the activities of the festival in particular after the great success the festivals achieved in its fifth session whether at the national level or the global one.

Mohamed Khalaf Al Mazrouei stressed on the importance to recall and be proud of our identity and our past achievements and the values and traditions of our national culture and ask inspiration in our actions from being proud of our genuine values and traditions which we inherited from our national Arabic culture without distorting the genuine character of our identity and our culture.

Enhancing the quality of the product and the farm:

Eng. Mubarak Al Qusiely Al Mansouri,





Director of the Jury of Muzaynat Rutab that the terms and conditions of the Rutab competition this year are designed to enhance the efficiency of the farm in quantity and quality through ensuring the cleanliness of the farm and its overall good shape in addition to the quality of the product and raise its economical revenue. In addition to the equal distribution of half marks of the Muzaynat Rutab into 50% for the agricultural production of Rutab and 50% to meeting the health and proper environment conditions of the producing farm.

Transparency of the Jury:

In an unprecedented move the supreme committee of the festival decided that the jury selects the winner participating works in front of the public directly. The new system gave the opportunity to the public to watch and follow up the checking processes and selection mechanism through which the winner participating works. The committee has determined 6 categories for participation

namely 4 of them in the category of Abu Me'an, category of Al Khalas, category of Al Debas and category of Fardh in addition to the Elite category and the competition of the best heritage display.

Praise:

All visitors of fifth Liwa Date Festival 2009 agreed to the great development in the activities of the festival this year and it was distinguished by its allocated spacious areas for activities further to the popular heritage market and the children's tent, besides the enhancement of the quality levels and the displayed varieties. The visitors and participants praised the interest of the wise leadership to support the festival and its generous patronage to its activities in order to promote tourism and trade in the Western Region in the Emirate of Abu Dhabi.

Best Dates meals:

The new events in the festival was the international competition for the best dish made of dates which a number of

chefs from across the world participated and compete with each other to win the prize of the best taste. The competition is new and got a great idea for its impact specially that most of the participants are multinational chefs who have the desire to prove their ability to win the contest which the committee did not set out any terms for it but left the way open free for each contestant to feature a popular meal made of Liwa dates and to be untraditional and the contestant with the best meal wins the competition and get a valuable prize.

Media Center:

The Media Center at fifth Liwa Date Festival was full of journalists and reports of local, Arabic and foreign press and media who flocked to the Western Region to report on the event which gained interest year after year at the national and global levels.



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Support of Nahayan Mabarak Al Nahayan to the Date Palm Friends Society is a distinguished mark for a better future

Sultan Khalifa Al Habtoor loved date palm therefore he excelled in it and its production

Patronage of Khalifa Bin Zayed for the blessed tree placed it in a leading position in the national economy of UAE



I look forward to the day where we can find that dates is the main meal for our children at schools





Despite of the simplicity of indigenous environment features in UAE, they affected Emiratis to a great extent and left their impact on them and their lifestyle as well as their souls. And so did the date palm tree being one of the key features of Emirati environment and the Arab Peninsula from ancient ages. It played a significant role in their lives during the pre-Oil era, where it was the food and shelter. They lived under its shade and ate its dates and build their homes from its branches and from its fronds they made their living and household tools and furniture.

Date palm is always in mind of Emiratis since it represents a great epic for its importance and significance. It expresses the strong bond and relation between the man who lived on this land and the blessed tree through different hard times where the date palm was the backbone of economic and social life.

Our interview today with one of the veteran passionate lovers of date palm

who experienced with it the pre-Oil era and the era of prosperity and blooming of economy. He is H.E. Mr. Sultan Khalifa Al Habtoor Vice Chairman of Date Palm Friends Society in UAE.

Since when you became interested in date palm and what does it mean to you?

We became interested in date palm through the public life and from our attachment for our fathers and grand fathers. Also the special encouragement of the late Sheikh Zayed bin Sultan Al Nahayan a great impetus in our souls where it placed the bond with this land and with its date palms which stand with dignity like its people through history.

Since long time ago date palm has been there in UAE and Arab Peninsula and still continue to be the companion and the source of food and shelter. We could not make it today without the existence of date palm from prosperity and welfare with the grace of Allah and the patronage

of Sheikhs of UAE who spared no effort to support and develop the local community and in particular the agricultural sector.

What are the date varieties do you have?

We have a farm with the size of 1000 * 1000 foot and another with the size of 2000 * 1500 foot in Khwaniej area in Dubai both of which have the best varieties of date palm such as Khala, Berhi, Nawader, Helali, Salatin, and others. Some of date palms are productive and the other are in their way. We are doing our best all the time to provide a promising and well-informed agricultural environment in selecting the best varieties in order to ensure a promising future for this vital economical agriculture for a better future of citizens and the home country.

How do you see the present status of date palm in UAE and the region?

Mr. Sultan Al Habtoor says that UAE enjoys a unique global experiment to depend on date palm and make use of it to be the main constituent of the modern stat renaissance, though the UAE people knew the date palm from long time. It is worthy to mention that its fruits played a prominent role in activating the trade movement based on it many cultures and kingdoms raised in the land which was famous of exporting dates and the booming of its trade with neighboring countries which led to have a historic presence being the link that bridges and connect ancient world cultures. Conveys moved to reach it through very harsh





routes through the Arab Peninsula, Iraq, Syria and Ancient Egypt. The relation between the man lived in this country and date palm witnessed many stages and a long struggle journey until it reached a qualitative change in recent days after it became a main tourist and investment resource in addition to its traditional role at the social, heritage and economical level, since the first human civilization lived in UAE.

Also dates can be the next Gulf Oil which is inexhaustible, although other countries produce dates, but Gulf region is famous of its date palms which are of the best quality varieties across the world since its dates are well-known of its sweetness and international well-positioned fame.

"Our vision to the importance of date palms in UAE has to exceed its quality and prestige as we've to look at it as a strategic agricultural crop that this region is distinguished of compared to the whole world. In other words we have to look and think about it as a crop that many manufactures in different countries depend on it, but what limits

this ambition is the decreasing water formula of groundwater that most of Gulf countries suffer from" He added.

His Excellency added that without the grace of Allah the Almighty and the determination and persistence of the late Sheikh Zayed bin Sultan Al Nahyan who was brought up to the values of ambition, sincerity and persistence and challenge where he insisted in achieving the impossible and refuted all claims that the agriculture project is impossible in our country when said "Let's try" and from this sheer philosophical aspect based on experiment we learned a lot from. Zayed "the good" was fully aware and confident of the giving of this land. He gave example for the best and greatest agriculture experiment and our country turned from a bare desert into a greenly pastures and date palms covering the land of young Emirates.

What has Date Palm Friends Society achieved until now?

Date Palm Friends Society has accomplished so many achievements

and national and regional successes at various levels. The long journey started on 25/10/2003 with a special patronage of H.H. Sheikh Nahayan Mubarak Al Nahayan, Minister of Higher Education and Scientific Research, Chairman of Board of Directors we try to study and disseminate information related to the best quality date palm in UAE, count and define main problems, suggest suitable solutions in collaboration with the parties concerned at the national level in addition to information exchange and dissemination with academic and research parties inside and outside UAE. We are working currently to launch a scientific laboratory for the Society to be like a genetic bank to produce the best varieties and to keep our quality varieties.

The Vice Chairman of the Society added that it has an active contribution in exhibition organization and conference related to date palm where they in collaboration with UAE University, Khalifa International Date Palm Award and Date Palm Research and Development Unit organized the International UAE Date Palm Exhibition in 2004, 2006 and 2008 respectively with a large Arab and international participation.

On the other hand and under the directive of H.H. Sheikh Nahayan Mubarak Al Nahayan Chairman of Board of Directors we have distributed many date palm cultivars and offshoots from the best varieties (Khalas, Berhi, Sukari and others) to the Society members in UAE in addition to our brother in the Sultanate of Oman.

Also the Society implemented a number of external visits included Ministry of Agriculture and Fisheries in the Sultanate of Oman in 2005 and the Cooperation Society of Dates Producers in Qassim,



We learned from Zayed the idea of (Let's try it ...)

Agriculture Cooperation Society in Butain, Farms of Sheik Saleh Al Rajhi and a number of successful agricultural projects in date palm cultivation and production in Kingdom of Saudi Arabia.

Since when the idea to hold your annual exhibition for distinguished dates started?

The idea of the personal exhibition for dates producers and lovers since approx. 5 years with individual initiative and effort at my farm in Ras Al Khaima or Dubai in collaboration with the technical committee in the Society and a number of growers and dates producers participate annually and its derivatives such as molasses and vinegar besides the traditional heritage industry that depend on the products of date palm in UAE and the sister countries in the neighbourhood they came and participate in love for date palm and its people exchange knowledge

and expertise about the best and new varieties that suits the environment of the region. We wish to develop this trial in order to benefit all region where there is date palm cultivation and date palm lovers. The date palm needs more effort and follow up in order to see its production reaches the utmost levels across the world.

What does it mean to you to be honored in March 2009?

Honoring in principle is a privilege to me and for the Society is an honor bestowed on us by H.H. Nahayan Mabarak Al Nahayan, Minister of Higher Education and Scientific Research, Chairman of Board of Trustees of Khalifa International Date Palm Award during the Award Winners ceremony in its first session 2009. It is in the same time an assignment and a new responsibility we try our best and pray to Allah to give us strength to

reciprocate to the date palm, home country and its generous people all the like. Date palm is always giving, to that end our responsibility towards it to take care of it with all our efforts to keep the formula balanced and continuing.

Would you like to send a word for date palm lovers in UAE?

We should realize the value of the national wealth and that strategic food supply and should develop it and protect it and encourage growers to expand the cultivated land with clean date palm away from using chemicals and to switch to organic agriculture that is free of chemical materials. I look forward to the day where we can find that dates are the main meal for our kids at schools this in application of the directives of H.H. Sheikh Khalifa bin Zayed Al Nahyan, UAE President (God Protect Him) and the support of Sheikh Mohammed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of UAE Armed Forces and the keen follow up of H.H. Sheikh Nahayan Mabarak Al Nahayan, Minister of Higher Education and Scientific Research, Chairman of Board of Trustees of Khalifa International Date Palm Award and Chairman of Board of Directors of Date Palm Friends Society for his highness belief that agriculture is life and civilization and support of all developing agricultural projects and pest control that may threat date palm through the excellent service offered by the competent parties in agriculture at the national level from agricultural extension centers, clinics and laboratories located in every place to render the service and fight diseases of the date palm in order to attain the sustainable development in number and types of date palms.



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Under the patronage of
 HH Sheikh Nahayan Mabararak Al Nahayan
 Minister of Higher Education and Scientific
 Research, Chairman of Khalifa International Date Palm Award Board of Trustees

Date Palm through the eyes of the World

Khalifa International Date Palm Award in collaboration with Abu Dhabi International Photographic Society (ADIPS) announces in its second session the launch of an international competition (every two years), to photograph the date palm tree in all its dimensions, products, tools, conditions and derivatives... and calls upon artists who love photographing nonprofessionals and professionals from across the world to participate in this competition in recognition of the date palm tree and strengthening the role of the photographer in enriching the country memory and revitalize its national heritage and promoting the sustainable development in all its dimensions.

A Specialist Scientific and Technical Committee will judge the contested photos and sort out the results and announce the winners in a special press conference to be held by the general secretariat of Khalifa International Date Palm Award, then the Jury notifies the winners with the results who will be honored within the Award ceremony at its second session during the month of March 2010 with a generous patronage of HH Sheikh Nahayan Mabararak Al

Nahayan, Minister of Higher Education & Scientific Research, Chairman of the Board of Trustees of Khalifa International Date Palm Award.

Features to be covered by the competition:

- 1- Date Palm Tree (whole, parts hereof, in different seasons..).
- 2- Fruits of date palm tree (ripe dates "ruttab", dried dates, unripe dates...).
- 3- Heritage industries which depend on the date palm parts such as (palm leaves, fronds and branches).
- 4- Man and its close relation with the date palm tree.

Objectives:

- 1- Engaging the art of photographing as a tool to develop the public awareness to the importance of date palm.
- 2- Creating a space to exchange experiences among Arab photographers.
- 3- Exposing the touristic, environmental and heritage capabilities of the date palm tree through the photograph.

4- Encouraging the link between man and land and agriculture.

Terms and Rules:

First: the Technical Terms:

1-The Competition is open for all photographers from nonprofessionals and professionals.

2- Participating with works either:

- a. Single photographs with a maximum of (5) photos.
- b. Serial photographs with a maximum of (2) sets not to exceed (3) photos per each set.

3- Works to be submitted colored or black and white.

4- Photos should not be less quality than 300 dpi (2400 X 2600) Mega Pixel.

5- Participating Photos to be submitted in the form of digital files on CD / DVD in the form of jpg or tiff files.

6- The participants should submit the photos attached with the participation form after filling it in via the homepage of the Award and works will not be accepted without the form or incomplete data forms.

7- Works (CD, Participation Form, Personal Photos) to be sent to or handed over to the following address:

Khalifa International Date Palm Award
P.O. Box 42781 Abu Dhabi
United Arab Emirates

8- The Award is not responsible for any damage, delay or any harm that may affect the participating works during its dispatch by mail.

9- The last date to receive participations is 01/12/2009.

10- Results to be announced in a press conference on 01/02/2010.

Second: Approval of the participating works:

1- Participating works will not be

approved or accepted via email except for photographers from Palestine and Iraq.

2- Combined works or those with added features will not be accepted, such as time and date of shooting and the signature of the photographer.

3- Photos transferred to black and white are accepted or modified by editing programs provided that there is no change in colors or contrast of the photo.

4- Participating photos must be first to participate and have not been published before or participated in other competitions and the Award management has the right to reject or withdraw the prize if it proves so.

5- Photos must be shot by the photographer himself.

6- Photos shot by cell phones (mobiles) will not be accepted.

7- Decision of the jury is final and review is not accepted or its decision cannot be appealed.

8- The Award management is entitled to reject any participating photo that does not meet the terms and objectives and the competition is not obliged to give any justifications.

9- The participant has no right to withdraw the participating works from the competition as long as he submitted them.

10- Participation terms in the competition are final and delivering the works along with signing the participation form is considered a prior agreement to the above-mentioned terms.

Third: prizes, works display and publication:

1- Winners to be notified via email during the month of February in order to complete the administrative and technical procedures.

2- Names of winners to be announced within a press conference after opening the exhibition of the winning works.

3- In case of winning the participant is requested to send a copy of a valid passport with a copy of his CV showing his complete name, phone number, email address and P.O. Box. In addition to his Bank Account number in English (Complete name + Bank Name and Branch City + A/C Number + Swift Code) so as to be able to send the money honorarium.

4- The Award management undertakes the publishing and disseminating the 20 distinguished works in glossy book to be issued later by Khalifa International Date Palm Award and will be displayed within the Award website on the internet.

5- A special exhibition will be held for the winning works within the Award celebrations at its second session in March 2010.

6- The Award management has the right to use the winning photos in the Award magazine (The Blessed Tree) or media campaigns or any other events.

7- The first three winners will get the chance to travel to UAE (including Entry Visa, expenses of travel and accommodation) to attend the honoring ceremony and the accompanying exhibition in the capital city Abu Dhabi.

Fourth: Prizes:

- 1- First winner: (4000 USD)
- 2- Second winner: (3000 USD)
- 3- Third winner: (2000 USD)

4- From fourth winner until the tenth winner: (500 USD)

The Award management grant certificate of merit for winners and participation certificate for all.

Date Palm

through the eyes of the World



Participation Form

Name: Country:
Age: Nationality: Resident of:
Mobile No.:
Postal Address:
Email address:

Participating photos:

No.	Photo type (single/series)	Subject	Remarks
1			
2			
3			
4			
5			

Declaration: I, the undersigned: undertake the following to the Award management:

- 1- Give full rights of ownership for the submitted photos in case of winning (including all elements in the photo).
- 2- The submitted works are not copied, transferred or added with any element of others' works.
- 3- Rights of ownership of the whole photos – including its innovative ideas – belong to me.
- 4- The rights of ownership of the submitted works have not been given to (by any means) or sold, or allocated or licensed or suspended its rights to any other party which can withheld to deal without restraint with the works and its rights.
- 5- I got all approvals of the people existing in the submitted works and are permitted to be published in books or publications or exhibitions with the above-mentioned terms.
- 6- I grant the Award and agree to display the submitted works in its exhibitions organized by Khalifa International Date Palm Award inside or outside UAE.
- 7- I also agree that the Award may re-produce or authorize any other party to re-produce all photos and publish them in the international media or to publish them on the internet.

Participant Name: **Signature:** **Date:**



Participations to be sent by regular mail to the following address:

Khalifa International Date Palm Award
P.O. Box 42781, Abu Dhabi, UAE.

Any registered mail will not be accepted.



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Recent Development in Date Palm Pest Status and Suggested Ecosystem based IPM Strategies for their Management in

Wadi Hadramout- Republic of Yemen

Abstract

The objective of this paper is to show the date palm pest status which recently has been changed during the past 10-15 years in Wadi Hadramout, Republic of Yemen. In March 2002, the Dobas bug *Ommatissus binotatus* has been reported for the first time in Houf area, neighboring the borders of Sultanate of Oman; and within months the pest was spread in date palm trees in Wadi Hadramout. The Date Palm Dust mite *Oligonychus afrasiaticus*, which was a secondary pest 15 years ago, has now becoming a major pest of dates in Hadramout. *Oryctes* spp which were known as fruit stalk borers, just restricted to Madini variety, are now major pests attacking the trunks of several varieties of date palm. The lesser date moth *Batrachedra amydraula* is still considered a key pest for date palm trees in the Wadi; and is still controlled by chemical control campaigns. The paper concluded with several Ecosystem based IPM strategies, which are suggested for the management

of such pests; including the use of light and pheromone traps, biological control agents as well as establishment of good quarantine centers in the borders, to keep an eye on some economic pests available in neighboring countries, such as the Red palm weevil *Rhynchophorus ferrugineus* which has not yet been recorded in Yemen.

Key words: *Oryctes* spp, Dubas bug, *Batrachedra amydraula*, *Oligonychus afrasiaticus*, *Ommatissus binotatus* lybicus.

Introduction

Statistics showed that date palm trees area in Yemen increased from 20144ha in 1997 to more than 23130ha in 2002. The production also increased from 26070 tons in 1997 to 31600tons in 2002. In Wadi

Hadramout the most famous date palm producing area in Yemen, area increased

from 5834ha in 1997 to 7620ha in 2002; and the production increased from 7788 tons in 1997 to 10220 tons in 2002 (Ministry of Agriculture & Irrigation (2003). However, the production per tree, and per area is still far away from the average in most date palm producing area. This might be due to poor agricultural practices as well as the attack of several pests and diseases.

Date palm trees in Wadi Hadramout (Republic of Yemen) are usually attacked by several pests, the most important ones are the lesser date moth *Batrachedra amydrula*, date palm stem borers (*Oryctes* spp) and the date palm dust mite (DPDM) *Oligonychus afasiaticus* (McGregor) (Acarina : Tetranychidae.) (Ba-Angood and Basshah, 2002.)

The objective of this paper is to show the date palm pest status which recently has been changed during the past 10-20 years in Wadi Hadramout, Republic of Yemen. The paper will give a comparison of pest status of the three main date palm pest species namely the lesser date moth *B. amydrula*, date palm stem borers (*Oryctes* spp) and the date palm dust mite (DPDM) *O. afasiaticus*, as well as the status of the recently introduced *Dobas bug* *Ommatissus binotatus*

The paper concluded with several

Ecosystem based IPM strategies, which are suggested for the management of such pests; and endorsing some measures of protection against the introduction of the date palm Red weevil which hasn't yet been recorded in Yemen, but is available in neighboring countries.

Pest status of the lesser date moth *Batrachedra amydrula* (Meyr) (Momphidae: Lepidoptera)

A survey of date palm pests carried out in Wadi Hadramout in February 1975 has shown that the percentage of fruits infested by *B. amydrula*, ranged from 53-82% in different locations in the Wadi (Ba-Angood et al (1975). Several chemical campaigns for the control of this pest were conducted afterwards. The recent one was conducted in 2003. pesticides used in campaigns launched in 1970s, 80s and 90s were Malathion 50, Dimethoate 40, Actellic 50, Carbaryl 85 and Methidathion. While in 2003 Match was used. The percentage of infestation of the pest before 2003 campaign ranged from 45-85% (personal communication), which means that the lesser date moth *B. amydrula* is still a key pest of dates in Wadi Hadramout.

Pest status of date palm dust mite (DPDM) *Oligonychus afasiaticus* (McGregor) (Acarina : Tetranychidae)

A survey of date palm pests carried out in Wadi Hadramout in 1975 and 1980 has shown that the percentage of fruits infested by *O. afasiaticus*, ranged from 3-15% in 1975 and 15-22% in 1980 in different locations in the Wadi (Ba-Angood et al 1975; Ba-Angood 1982).

Recently, Basshah (1999) in his MSc Thesis on the pest, has found that the maximum mean percentage of infestation of the DPDM reached 86.9% and 71.8% in Madini and Mijraf date palm varieties, respectively (Table 1). The mean number of mites/ individual fruit ranged from 21-82 mite in Mijraf variety and from 12-30 in Madini variety in May and June where the pest occurred frequently.

It is worth to mention Hamra and



No	Variety	Main Date Palm Growing Areas		
		Seiyun	Shibam	Tarim
1	Mijraf	71.8	58.2	NA
2	Madini	86.9	57.4	63.3
3	Gzaz	42.8	NA	NA
4	Saree'a	66.5	45	29.9
5	Hamra	39.2	43.3	28
6	Hajri	30.3	43.8	NA
7	Jahmi	NA	NA	47.8
8	Azar	NA	NA	36.7
Mean		56.25	49.54	41.14
L.S.D. at (5%) for Varieties		23	6.49	18.14
For areas		18.7		

NA = Not Available

Table 1. Mean percentage of infestation of *O. afrasiaticus* on different varieties of date palm in main growing areas in Wadi Hadramout

Month	Week	Mean No of Fruits/ branch of a bunch		Mean No of Mites/ individual fruit	
		Mijraf	Madini	Mijraf	Madini
May	First	83.7	74.3	22	18.6
	Second	56.3	71	44.2	22.7
	Third	84	71.7	44.5	29.2
	Fourth	76.7	68.7	62.7	30.2
June	First	63	73	81.7	28
	Second	68.7	54	58	21.3
	Third	55.7	46.3	35.7	19
	Fourth	63.3	43.6	20.5	11.9
July	First	39	63.3	17	10
	Second	34	35.7	8.7	3.7
	Third	35.3	29.3	1.5	0.8
	Fourth	41.7	36.7	0.0	0.0

Table 2. Mean No. of *O. afrasiaticus* mites per individual date fruits for *Mijraf* and *Madini* varieties during the period May – July, 1998

Hajri varieties were found to be less susceptible, while *Mijraf* and *Madini* were comparatively more susceptible.

This pest was considered till 1980 a secondary pest on dates (Ba-Angood 1982), but recently the pest is increasingly spreading in Wadi Hadramout and is considered a key pest (Ba-Angood and

Bass'haih 2000; Ba-Angood and Bass'haih 2001).

Pest status of date palm stem borers (*Oryctes* spp)

Oryctes spp are usually known in most date palm growing areas as frond borer pests. In Wadi Hadramout, they are known

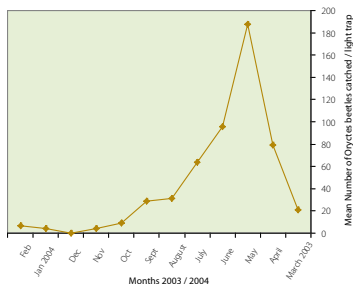


as stem borer pests. The previous survey carried out by Ba-Angood et al (1975) has shown that percentage of infestation measured by trees fallen with *Oryctes* spp were found in the trunk of them, was not exceeding 4%. The number caught by light traps was not exceeding 18 per trap. These pests were confined only to *Madini* variety which is the most popular variety (Ba-Angood 1982).

AlHabshi et al (2003) has made a comparison between trap catches of the pest in 1983 and 2003. He concluded that 4 traps in 1983 caught 166 in June 83, with a mean of about 42 per trap; while two traps in 2003 caught 146 with an average of about 73 per trap.

Recently Albaiti in his field work for his MSc thesis on *Oryctes* spp in Wadi Hadramout, has found that the number of *Oryctes* captured by light traps reached 188/3traps in May 2003 (Fig 1) with a mean value of about 63 per trap. This indicates that the pest is increasingly spreading. A lot of trees were observed felled down with *Oryctes* larvae mining on them in Wadi Hadramout; which makes the pest a key pest of date palm in the area. The pest is no longer confined to *Madini* variety but it also attacks other date palm varieties.

Fig 1. Number of *Oryctes* spp. caught by 3 light traps in date palm growing areas in Wadi Hadramout 2003/004



Pest Status of the Dobas bug *Ommatissus binotatus lybicus* DeBerg (Tropiduchidae: Homoptera)

The first record for this pest in Yemen was in Man'ar area neighbouring Sultanate of Oman on December 2002. A year after and on 2nd December 2003 the pest was first recorded in Sier area at Wadi Al- Ain in Wadi Hadramout. The pest spread suddenly almost in all Wadi Hadramout.

The results of a survey carried out by the Plant Protection Department showed that the infestation in Wadi Al- Ain where the pest has severe attacks ranged from 21-79% (Bass'haih personal communication). The Office of Agriculture and Irrigation in Wadi Hadramout are recently launching a chemical campaign for the control of the pest using Dimethoate and Actellic and now are switching to Actara as injection.

The Dobas bug which was never a pest in Yemen till 2 years ago is now becoming an important pest of date palm in Mahra as well as Wadi Hadramout date palm growing areas.

The Red palm weevil *Rhynchophorus ferrugineus* (Curculionidae: Coleoptera)

This pest has not yet recorded in Yemen though it is a major pest of date palm in neighbouring countries e.g. Sultanate of Oman and Saudi Arabia. If we don't have enough precautions, the pest would have the chance to enter Yemen like Dobas and become a major pest.



Suggested Ecosystem based IPM strategies for the management of date palm pests in Yemen

From the above findings, we can conclude that the status of key pests of date palms namely: The lesser date moth *Batrachedra amydraula*, the date palm stem borers (*Oryctes* spp), the Dobas bug *Ommatissus binotatus lybicus* and the date palm dust mite (DPDM) *Oligonychus afraasiaticus* is in increase, despite the chemical control campaigns the government is launching for the control of such pests.

Therefore, suggested Ecosystem based IPM strategies for the management of these date palm pests should be enforced in Yemen. These might include the following :

1. Survey and monitoring programs should be continued for estimation of the population dynamics of such pests and correlate this to the changes in weather parameters, using light and pheromone traps as well as hand sampling.
2. Establishment of Quarantine stations on the borders where handling of plant materials are passing between Yemen and its neighboring countries, to protect the country from the introduction of the Red Date Palm weevil which is available in neighboring countries, such as Sultanate of Oman and Saudi



Arabia. Internal quarantine should be endorsed to stop the spread of Dobas bug and protect other areas of date palms in Yemen (Tihama and Coastal areas) from being attacked.

3. Training plant quarantine, extension and plant protection personnel, technicians and officers to carry out their job properly.
4. Equipping plant Quarantine offices and laboratories with appropriate technology and equipments to carry their tasks properly.
5. A survey of indigenous biological control agents should be conducted to see whether they can play a role in reducing the population of such pests, and the use of natural enemies in the IPM programs, if possible
6. Testing packages of methods for implementing IPM programs for the management of date palm pests.
7. IPM programs should be incorporated within the frame work of the Integrated Crop Management (ICM) programs for date palm trees; as this will contribute at the end to sustainable development.
8. Cooperation and coordination in this

field should be strengthened between among neighboring countries in the form of exchange of information expertise, training and joint survey and monitoring

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Effect of horticultural practices
and physiological factors on

REDUCING INFESTATION (%) OF PESTS ON DATE PALM TREES

Abstract

Date palm trees (*Phoenix dactylifera* L.) among the most common horticultural crops in the Arabian Peninsula. A number of insects attack palm trees and cause a big damage on palm orchard. The red palm weevil (*Rhynchophorus ferrugineus* oliv.) is considered the most dangerous insect. Most Arabian Gulf countries are using the integrated pest management (IPM) on controlling the insects and diseases on date palm trees, but there are no deep studies on the nature,

anatomy, physiological factors, drought, dark, light, nutrition, hormone balance, allelochemicals, salinity, horticultural practices (irrigation, pruning, offshoot removal), and correlated these parameters with infestation % and consider these parameters as a key for integrated pest management (IPM). Survey and registration of resist cultivars is also considered as a very important factor for reducing the infestation % by knowing the gene or the compound (might be



allelochemicals) responded to appear this character. By Genetic engineering, molecular biology and tissue culture techniques can produce the desirable cultivar.

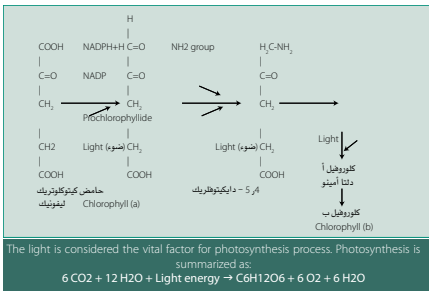
Additional Index words: salinity, light, hormone, allelochemicals, drought, photo-synthesis, irrigation, and nutrients.

Introduction

The date palm (Phoenix dactylifera L) is one of the oldest cultivated crops, the earliest know records in Iraq (Mesopotamia) show that its culture was probably already established as early as 3000 B.C. the date palm tree has also been in Egypt since prehistoric times, but its culture did not become important there until somewhat later than in Iraq. From Western Iran across, Arabian peninsula and North Africa, dates have long been a stable food for native population [20].

Date palm tree is well adapted to grow under salt, drought, nutrient and temperature stresses for a short period, but if the tree subjected to stresses for along periods, the stomatal could be closed, assimilation, growth, yield, cell division and enlargement. Ion transport to the root, hormone levels significantly decreased [1-6, 14, 16, 18]. Also exposing the plants to stresses could cause alterations in gen expression leading to induction of specific genes, and an increased abundance of their translatable mRNAs and protiens. As a result the increased synthesis of certain novel protiens occurs in stressed plants with a concomitant decrease in the level of certain pre-existing protiens [8], the growth, yield and resistance of date palm significantly reduced as compared with non stressed date palm trees.

Excessive application of fertilizers particularly N, K (because of their high solubility) resulted in a silinity build up in the soil. This is reflected typically in a decline, growth, yield [16] and probably increased the susceptibility of date



palm tree to insects attack and diseases infection. Other factors such as shade, crowded trees, flooding unproper irrigation, fertilization, pruning, offshoot removal, and cultivation, all these cultural practices could be increased the infestation (%).

Date palm trees include more then 3000 cultivars, some of these cultivars are more resistant to one or more adverse factors than others. This review will go over some previous factors, and how they affect growth, hormone balance, ion uptake photosynthesis, and how these reflect on the resistance of trees.

The Objectives:

The main objective of this review is to summarize the most important horticultural and physiological factors that effect directly or indirectly the photosynthesis, growth, hormone balance, protien synthesis, ion uptake and how that is reflected on the resistance of date palm trees to insects attack and diseases infection.

This review also will raise some questions about some resistant cultivars to pest attack?

1. Is the resistance contributed to allelochemicals? Anatomical nature of tree? Or to physiological or genetic factors?
2. Is it possible to transfere resistance characteristics from one cultivar to other desirable cultivar, by using genetic, or molecular biology, genetic engineering, and tissue culture techniques.

1-Effect of light intensity or shade on growth of date palm trees:

The new leaves of date palm are emerged in groups 3-5 white yellowish leaves, than gradually changed to the green color under sunny light, whereas the trees grown under low light intensity or indirect light produce small, pale color leaves and contain undeveloped chlorophyll. Photosynthesis processes significantly reduce. Growth also declines therefore tree resistance to pests could be declined gradually.

When the light hits the leaves chloroplast splits water into hydrogen and oxygen, incorporating the electrons of hydrogen into the bonds of sugar molecules.

Photosynthesis is a redox process: H_2O is oxidized, CO_2 is reduced.

The light reactions and the e grana produce ATP and split water, releasing O_2 and forming NADPH by transferring electrons from water to $NADP^+$. The Calvin cycle in the stroma forms sugar from CO_2 , using ATP for energy and NADPH for reducing power.

The light reactions convert solar energy to the chemical energy of ATP and NADPH. The pigments of chloroplasts are built into the thylakoid membrane near molecules called primary electron acceptors, which trap the excited electrons before they return to the ground state. Pigment molecules are clustered in an antenna complex surrounding a chlorophyll a molecule at the reaction center. Photons absorbed anywhere in the antenna can pass their energy along to energize this (chlorophyll a), which then passes an electron to a nearby primary electron acceptor. The antenna complex, the reaction-center chlorophyll, and the primary electron acceptor make up a photosystem, a light-harvesting unit built into the thylakoid membrane. There are two kinds of photosystems. Photosystem I contains P700 chlorophyll a molecules at the reaction center; photosystem II contains P680 molecules.

Noncyclic electron flow involves both photosystems and produces NADPH, ATP, and oxygen. Cyclic electron flow employs only photosystem I, producing ATP but no NADPH or O_2 . ATP production during the light reactions is called photophosphorylation. The mechanism is chemiosmosis. The redox reactions of the electron transport chain that connects the two photosystems generate an H^+ gradient across the thylakoid membrane. An ATP synthase uses this proton-motive force to make ATP (Fig. 1).

The Calvin cycle uses ATP and NADPH to convert CO_2 to sugar:

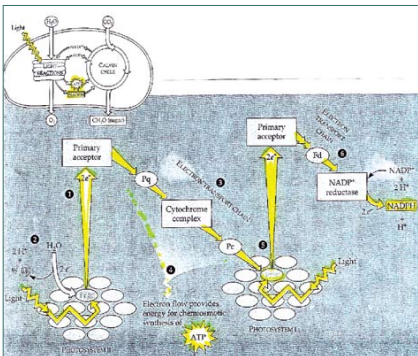


Figure 1. How noncyclic electron flow during the light reactions generates ATP and NADPH. The orange arrows trace the current of light-driven electrons from water to NADPH. Each photon of light excites a single electron, but the diagram tracks two electrons at a time, the number of electrons required to reduce $NADP^+$. The numbered steps are described in the text (7).

The Calvin cycle is a metabolic pathway in the chloroplast stroma. An enzyme (rubisco) combines CO_2 with ribulose biphosphate (RuBP), a five-carbon sugar. Then, using electrons from NADPH and energy from ATP, the cycle synthesizes the three-carbon sugar glyceraldehyde 3-phosphate. Most of the G_3P is reused in the cycle to reconstitute RuBP, but some exits the cycle and is converted to glucose and other essential organic molecules. It is very clear that any reduction in light intensity or availability of water will reduce photosynthesis processes and finally the tree growth, yield and resistance to adverse factors will be reduced.

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2- Salinity Stress:

Plant growth is affected by excessive concentrations of soluble salts in the root solution. Salts decrease the availability of water to the plant by reducing the free

Table 1. Effects of Changes in Concentration of the Mineral Nutrients in the Medium on the Level of Endogenous Phytohormones(18).

Mineral nutrient	Concentration change (mol m ⁻³)	Concentration change in phytohormone
NO ₃ ⁻ ↓	14-0	GA ↑, IAA ↓
Pi ↓	1-0	CK ↓
NH ₄ ⁺ ↑	0-3	GA ↑, IAA ↑
NO ₃ ⁻ ↑	0-18	CK ↑
NH ₄ ⁺ ↑	0-16	CK ↑
NO ₃ ⁻ ↓	10-1	CK ↓
Pi ↓	1-0.1	CK ↓
K ⁺ ↓	6-0.5	CK ↓
N ↓	8-0.8	CK ↓
Pi ↓	1-0.1	CK ↓
K ⁺ ↑	0-1	GA ↓
Mineral	30-260	ABA ↑ temp
Nutrients ↑		CK ↓ perm
Mineral	30-0.6	CK ↓
Nutrients ↓		

^a Decreased or increased concentration indicated by direction of arrow; temp = temporarily, perm = permanently. Indicated concentration changes are approximate values.

energy of water. Also, plant growth is inhibited by an excess of solute taken up by plants from saline water. Furthermore, salts may exert detrimental effects on plant growth through the toxicity of one or more specific ions present in higher relative concentrations, their influence being essentially physiological. The salinity stress problem arises when the soils are already saline or are irrigated with saline water, which adds to the salinity of the soil. In addition, excessive use of chemical fertilizer and excessive irrigation have turned hundreds of hectares of cultivated

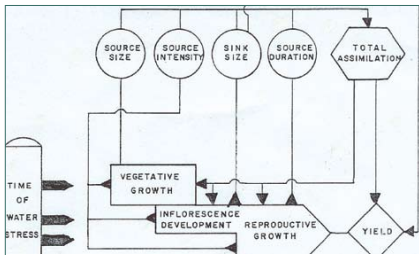


Figure 2. General effects of drought stress on yield as variations occur with time in the physiological processes that precede yield alterations. Processes affected are carbon dioxide assimilation, translocation (source to sink relations), and the ontogenetic development of the plant. Source size is usually the leaf size that is effected by drought, source intensity is the rate of photosynthesis in leaves, source duration is the length of time that photosynthesis continues before there is a significant reduction in rate as drought continues.

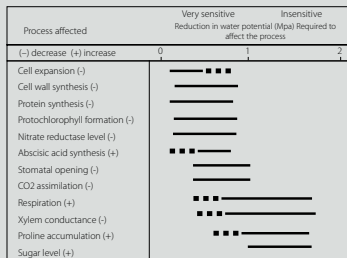


Figure 3. Relative sensitivity to water stress of various plant processes. The solid horizontal bars indicate the range of stress levels within which a process is first affected; the broken bars refer to the portion of the water potential range in which the response is not well established.

fertile lands into saline lands (1).

It is generally held that the plant resistance to salinity rests with its ability to restrict or prevent the entry of Na to the shoots. This restriction is necessary for vital processes, such as photosynthesis, to take place without disruption. Salinity stress is known to retard plant growth through its influence on several vital facets of plant metabolism, including osmotic adjustment, nutrient uptake, protein and nucleic acid synthesis, photosynthesis, organic solute accumulation, enzyme activity, hormonal balance, injury to tissue, alteration in respiration rates, and reduced water availability to trees.

The mechanisms of salt tolerance of cultivated crop species that differ considerably in tolerance to salinity generally range from restricted ion uptake and translocation into the shoot to structural metabolic changes that decrease salt injury. Salt tolerance under such conditions is generally related to the ability to regulate Na and Cl uptake by

shoots and subsequent translocation to the shoots (Alam, 1994).

The most evident effect of salinity is disturbances in growth, and growth is affected by phytohormones. Indeed, evidence shows that many environmental factors (i.e., changes in the concentration of nutrients), including stresses, affect the level of endogenous plant hormones (Table 1), and thus the hormonal balance of the plant is disturbed. It therefore seems logical to assume a relationship between the effect of the stress on hormonal balance and the effect of the disturbed hormonal balance on the growth and development of the plant. Recently, a considerable amount of evidence has suggested that phytohormones are the signals sent between root and shoot, triggering responses to external stress. It was suggested that the endogenous hormonal balance has an important regulating role in the response of plants to salinity, and it may be possible to ameliorate the endogenous balance by application of exogenous hormones (2, 3, 4, 5, 18).

3- Effects of Drought on Growth and Yield:

Drought has profound effects on growth, yield, and plant quality. The first effect of the stress may well be a loss of turgor that affects the rate of cell expansion and ultimate cell size. Loss of turgor is probably the process most sensitive to water (drought) stress. The result is a decrease of growth.

The mechanisms underlying the responses of plants to water stress may be divided into five categories:

1. Reduction of water potential or activity of cellular water.
2. Decrease of cell turgor pressure.
3. Concentration of micromolecules and macromolecules as cell volume decreases with reduced turgor.
4. Alteration of spatial relations in the

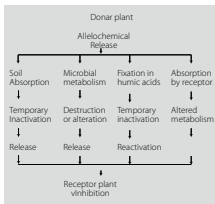


Figure 3. An allelochemical may be altered in a variety of ways as it moves from the donor plant in which it originated to a receptor plant where it may act as an inhibitor of metabolism (13).

plasmalemma, tonoplast, and organelle membranes by volume changes.

5. Change in structure or configuration of macromolecules by removal of water of hydration or through modification of structure of adjacent water.

Moderate water stress affects translocation indirectly by altering the source to sink relationships for assimilates. For example, because cell expansion is reduced, the source (leaves) is smaller and less photosynthate is available for translocation to fruits. On the other hand, the sink (fruits) size may be reduced, and if drought stress occurs after leaf expansion, the result is that the competition between leaves and fruits is lessened. Some of the relationships between the timing of drought stress and plant development are outlined in figure (2, 3)(10).

Nutrients are less mobile in a drying soil because the pores between soil particles are replaced by air and the pathway from the soil to the root surface is less direct. Since the rate of ion diffusion to the root is very often the step limiting nutrient uptake, a decrease in soil water availability can affect plant growth (22).

Finally the changes in phytohormones

Table 2. Response of Plants to Environmental Parameters in the Soil(18).

Parameter	Whole-plant response	Changes in phyto-hormone concentration
Water ↓	Growth ↓	ABA ↑
Oxygen ↓	Growth ↓	ABA ↑, ethylene (ACC) ↑
Mineral nutrients ↓	Growth ↓	CK ↓, GA ↓
Mineral nutrients ↑	Growth ↓	CK ↓, ABA ↑, temp
Salinity (NaCl) ↑	Growth ↓	CK ↓, ABA ↑, temp
Temperature ↓	Growth ↓	CK ↓, GA ↓, ABA ↑

↓Decreased or Increased Concentration Indicated by direction of arrow.

concentrations are occurring in response to modifications of parameters of soil environment (Table 2).

4- Cultivar:

The date palm tree cultivars differ in their ability to resist the pests invasion. It was reported (9) that the Zanati was the only immune cultivars as nematode infestation did not survive on its roots. Highly resistant to nematode (*Meloidogyne incognita*) of Egypt date palm cultivars; Aynat, Malakabi, Orabi, Sakkoti, Samani and Seqii; Amhat, Hayany, Sikary, were considered moderately susceptible. On the other hand, cultivars Aglani, Bent – Aisha and Zaghool were rated as highly susceptible. It was demonstrated (26) that the Lulu and Nagal date palm cultivars are more resistant to infestation by Red Palm Weevil (*Phynchophorus ferrugineus*) as compared with Khasab, Fahal, Bagal, Khuniezy, Jebry, Boman, Helaly, Fardh and Khalas. The resistance cultivars of date palm to attack by pests, probably produce phenols, enzymes, inhibitory hormones and or toxins to pests which prevent its development (9) or to

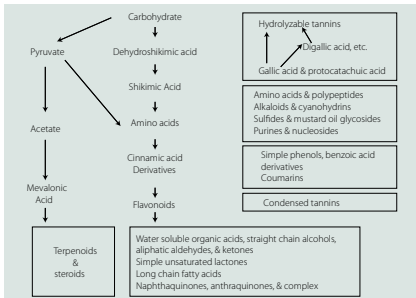


Figure 4. The metabolic origin of allelochemicals from the normal metabolism of plants is outlined. The allelochemicals are enclosed in the boxes (10).

allelochemicals, (10, 11, 15, 19, 22) or to synthesize of certain novel proteins as a defense way to avoid the invasion of pests (8). Because the allelochemicals could

have a vital role in IPM, therefore, I will go over these compounds briefly, and how are they produced? and how could they protect the tree from invasion of pests?

Allelochemicals

Allelochemicals: Chemical compounds released from a living organism that affect other organisms in the vicinity (10). It was proposed that allelopathic plants, or allelochemicals from such plants, could be used in agricultural ecosystems to manage plant pests in a variety of ways (23):

- 1- By interplanting allelopathic plants with crop plants:
- 2- By increasing the allelopathic potential of crop.
- 3- By using allelopathic plants as sources of pesticides.
- 4- By identifying and synthesizing new compounds that appear as secondary metabolic compounds in allelopathic plants.





However, the interaction may be quite complex on the interfering chemicals may not come directly from a single organism or plant but may arise as a result of decomposition processes and formation of humus in soil (12, 15) (Fig. 3).

Classification of allelochemicals:

Based on their biological activity, allelochemical can be classified as follows:

- 1- Substrates for microorganisms.
- 2- Predisposers for disease.
- 3- Enhancers of root exudation.
- 4- Agents for altering soil structure.
- 5- Phytotoxicants.
- 6- Growth promoters.

In each of these categories they affect physiological processes in stressful ways that depend upon the species and environmental conditions.

The chemical nature of allelochemicals covers a wide range of classes of compounds and the list of compounds is extensive. Most of the allelochemicals arise from the activity of the mevalonic acid metabolic pathway (Figure 4). Many of them are described as the growth substances such as auxin, gibberellins, cytokinins, abscisic acid, ethylene or their

analogues and as the secondary plant growth substances such as phenols, aliphatic and aromatic carboxylic acids and their derivatives, steroid, terpenoids, alkaloids, amino acids and lipids (21, 24, 25). However, many of these chemicals serve as protective agents against competitors, predators and pathogens (10).

Allelochemicals: are novel compounds possessing strong toxic activity often accompanying an antifeedant action. These chemicals are often isolated from plants of desert or tropical origin; these products as inducers of resistance, for example "phytoalexins" which are compounds in plants whose biosynthesis is elicited as a result of attack of pests (11, 24). Further studies are needed to define and clarify, the functional roles of these compounds, and how can be transferred the resistance characters to susceptible cultivars of date palm trees.

CONCLUSION:

The results of the review revealed that low light intensity, drought, salt, nutrient stresses for a long period could produce new novel proteins, abnormal hormone balance, and decreased cell division, cell enlargements, growth, yield and other metabolic activities, therefore the stressed date palm trees might be more sensitive

to pests attack than non stressed trees. However, this paper recommended that the physiological anatomical, genetic factors studies should play important role in applying IPM to control the pests of date palm trees.

Many researchers also mentioned that the resistance ability of date palm trees to certain insects, diseases or even the adverse conditions depend on cultivar and horticultural practices. These variations in ability of date trees to tolerate the invasion of insects and pathogens could be contributed to allelochemical compounds are secreted by tree to prevent the pests invasion, or to nature of structural, anatomical and physiological aspects of palm trees. Therefore these points need more studies to clarify the fact of cultivar resistance.

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Importance of Date Palm Fruit in the Red Palm Weevil,

**Rhynchophorus ferrugineus Olivier
(Coleoptera: Curculionidae)**

Aggregation Pheromone Traps

Abstract

Experiments were conducted in four date palm plantations at AL-Rahbba from May 2004 to April 2005. Twelve traps, in each plantation, were used to know the importance of adding dates, as a bait, to the traps of the red palm weevil (RPW), *Rhynchophorus ferrugineus* Olivier (

Coleoptera: Curculionidae) to enhance the number of captured insects. The traps contained the aggregation pheromone (4-Methyl-5-Nonanol 90% + 4-Methyl-5-Nonanol 10%) and 350g of dates to compare their catch with the catch of traps containing either the pheromone



alone or dates. The pheromone lure in each trap was changed every three weeks, while the water and dates were changed every 2 weeks. The number of RPW captured in the 16 traps were 1752, 181 and 54 insects for the three treatments, respectively. There were significant differences between the three treatments. The first treatment catch value was 10 and 32 folds of the second and third treatment value, respectively. The second treatment catch value was more than three folds of the third treatment catch value. The experiment also showed that adults RPW were present throughout the year, and the number of females was higher than the number of males. The numbers of captured insects were 420, 452, 542 and 573 adults in the four plantations, respectively. The reason behind the variation in numbers could be explained by a variety of factors such as farm practices, differences in tree age and sources, farmers knowledge, etc.

Key Words: date palm, aggregation pheromone traps, trap catch, *Rhynchophorus ferrugineus*.



INTRODUCTION:

Palm trees are infested by several insect pests, Red Palm weevil (RPW) *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae) is one of the most important and dangerous. It constitutes a major threat to palm trees all over the world (Frohlich and Rodewald, 1970; Sharif and Wajih, 1983; Al-Saadani, 1993; Faleiro et al., 1998; Al-

Ajlan, 1999; Al-Saoud, 2004).

There are several features of RPW that make it dangerous. Firstly the early stage of infestation are difficult to detect. This delays the instigation of control measures. It has been reported (Lever, 1969; Al-Al Saoud, 2004 a; Al Saoud, 2006) that the infestations of insect is often discovered only after complete destruction of the tree; trees fall over or the trunk collapses





or bad odors are emitted with a gel material from the trunk, destroying the crown of the tree. Secondly, weevil captures have been reported to be the female dominated during various times of the year (Abraham et al., 1999; Faleiro and Rangnekar, 2000; Vidhyasagar et al., 2000; Faleiro et al., AL-Saoud 2004a; Al-Saoud, 2006), and thirdly, the presence of the pest have been reported throughout the year, (Ghosh, 1912; Al-Ahmadi, 2002 and Al-Saoud, 2006). The activity period of this insect differs from one place to another and from time in all places where it lives. Pheromone trap captures have indicated that under coastal humid conditions of Western India, RPW is most active between October and November, and least active between June and July (Faleiro and Rangnekar, 2001a). Under arid conditions in the Middle East, weevil captures in pheromone traps were highest during May and November, with low activity being recorded during February and August, the peak of winter and summer, respectively. Also in the Middle East infestation of RPW in date palm increased with the severity of the summer, indicating that the peak weevil activity observed during May was crucial

in determining the high infestation level in the field during the subsequent summer months. The severe winter months from December to February in the region probably inhibit the hatching of eggs laid during the second activity peak of November, leading to a decline in the infestation level during winter (Anonymous, 1998). The worst activity of the RPW in Kingdom of Saudi Arabia was from April to November in 1995, from May- Jun to October in 1996, and from May to September in 1997 (Abraham et al., 1999)

Large number of the RPW were attracted by aggregation pheromone traps from February to August in Al-Ain in UAE. The number decreased after April in the south of the city, while the numbers increased in the western part of the city during November (Khalifa et al., 2004).

There are several methods to control this pest. To follow one of the methods is insufficient to control the pest effectively. Different methods should be followed to get an acceptable results in minimizing injury and preventing the spread of this pest. (Abraham et al., 1998) stated that the Integrated Pest Management Programme

(IPM) succeeded in controlling RPW injuries in AL-Qatif area during 1994 to 1997. Similarly, infestation levels were brought down from 6.6 % in 1993 to 2.5 % in 1997, due to the use of pheromone traps, as well as other control measures, in the areas of palm trees cultivation. (Vidyasagar et al., 2000). This is similar to what is mentioned by (Faleiro et al., 1998).

It is well known that this insect is a hiding enemy, and infestations are often





mass trapping experiments (Chinchilla et al., 1993; Oehlschlager et al., 1995).

In India it was reported that the use of aggregation pheromone traps for two successive years on palm trees farms to control RPW led to a 75% reduction in numbers of captured insect (Muralidharan et al., 1999). Abraham et al. (2000) stated that the average number of captured insects in heavily infested areas was 2.55 weevils / trap / month during 1999, and decreased to 1.41 weevils / trap / month during 1997, indicating that RPW pheromone traps substantially curtail the building of the population in the field. (Oehlschlager, 2000) showed that throughout the first year of trapping capture rate in the entire Coto plantation declined from 30 weevils / trap / month in 1994 to 4 weevils / trap / month a decrease of over 80% of the R. palmarum, and during the period between 1994 and 2001 monthly capture rates were no higher than 2 weevils / trap / month.

The trap components are important, especially the nutritional material added to the traps and its renewal. (Kurian

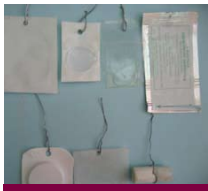
discovered even by trained and practiced specialists. The percentage of severely infested palm trees that were eradicated at the beginning of 1994 was 31.53%, and this figure decreased to 19.53 in 1997.

Several scientists have confirmed the large importance of aggregation pheromone traps in RPW control. (Abraham et al., 1998; Abraham et al., 2000; Abraham et al., 2001; Faleiro et al., 2002a; Faleiro et al., 2003; Al-Saoud, 2004b). The intensive and continuous effort to control this insect has led to a significant decrease in their numbers and has prevented their increase in the field. Pheromone traps are considered to be the major key in the IPM programmes to reduce the insect population in the field.

Initial attempts to control RPW in the Kingdom of Saudi Arabia with insecticides were not successful, (Bokhari and Abozuhairrah, 1992). The Integrated Pest Management (IPM) strategy has successfully suppressed the pest in date plantations of Saudi Arabia, and mass trapping of the pest occurs widely in the Arabian Peninsula where it is a major problem in date palm (Abraham et al., 1998). Various ways should be followed

to achieve this goal. The aggregation pheromone traps have played a vital role in this regard by collecting and killing the adults to interrupt the life cycle of the insect and its reproduction. During the period April 1991- September 1992 an estimated 123000 weevils of R. palmarum were captured in trap optimization and





et al., 1979, 1984; Abraham, 1998) found that adding coconut juice and Acetic acid to the pheromone traps helped to attract RPW to the traps. (Faleiro and Satarkar, 2002 a) reported that replacement of food bait in pheromone traps was required every 10 days. Large numbers of the insect were caught when dates were used as food bait, compared with coconut. (Nair et al. 2000). Trials conducted in India, showed that the use of banana and sugarcane as food bait in pheromone traps gave positive results in increasing the efficacy of the traps. (Faleiro and Satarkar, 2003) said that water and food should be changed every 15 days maximum. (Faleiros results (2003) showed that the use of oil palm fruits as food bait had a repelling effect on RPW preventing them from approaching the pheromone traps, instead of attracting them. (Oehlschlager et al., 1993,2003) found that adding sugarcane pieces or palm tree parts to the aggregation pheromone traps of *R. palmarum* led to the increase of the captured weevils in the traps.

The efficacy of aggregation pheromone traps used in RPW control is affected by several factors, as (a) - the addition of the nutritional material (b)- regular servicing of the food and water in the traps. (c)- the manner in which the traps are used and other factors.



This study aimed to determine the role of dates as food baited in fortifying the efficacy of aggregation pheromone traps of RPW, by counting numbers of the insect collected from the traps that contain pheromone and date fruits comparing with those that contain pheromone or date fruits only.

MATERIALS AND METHODS:

A trial was conducted to test the effect of adding palm date fruits as food bait to Red Palm Weevil aggregation pheromone traps, on the numbers of the insect collected from these traps.

1. Study sites

The experiment was conducted at four date farms at Al-Rahba, Abu Dhabi (Lat. 24° 28' N; Long. 54° 22' E), UAE in 2007. Each farm contained at least 140 date palm trees of different ages (3-20 years).

2. Traps

Pheromone traps were fabricated using a 10 l polypropylene yellow bucket with four rectangular (3 x 8 cm) windows cut equidistantly below the upper rim of

the bucket. The distance between each window and the bottom of the bucket was 16 cm. The bucket was covered with a lid that had three windows similar to the ones on its sides. The upper surface of the lid had a small handle to ease opening the trap and the lower side had a small knob on which a wire was fixed



to hold the pheromone and kairomone dispensers. The water was always replenished to keep sufficient moisture in each trap. Food bait (dates) was changed every two weeks. Based on the dispensing rates, the pheromone was replaced every three weeks.

3. Experimental design and trap installation

The experimental design was a randomized complete block design with three treatments (Contains) and four replicates (farms). A total of 48 traps were installed for a trapping period from 28/4/2004 till 4/5/2005 (studying period). In each farm, the traps were installed near the farm peripheries with two rows of trees left as an outer border. The distance between traps was 50 m and each trap was 4 m away from date palm trees. Traps were buried in the ground down to the level of side windows to

facilitate entrance of *R. ferrugineus*. Part-burying the trap also prevented it from being over-turned by wind or animals. Captured weevils were collected weekly. In order to minimize the effect of trap location on the number of captured insects. Every trap was shifted to next location after taking weekly results, to avoid location effect on collected insects, and to know the insect numbers in every location and in every treatment in each farm during the studying period.

The trial was consisted of 48 traps (buckets). The traps were divided into 3 divisions (different treatments), 16 traps each:

- 1- group contained palm date fruits only.
- 2- pheromone only.
- 3- pheromone + 350g of date fruits.

The dates fruits used were forage fruits or

those dropped around palm trees in the farms. These dates fruits are inconsumable, they have no cost according to the farmers. Then, we used the aggregation pheromone that is specially attracts RPW adults. The pheromone contains 400 mg of the active ingredient (4-Methyl-Nonanol-5(9 parts) + 4-Methyl-Nonanol-5(1 part)) purity 95%.

These treatments were distributed in 4 farms at Al-Rahba region, Abu Dhabi, each farm, contains nearly 140 palm trees, some of the trees were transplanted as seedlings from the mother tree, the others were grown as tissue seedlings the age of the trees were between 3- 20 years.

The agricultural application were different from farm to another (pruning, irrigation system, cleaning fertilizing, grass removing, seedlings separation from their mother, covering the stem biases with sand, covering the roots with sand,

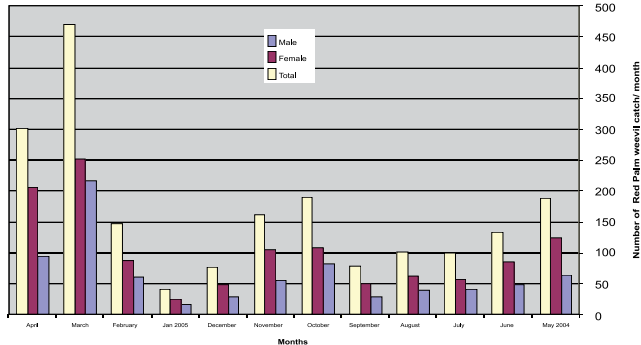


Fig 1. Monthly RPW *Rhynchophorus ferrugineus* Oliv., captures with aggregation pheromone traps in Al-Rahba during May 2004 to April 2005.

pesticide use, cleaning the head and the trunk of the palm tree...etc.

12 traps were put in each farm, about 50 m distance were left between every 2 successive traps, every trap was provided by 4-5 liters water, water level inside each trap was 4-5 cm. lower to the side-openings of the bucket, serial numbers were given for traps and locations from 1-12 in every farm to know the numbers of collected insects from each location, and each treatments in each farm. .The trap were 3-4 m distance from palm trees, they were fixed in hole of 12-15 cm depth in the sand, part of the trap was covered by sand to fix it in safe place, and to avoid trap turning upside-down by wind, animals or any other external factors. The traps were put in opposition easy for insects to reach through the trap side-openings. Trap maintenance and food change were done every 2 weeks, the pheromones

were replaced every 3 weeks. Numbers of weevils captured (Female, Male and Total) recorded weekly. Results were registered in special tables.

4. Statistical analysis:

The data was processed and subjected to ANOVA test

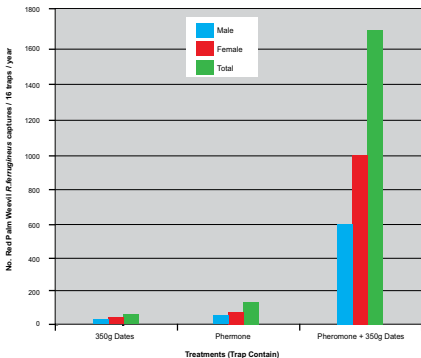
RESULTS AND DISCUSSION:

1- Seasonal activity of Red Palm Weevil in Al- Rahba:

From the results presented in Fig 1, it can be seen that red palm weevil dose not enter diapause and it is found throughout the whole year in the date palm areas. Similar results were recorded by (Ghosh, 1912; Abraham et al., 1999; Vidhyasagar et al., 2000; Al-Ahmadi, 2002; Al-Saoud, 2006). Consequently, reproductive of the insect occurs all year, damage from RPW is increased and control, is difficult



to achieve especially using chemicals, because application of pesticides must cease during, mid February until the end of March(pollination period), and from beginning till of end of the maturity and harvest the crop (June- October).



Fig(2) Number of red palm weevil adults collected in aggregation pheromone traps in four date palm farms at Al- Rahba during 28/4/2004- 4/5/2005.

Fig. 1 showed that Weevil captures were female dominated during different months of the year. This has been found by several workers (Abraham et al., 1999; Vidhyasagar et al., 2000; Al- Saoud, 2004; Al- Saoud, 2006). The adult female that lays eggs on the date palms, spreading the infestation, so mass trapping of RPW helped suppress the build up of the pest. Fig. 1 indicated that the capture of adults increased during March- May, and October- November, and decrease during December- February in 2004/ 2005 season. (Al- Saoud, 2006) found similar trends in Al- Khatim region, with some differences due to environmental conditions , especially temperatures and relative humidity, in the two regions. Similar results were recorded in the date palm plantations of Al- Ain in United Arab Emirates (Khalifa et al., 2004) with some differences. They found that the number of weevil trapped increased in February and March reaching maximum catch in April. It then decreased to the least number in October. The period of red palm weevil was from February to August in most of



improve the performance of the trap.

The main role of pheromone traps in control programs is the intensive and continuous collection of adult RPW and killing them to prevent their reproduction and spread of infestation. The benefit is higher when greater numbers of the females are collected, for they are considered the main factor in spreading the infestation which occurs as a result of laying large numbers of the eggs. If males are collected preventing them from mating with females, this leads to limited spread of this dangerous pest. with in several places, and if we collect the males preventing them of mating the females, this leads to limited spread of this dangerous pest. Numbers of collected adults from the pheromone traps that contained these treatments showed that the use of pheromone and 350 g date (t3) resulted in the collecting of 88.2% of the adults collected, t2

Al- Ain districts. The minimum activity period was after April in the southern Al- Ain areas, and the activity increased in the western areas during November. Studies in Arab Saudi Kingdom, showed that the maximum activity of the weevil was during April and November in 1996 and in May and September in 1997(Abraham et al., 1999).

2- Effect of Date fruits in Aggregation Baited Pheromone Traps on the Collected number of RPW.

Fig. 2 showed that significant differences occurred between treatments. The greatest number of RPW caught was 1752 weevils for the treatment using pheromone + 350 g dates(t3), compared to 181 weevils for Pheromone alone treatment(t2)and 54 weevils when dates alone (t1)were used in the trap. The third treatments (t3) were better than the other two treatments, and the 2nd treatment (t2) was better than the first. The results indicated that the addition of a date fruits to the pheromone traps was effective in

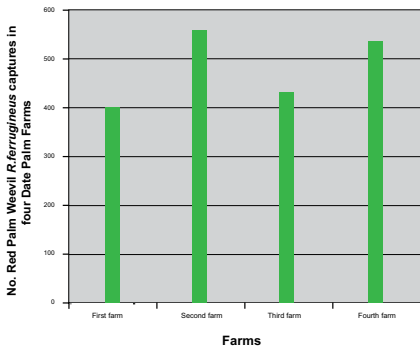


Fig. (3) Number of Red Palm Weevils catches in aggregation pheromone traps in four Date Palm Farms in Al- Rahba during 28/4/2004- 4/5/2005.



resulted in the collection of 9.1%, and t1 just 2.7%. These results were similar to what (Abraham et al. 2001; Faleiro et al. 2002a; Al- Saoud, 2004a; Al- Saoud, 2006) found that a massive controlling program of RPW helped to prevent the increase of the pest in the fields. These results are also similar to finding by (Nair et al. 2000; Faleiro and Satarkar 2002a) who showed the importance of using date as a food bait in aggregation pheromone traps of RPW. These results were not in full agreement with above researchers regarding the frequency of changing the food and water or adding water to the traps. Dates were changed every 2 weeks which gave good results during trial period. Fungi and algae were usually growing on water surface of the traps if water was not replaced for more 2 weeks. These results agreed with (Oehlschlager et al., 1993a and Oehlschlager et al., 2002) who recommended food replace every 2-3 weeks. (Nair et al., 2000) suggested using banana and sugarcane as food in pheromone traps because they were both easy and cheap to acquire in India, however, using these materials in UAE, would lead to an increase in cost while

using these materials in UAE, will lead to the increase in costs due to the high prices of these materials. Consequently, in UAE, the use of fallen dates is recommended.

3- Effect of Different Treatments on the Number of RPW captured in Aggregation Pheromone Traps in Al-Rahba, between May 2004 to April 2005.

Fig. 3 indicated that there were significant differences between the numbers of RPW catches on the fourth date palm farms. The number of RPW weevils caught on the four date palm farms. The number of RPW caught was 420, 573, 452 and 542 weevils on the four farms respectively. The maximum was in farm tow (573 weevils) which was significantly higher than the number on the other 3 farms. The number collected on farm 4 was significantly higher than the numbers on farms 1 and 3, and more were caught on farm 3 than on one. The differences in numbers of RPW caught on the 4 farms may have been affected by many factors, including age of trees, agricultural practices, source of trees, farm sites, and the expertise of farmers and agricultural

workers, especially concerning weevil management ...etc.

These results showed the role of additional date fruits in aggregation pheromone traps on increasing the numbers of RPW adult's catches on these traps compared with these numbers of RPW adults caught in these traps compared with these numbers of RPW catches on aggregation pheromone bait traps contain pheromone only or date fruits only.

CONCLUSION

The number of weevils caught in t3(pheromone + 350g date fruit) was 10 and 32 times greater than t2 and t1, respectively. The question arises, why was t3 (pheromone + date fruits) so superior to the other treatments? The reason may be that date fruit acted as a food, and the pheromone acted as an attractant to adult RPW. As more adults were attracted perhaps the attraction of other insects combined with these smells created a new type of smell to attract the adults of this insect in comparison to food alone or pheromone alone. Further investigation is required to study these behaviors.

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MILLION TREE CAMPAING

EEG's Million tree campaign has been one of its many programmes that has received continuous support from its patrons, both from the corporate arena as well as its individual members. The campaign has grown from strength to strength with the latter half of 2008 bearing witness to the appreciation received.

The young eco warriors of EEG adopted the campaign and enthusiastically added their bit to ensure that UAE has ample sustainable green spaces. Dibyo Majumdar, an active student member of EEG undertook his "green action" by planting 2 Neem trees in his neighbourhood in July and vouching for their survival in the summer heat. One year old Seyon Nagendram too celebrated his first birthday in a novel way by planting a Neem Tree within EEG's office grounds. EEG appreciates and salutes citizens and parents who instill in their children a sense of responsibility towards the environment from the very beginning.

Islam Elsafy of CNS, Abu Dhabi was honored by his colleagues in the same vein with a tree being planted at EEG's office on his behalf.

The million tree campaign figured prominently in EEG's Ramadan Celebrations with a tree auction. The month of Giving witnessed the wholehearted participation of individuals and corporate members of EEG who enthusiastically bid for trees that would be donated on their behalf to school all over UAE.

EEG chairperson gave a presentation on the Million Tree Project at Dubai men's College on the 16th of November. In her presentation entitled The Green Journey, Mrs. Al Marashi noted the initiatives undertaken by EEG, particularly its Million Tree Campaign, and its contribution to sustainability. She noted that the Million Tree Campaign has surpassed its target and has encouraged individuals and companies to come on board. EEG conducted a symbolic tree painting activity at the venue with the participation of dignitaries and guests.

Employees and officials from the RSA Group – Asia and Middle commemorated one day out of their volunteer week a tree planting ceremony at the Mohammed Bin Rashid School for Boy on the 18th of November. The volunteers from RSA Group, EEG staff, teachers and enthusiastic students of the school, joined hands in digging pits and planting the 15 indigenous tree saplings within the school campus. The students were delighted to receive trees and volunteers from the RSA Group were happy to have a hands-on experience with this green initiative.

The year 2008 has been a year of action with a number of corporate organizations and individuals coming forward to participate in the campaign. A large number of trees were donated to deserving schools all over UAE in a bid to help balance the carbon count of the atmosphere and help mitigate some of the repercussions of the 'modern' way of living.



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Views of AAAID on the Impactions of Global Environmental, social, and Technological Changes in the Pest Complex of the Date Palm.

Abstract

There is little scientific documentation on the effect of changes in the global environment, social awareness, and technological advances in the pest complex of date palm. Nevertheless, it is safe to assume that these external pressures do have some significant effect on the pest complex. Trees of date palm are relatively highly resistant to most common environmental stresses (that is physical, chemical, and biological) with exception to the old date palm epidemic disease (Bayoud, *Fusarium oxysporum* f. *sp.albedinis*) and the recent devastating red weevil (*Rhynchophorus ferrugineus*), none of other environmental stresses are of threatening effect on investment in the sector of date palm. However, significant changes in the ecology of the traditional growing areas of the date palm may reveal another story in the near future. Hence integrated pest management strategies should take the effect of such changes into account for the date palm long-

term sustainability. AAAID has placed special attention on date palm industry in the Arab World specifically towards the sustainability of date palm investment projects. This paper herein explores the activities and practices of AAAID in this respect.

AAAID in brief

Arab Authority for Agricultural Investment and Development (AAAID) was established in 1976, with its legal entity as an independent financial and investment institution.

Location:

Main Office : Khartoum, Republic of the Sudan.

Regional Office : Dubai, United Arab Emirates.

Objectives:

Development of agricultural resources

and production of the maximum possible amounts of food production.

1. Increase the exchange of agricultural products and inputs between Arab countries.
2. Promotion, financing of implementation of agricultural project...
3. Conduct research and studies.

The AAAID activities include investment in all forms of agricultural production and related activities. This includes investment in major agricultural sectors (plant and animal production), agricultural processing, agricultural services and inputs, marketing, inter-Arab trade, and applied research.

Pests of the date palm

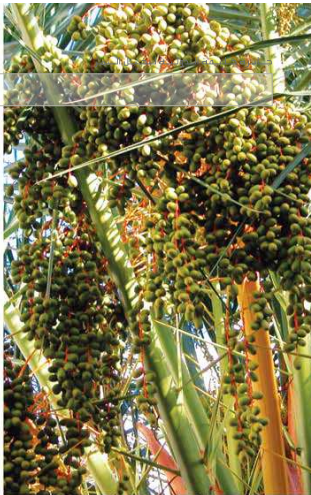
Date palm trees are relatively highly resistant to the most common physical, chemical, and biological environmental stresses. It is one of the oldest cultivated trees in recorded history. With exception to biological stress such as the old epidemic Bayoud disease (*Fusarium oxysporum* f. sp. *albedinis*) and the recent damaging red weevil (*Rhynchophorus ferrugineus*) the other two environmental stresses do not seem to be of threatening effect. The threatening of those pests comes from their devastating damage, wide and fast spreading, and lacking of economically effective control method. There are hundreds of other registered pests of the date palm, but then are of no economic concern or under control. The existing methods of pest control with synthetic chemical pesticides on date palm however, do not fall in line with the social environment awareness terms. This will add other task on shoulders of the investment project in date palm sector. With the changing global environment the ecology of the date palm has recently contracted with some changes, this is likely to have some effect either positive or negative on the pests of date palm. AAAID has contributed its share to the

sector of date palm and gives the sustainability of investment in date palm a priority concern as will be detailed.

Influence of the global environmental changes

Global warming is a daily base concern of scientists and agriculturists worldwide. Most of the recognized uncommon climatic changes in nature explained to be due to such phenomenon. Hence, continuity of human survival with no limitation on the earth becomes questionable. Pest damage in agricultural products is calculated to be one third of the produced food and has been paid much concern in term of food security reference. Furthermore, the recently recognized alteration in pest behavior will add more complication. Regarding the pests of date palm for instance one could draw geographical maps for their distributions in the past and majority of the registered pests of no economic importance. Nowadays some of the geographically localized pests have started to appear outside their niches and some of the minor pests started to be of economic effect.

The change in the life cycle of many pests, recording new strains resistant to pesticide,





and widening host ranges of some other pests are other examples of the effect of the changing climate on the date palm. In summer of 2002 a large number of date palm trees in Iraq showed uncommon symptoms when up to 30% of the tress leaves suddenly withered. The symptoms in some cases associated with leaf spotted pathogens (*Diplodia* sp., *Alternaria* sp., and *Cladosporium* sp.) which are registered as minor pathogens. Preliminary investigation on the case indicated considerable changes in the water table of the examined problematic locations. The level of the water table went from 1-3 meter up to 8 meter at some locations of the worst cases. In addition head bending disease (*Thelaviopsis* sp.) become epidemic and killed many trees.

The influence of the social awareness changes

The recent trend of human towards a secure healthy environment has become a demand of the modern societies worldwide. Environmental pollutions are a major concern and headache to both industry and modern agriculture. Generally agrochemicals are harmful to environment if over used. Therefore, modern agriculture is questioned despite its promises to ensure

the food security since it relies on many types of agrochemicals. Such awareness opposes the success of pesticides to various extent depend on type, application method and time, and agriculture product. Date palm in this regard poses a more complicated situation for the following reasons:

1. Date Palm trees are scattered inside or/ and nearby towns and cities.
2. Rural, farmers, and their animals live under date palm trees.
3. Fruit trees, vegetables and field crops are grown under date palm trees.



4. Aerial spray of pesticides is the most effective and economic method and is the only available efficient method in many cases.
5. There is little information on the behavior of pesticides on date palm, their translocation, and metabolism.
6. Time of spraying against some pests is during fruit bearing is often wrong.

The influence of the technological advances

In the last three decades the world has seen great advancements in the area of information technology and biotechnology. The most important advances that influence pests of date palm are:

1. **Information technology advances**, which facilitate documentation and follow up for all available information about date production and date palm pests on a regional scale. Technologies such as GPS (Global Positioning Systems) and GIS (Geographical Information Systems) per se will greatly enhance date palm farm management and pests monitoring and control.
2. **Biotechnology**, such as tissue culture, genetic engineer, and bio-pesticides are of great benefit to serve date palm.



This knowledge has enabled human for unlimited required number of date palm trees at any time, offered fast and more reliable breeding program, and utilized safe to the environment pesticides respectively.

3. **New generation of pesticides**, new formulations and groups of pesticides now are available to overcome the complication of the common chemically synthetic pesticides.
4. **Ecological based ingratiated pest management**, recently pest control has been widely enhanced with the new IPM strategies by including ecological aspects of adverse effect against the pest.
5. **Organic farming**, mission of organic farming philosophy is to minimize agrochemicals in the environment by introducing an alternative growing method. This offers better market for date palm.

Application of the above mentioned

technologies would effectively help improve pest management and secure sustainability for the date palm investment projects.

The contributions of AAAID to the Date Palm sector

AAAID has placed a special attention to the sector of date palm in Arab countries through various activities, practices, and applied research with aim of securing sustainability for the investment projects in this vital sector as can be summarized in the followings:

1. Arabic consulting team on date palm was initiated in 2201 **under the umbrella of AAAID** to provide consultation services to the Arab World. Members of this team is selected from distinguished scientists in the Arab countries- supervised and sponsored by AAAID.
2. An extensional study in tissue culture with emphasis to date palm at the Arab countries was accomplished

-supervised and sponsored by AAAID in 2001.

3. Arabic workshop in tissue culture with emphasis to date palm - **arranged and sponsored by AAAID in 2003.**
4. Arabic workshop in date palm industry, marketing and utilizing date palm wastes is going to be held in Saudi Arabia – arranged and **sponsored by AAAID in May-2004.**
5. Applied research - utilizing date palm leaves in animal feeds and organic fertilizer preparation. -Joined project with AL- AIN University and Ministry of Agriculture in UAE, **sponsored by AAAID in 2003-.**
6. Applied research - evaluating date palm true type of various tissue culture propagation methods – **sponsored by AAAID in 2004 -.**
7. A pilot project- producing bio-control pathogen against the red weevil of date palm –a joint project with AOAD- **sponsored by AAAID.**

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PHEROMONE BASED STRATEGY

for the management of red palm weevil in date palm and coconut agro-ecosystems : Implications, protocols and impact

Abstract

Red Palm Weevil (RPW), *Rhynchophorus ferrugineus* Oliver, (Coleoptera: Rhynchophoridae) is a lethal pest of palms. The pest has a wide host range and is reported to cause severe loss to date palm and coconut plantations in several countries. The male produced aggregation pheromone "Ferrugineol" (4-methyl-5-nonanol) was identified and synthesized during 1993. Since then

trapping RPW adults with food baited pheromone traps is widely practiced in surveillance and Mass Trapping Programmes (MTP) to manage the pest. This article presents an overview of the implications, protocols and impact of using food baited pheromone traps to manage RPW along with the biology, feeding behaviour, damage symptoms and Integrated Pest Management (IPM) strategy in managing RPW.

Table 1. Host range of *R. ferrugineus*. (1956 to 1998)*

Sr. No.	Host Palm Species	Reference
1	<i>Cocos nucifera</i> , <i>Phoenix dactylifera</i> , <i>Metroxylon sagu</i> and <i>Corypha umberaculifera</i>	Nirula, 1956
2	<i>Cocos nucifera</i> , <i>Areca catechu</i> , <i>Arenga pinnata</i> , <i>Caryota sp.</i> <i>Coelococcus sp.</i> , <i>Corypha sp.</i> , <i>Elaeis guineensis</i> , <i>Livistona sp.</i> , <i>Metroxylon sagu</i> , <i>Nypa sp.</i> , <i>Oncosperma sp.</i> and <i>Phoenix sp.</i>	Lever, 1969
3	<i>Areca catechu</i> , <i>Arenga pinnata</i> , <i>Borassus flabellifer</i> , <i>Caryota maxima</i> , <i>Caryota cumingii</i> , <i>Cocos nucifera</i> , <i>Corypha gebanga</i> , <i>Corypha umberaculifera</i> , <i>Corypha elata</i> , <i>Elaeis guineensis</i> , <i>Metroxylon sagu</i> , <i>Oreodoxa regia</i> , <i>Phoenix canariensis</i> , <i>Phoenix dactylifera</i> , <i>Phoenix sylvestris</i> , <i>Sabal umberaculifera</i> , and <i>Washingtonia sp.</i>	Esteban-Duran et al., 1998

*Reproduced from Abraham et al., 2002

Introduction

The Red Palm Weevil, (RPW) *Rhynchophorus ferrugineus* Olivier (Rhynchophoridae: Coleoptera) has a wide distribution as a pest of palms. Table 1 reveals the progressive increase in the host range of *R. ferrugineus* from 1956 to 1998. Coconut palm (*Cocos nucifera* L) and date palm (*Phoenix dactylifera* L) are the economically important species among Palmae attacked by RPW.

Information on *Rhynchophorus ferrugineus* was first published in 1891 in Indian Museum Notes (1891/3). Lefroy (1906) recorded it as a pest of coconut in India. Buxton (1920) reported *R. ferrugineus* from Mesopotamia (Iraq) on date palm. This pest is distributed in Tropical Asia from the Middle East to South East Asia. During the last two decades, it has invaded the date palm gardens of Gulf countries including Qatar, Kuwait, Oman, Saudi Arabia, Bahrain and United Arab Emirates (Anonymous, 1995). The pest is also reported to spread into

non – conventional areas across the red sea in Egypt (Cox, 1993) and also into Europe in Spain (Esteban - Duran et al., 1998).

Biology, feeding behaviour and symptoms of infestation

Red palm weevil is protected by nature throughout its life span. Eggs are laid in holes (58-531/female), which are made on soft tissues of the palm using the rostrum. Eggs are laid in a hole which is cemented by the female weevil so as to protect them from natural enemies and adverse weather. On hatching (1-6 days), the grubs make tunnels and start feeding on soft palm tissue. The chewed palm tissue is worked backwards by the grubs to seal the tunnel so that entry of any other organism is prevented. The larval period is reported to range from 25- 105 days. Pupation (11-50 days) takes place inside the cocoon, which is made out of palm tissue fibre. The weak and tender pupa is protected by the thick and strong cocoon. Thus, the pupal stage is also well

protected. The only stage moving outside is the adult weevil, which is reported to have a longevity of 39-120 days. Since the exoskeleton of the adult weevil is very thick and hard, it is difficult for the predators to attack the pest. Thus, all stages of the RPW are well protected by nature (Abraham et al., 2002).

RPW is a concealed tissue borer, usually infesting young palms with soft tissue below 20 years old. Infested palms exhibit one or more of the following symptoms viz. presence of tunnels on the trunk and base of leaf petiole, gnawing sound due to feeding by grubs, oozing out of thick brown fluid from the tunnels, appearance of chewed plant tissues in and around opening of tunnels with a typical fermented odour, fallen empty pupal cases and dead adults around a heavily infested palm, breaking of the trunk and toppling of the crown in case of severe and prolonged infestation. Besides these symptoms, infested date palms often exhibit dried suckers (Abraham and Kurian 1975; Abraham et al., 1998).



Integrated Pest Management strategy for RPW

In coconut RPW has been managed using an IPM programme as recommended by Abraham and Kurian, (1975) and Abraham et al. (1989). The major component of this IPM programme in coconut are: surveillance of the pest, maintaining plant and field sanitation, trapping adult weevils, preventive chemical treatment of wounds, treating the crown of bud rot diseased/ *Oryctes* attacked palms which often attract the weevil, with a combination of fungicide and insecticide, filling the leaf axils of young palms with a mixture of insecticide and sand, curative chemical treatment of infested palm, cutting and burning of severely infested palms, discouraging the making of wounds on the stem and cutting of leaves at a distance of one meter away from the leaf base and educating farmers and agricultural workers on palm weevil management. This IPM programme first developed and tested on coconut was modified and successfully used to manage RPW on date palm in the Middle East (Abraham et al., 1998). The IPM programme for date agro - ecosystem in the Middle East revolves around the use of food baited pheromone traps in surveillance and mass trapping programmes. Examining palms to detect RPW infestation specially around pheromone traps recording consistent weevil captures, locating hidden breeding sites, plant and field sanitation, preventive and curative chemical control, insecticide dip of suckers before transportation for planting, adopting quarantine measures to restrict the transport of infested palm suckers and training and education for large scale weevil management are the important components of the IPM programme in date plantations.

Pheromone trapping

Hallett et al. (1993) identified and synthesized the male produced aggregation pheromone "ferrugineol"

(4-methyl-5-nonanol) for red palm weevil. Further, Oehlschlager et al. (1993a) designed a pheromone based trapping system. Food baited pheromone traps are used widely for monitoring weevil activity, to assess the population levels of the pest and also to mass trap the adult weevils. Pheromone trapping is currently a key component of RPW management programmes, both in date and coconut plantations (Abraham et al., 2000 and Faleiro et al., 2002). Weevil captures from date and coconut plantations in Saudi Arabia and India, respectively have



been reported to be female dominated (Abraham et al., 1999; Faleiro and Rangnekar, 2000; Vidyasagar et al., 2000), which is desirable in any IPM programme, as it is the females that lay eggs which hatch into damage inflicting grubs.

Trapping RPW adults using suitable attractants formed an important component of the IPM strategy prior to the synthesis and availability of pheromone

lures. Maharaj (1973) reported that metal traps filled with coconut petioles were effective in attracting the pest in Sri Lanka and Trinidad. In India coconut logs proved more effective than metal traps (Kurian et al., 1979). Further, Kurian et al. (1984) found that coconut logs treated with a mixture of toddy (1L), yeast (5g) and acetic acid (5ml) attracted significantly more number of adult weevils as compared to other food attractants.

Pheromone Trap Design

Bucket traps with pheromone and insecticide treated sugarcane has sustained pheromone based trapping system for *R. palmarum* on oil palm in Latin America (Oehlschlager et al., 1993a). Based on this experience, bucket traps containing pheromone lure and an insecticide treated food bait is widely used to manage RPW both in date and coconut plantations (Faleiro et al., 1998). Five litre capacity high density polyethylene buckets with four windows (1.5 X 5 cm) cut equidistantly below the upper rim of the bucket are used to fabricate pheromone traps. Jute sack pieces are usually stuck with adhesive to the outer surface of the trap to provide grip for the attracted weevils and facilitate their entry in to the trap. Besides, a new pheromone sachet, hung to the bucket lid from inside with a piece of wire, the bucket trap contains kairomone releasing food bait mixed in one litre of water. The food volatiles released from the bait act synergistically with ferrugineol released from the pheromone sachet to enhance weevil captures (Hallett et al., 1993; Faleiro and Chellapan, 1999). Insecticide free traps containing funnels to prevent weevil escape have been reported to be equally effective as traps using insecticide to retain weevils (Hallett et al., 1999).

This article aims to assess the implications, protocols and impact of using pheromone trapping technology for the management of RPW in coconut and date agro-ecosystems.

Implications

It is significant to point out that weevil captures using ferrugineous based pheromone traps have been reported to be female dominated (1:2) by several workers (Anonymous, 1995; Abraham et al., 1999; Faleiro and Rangnekar, 2000). This is desirable from the weevil management point of view as it is the adult female that lays several eggs which hatch out into damage inflicting grubs. Further, laboratory studies on pheromone trap captured female weevils from date and coconut plantations of Saudi Arabia and India were found to be young, gravid and fertile (Abraham et al., 2001; Faleiro et al., 2003), indicating that Mass Trapping Programmes (MTP) for RPW will substantially curtail build of the population in the field.

Spatial distribution studies based on pheromone trap captures in coconut agro-ecosystems of Goa, India have shown that RPW population is highly aggregated (Faleiro et al., 2002a), indicating that plantations in and around heavily infested gardens are prone to RPW attack and need to be protected. Due to this aggregative tendency in the behaviour of the pest, infestations in date plantations of Al Hassa, Saudi Arabia were reported to occur in clusters (Anonymous, 1998).

Pheromone trap captures have also indicated that under coastal humid conditions of Western India, RPW is most active between October and November, while weevil activity is least between June and July in this region (Faleiro and Rangnekar, 2001a). Under arid conditions in the Middle East, weevil captures in pheromone traps were highest during May and November, with low activity being recorded during February and August at the peak of winter and summer, respectively. Also, in the Middle East infestation in date palm due to RPW increases with the severity of the summer, indicating that the peak weevil activity observed during May is crucial in

determining the high infestation level in the field during the subsequent summer months. The severe winter months from December to February in the region probably inhibit hatch of eggs laid during the second activity peak of November, leading to a decline in the infestation level during winter (Anonymous, 1998). Studies on the diurnal activity of the pest have shown that RPW adults are most active between 12.00 a.m. to midnight to 6.00 a.m. in the morning (Faleiro and Satarkar, 2003a).

Protocols



Standardizing protocols is essential for the judicious use of pheromone traps in the field. The findings reported below pertain mainly to the work done in coconut at the ICAR Research Complex for Goa, India and also from Indonesia and Saudi Arabia.

Field trials conducted in Goa, India have shown that trap colour did not significantly influence weevil captures (Faleiro et al.,

2002b). However, greater response of RPW to black than white bucket traps was reported from Indonesia, probably due to higher pheromone release rates from black traps (Hallett et al., 1999). Ajan and Abdul Salam, 2000 have reported best weevil captures using Saudi bucket traps with side and top openings. Also, they reported superior weevil captures in green reusable bucket traps as compared to white and yellow. Bucket traps with jute sack wrapping enhanced the trapping efficiency.

A trap height of 1m from the ground registered the best weevil captures in India. Reports from work done in Indonesia suggest best captures at ground level with no weevil catch when traps were placed at a height at 10 m from the ground.

Studies on the periodic replacement of food bait in pheromone traps have shown the need of servicing (replacing food bait and water) RPW pheromone traps every 10 days (Faleiro and Satarkar, 2002a). Weevil captures were not impaired when Kairomone releasing food bait (coconut petiole) was not replaced for a month, provided water in the traps was replenished if traps were not serviced beyond 15 days. Weevil captures were the best when dates were used as food bait, which was at par with sugarcane. Green coconut petiole bits were however recommended as it is freely available through out the year. Oil palm fruit when used in pheromone traps as food bait had a repelling effect on the pest (Faleiro, 2003). Studies conducted in Kerala, India on the efficiency of food baits in combination with pheromone lures showed that banana and sugarcane were equally effective and superior to other food materials (Nair et al., 2000).

Laboratory studies with six coconut cultivars, revealed that the cultivar, Malayan Yellow Dwarf (MYD) was least preferred (16.78) by the weevil for egg laying. While, maximum number of eggs (31.32) were laid in Chowghat Green

Dwarf (CGD) (Faleiro and Rangnekar, 2001b).

It is essential to retain the captured weevils in the pheromone traps. This can be achieved by adding odourless insecticides in the trap that do not counter the attractiveness of the pheromone and food bait. Carbofuran 3G at 10g/l of water was found to be most suitable for use in pheromone traps to kill the trapped weevils (Faleiro and Sataraka, 2002b). Carbofuran and Carbaryl were found to be effective for use in *R. palmarum* traps on oil palm in Malaysia (Oehlschlager et al., 1993b). Insecticide free funnel bucket traps were found to be equally effective in preventing escape of captured weevils (Hallett et al., 1999). However, funnel bucket traps are not commonly available.

In MTP, a trap density of 1 trap/ha is recommended. However, in endemic pockets, a trapping density of 2 traps/ha could be maintained initially for 6-12 months (Faleiro and Sataraka, 2003b). MTP for RPW was successfully implemented between 1994 and 1998 in date plantations of Al-Hassa in Saudi Arabia at a trapping density of 0.66 traps/ha (Anonymous, 1998).

Under the agro-climatic conditions of Goa, India ferolure+ was found to last in the field for 5-6 months (Faleiro and Rangnekar, 2001c). In the Middle East the same lure had a field longevity of 4-5 months (Faleiro et al., 1999). Lure longevity can be optimized by setting the traps in the shade. The aggregation pheromone, ferrugineol released at 3mg/24hr has been reported to be numerically superior to lower doses from trials conducted in Indonesia. Trials from India have indicated that the efficiency of the trapping system can be maintained with even a low release of 0.13 mg/day. Release of ferolure+ in the field under coastal humid conditions of Goa was significantly and negatively correlated to rainfall ($r = -0.59$), while it was positively correlated ($r = 0.43$) to maximum temperature.

Field trials using ferrugineol based pheromone lures in date and coconut plantations of Saudi Arabia and India respectively, showed that ferolure+ manufactured by Chem Tica Natural, Costa Rica was superior to lures procured from other countries (Faleiro et al., 2000 and Faleiro and Chellapan, 1999). Further, trials conducted in Goa revealed that pherobank lure, 400mg from Holland was superior to the commonly used



ferolure+ 800mg. The indigenously produced Central Plantation Crops Research Institute, Kerala lure was 50 per cent efficient in attracting the pest as compared to ferolure+ 800mg. The lure synthesized by CPCRI, Kerala can be economical if available commercially.

However, the dispensing technology and the high weevil attracting potential make ferolure+ the most widely used ferrugineol based lure for RPW (Faleiro and Sataraka, 2003c).

Impact

Pheromone trapping has a significant role to play in surveillance and mass trapping programmes. In date plantations of Al-Hassa in Saudi Arabia, a close surveillance was maintained on the build up of RPW through monitor traps during 1994, which helped to identify pockets of date plantations endemic to the pest. These endemic areas (4000 ha) were subsequently brought under MTP. The weevil captures reduced in these areas from 2.55 weevil/trap during 1994 to 1.41 in 1997 (Abraham et al., 2000), indicating that MTP had suppressed the pest. Also, the number of severely infested palms that had to be eradicated in Al Hassa reduced from 31.53 per cent in 1994 when MTP was initiated to 19.53 per cent in 1997 (anonymous, 1998). Similarly, infestation levels were brought down from 6.6 per cent in 1993 to 2.5 per cent in 1997 in severely infested date plantations in Al-Qatif of Saudi Arabia (Vidyasagar et al., 2000). In both the above cases, MTP was simultaneously carried out with other IPM practices.

In coconut plantations of Goa, monitor traps, registered a mean catch of 30.06 weevil/trap, between August, 1999 to December, 2001, indicating a high level of the pest in the state. Further, mass trapping for one year coupled with phytosanitary measures, treatment of breeding sites and curative chemical treatments successfully suppressed the pest in five coconut plantations (45 ha).

The judicious use of food baited pheromone traps therefore forms a key component of the IPM strategy against RPW and will continue to do so until an effective bio-control agent is found to combat this lethal pest of palms.

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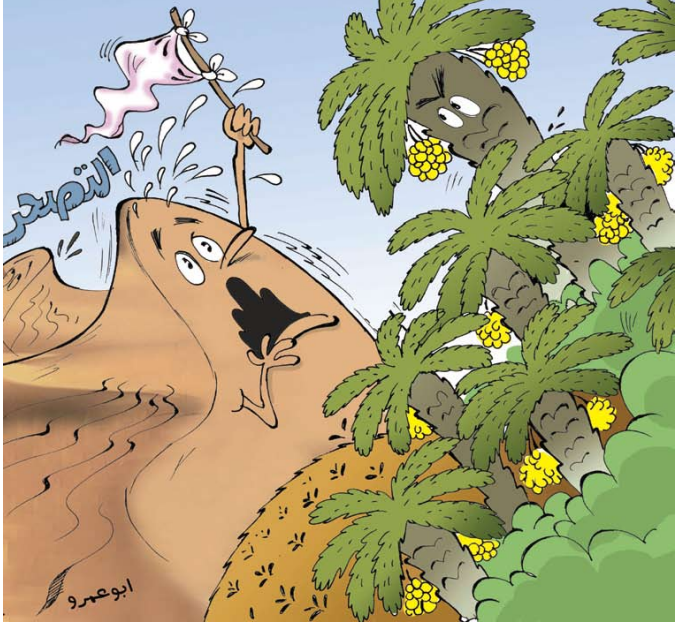
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الزحف إلى الأخضر



ابوعمر

Dr. Akef Mansour

The Efforts of AOAD

to Control Date Palm Pests In the Arab Countries

Abstract

Cognizant of the importance of social, economical, and historical role of the date palm tree in the GCC Arab countries, AOAD devoted many of its activities to the care and protection of this blessed tree.

One of its important regional projects is The Regional Project for the Bio-control of Red Palm Weevils in the Gulf Cooperating Council Arab Countries. After only 5 years of research and development funded by IFAD and IDB the project made outstanding achievements including but not limited to: well equipped bio-control laboratories, up-graded technical capabilities of more than (466) extension and research personnel and well established trained national teams in the 6 Gulf Cooperating Council Arab Countries viz Saudi Arabia, Emirates, Bahrain, Kuwait, Qatar and Oman. Capitalizing on

these resourceful capabilities, the project used the indigenous entomopathogens, which it discovered in the region along with the improved trapping system for Red Palm Weevil (RPW), which it developed, to assemble appropriate IPM systems effective against RPW.

Following the recommendations of a critical evaluation panel, AOAD formulated a project document to further develop the already formed national teams, validate the improved IPM systems under various socio-economic and environmental situations in the region and develop the project formulations of local entomopathogens into bio-pesticides of improved efficacy, which covers the 6 GCC countries in addition to 3 newly added Arab States to the project; Jordan, Palestine and Yemen. The project was met with generous support of Arab



regional and international development financial agencies. The execution of this phase of the project is presently underway.

Another group of activities concern country level projects which target specific problems in individual countries. Here a number of projects are directed to control date palm pests in Emirates, Sultanate of Oman, Saudi Arabia, and Kuwait.

Introduction

As part of its enduring programmes, AQAD executed during the years 1997-2002 a bio-control project for date palm pests in the Arab Gulf Region (AGR). After only five years (1997-2002) of research and development funded by IFAD and IDB, The Regional Project for the Bio-Control of Red Palm Weevils Stem Borers and Grubs in the Gulf Cooperating Council Arab Countries , made outstanding achievements including, but not limited to :

- ▶ The establishment of a novel collection of efficacious local entomopathogens with high tolerance to drought and saline soil conditions; and two predators against red palm weevils. DNA analysis confirmed that the entomopathogenic strains are unprecedented and unique

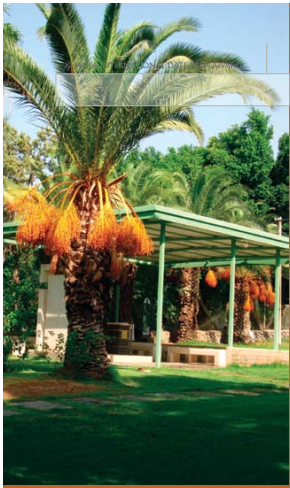
to the region, compared to other strains around the world.

- ▶ A newly improved pheromone/ kairomone trapping system has been designed and tested with excellent results. A total of 24000 traps have been distributed to national programmes, which in the 2001/2002 season alone caught about 150000 weevils in the region. Work has progressed vigorously resulting in the development of an innovative, cost-effective method of application of *B.bassiana*, which protects the fungus from being exposed to deleterious UV light, delivers the fungus directly

to its target host and prevents drift encountered with the traditional spray method of application.

- ▶ The project established well-equipped bio-control laboratories, up-graded the technical capabilities of 466 extension and research personnel and established well-trained national teams in the region.
- ▶ In the area of host-related semiochemicals, the project developed and standardized a simple practical method for the extraction of kairomones from date palm trees.
- ▶ The project, in cooperation with ICIPE, demonstrated that these kairomones differ quantitatively and qualitatively among different varieties and age categories of date palm trees.
- ▶ In biopesticides, the project developed two biopesticide formulations by the use of local strains of *B.bassiana*, one for the release method of contaminated males and another for spray applications, suitable for the prevalent environmental conditions in the AGR.





Following the recent critical evaluation of the various outputs of the project by an international external review panel during the period 12-22 April 2002 and recognizing the importance of date palm and progress already made at the project towards its protection, the panel recommended that the achievements so far made warrant further investment for an additional two-year phase to capitalize on the considerable resources now available. This is especially so because the improved bio-control technology developed in this project can suppress the spreading pattern and damage due to red palm weevils in the region, particularly in areas where infestations have become serious.

- ▶ Pursuant to the recommendation of the International Review Panel and the wishes of the beneficiary countries, AOAD prepared a project document for the third phase of the Project entitled "Transfer of Bio-control Technologies as Essential Components of IPM to control Red Palm Weevils in the Middle East" covering 9 countries namely Saudi Arabia, Emirates, Qatar, Oman, Bahrain, Kuwait, Jordan, Palestine and Yemen. This document was met with enthusiasm from several financial developmental institutions which pledged generous financial support.
- ▶ The third phase of the project entails wide area application of bio-pesticides based on project discovered entomopathogens and hence wide scale formulation and production of these bio-

pesticides is of primary importance. Following is a brief description of this project

Project Objectives :

The principal objectives of the project are to:

- ▶ Assemble and validate an adaptable, environmentally sustainable, cost-effective, location-specific, integrated pest management (IPM) system that capitalises on the new bio-control technologies namely ; trapping insects and releasing the local entomopathogenic fungi and nematodes, in addition to local sanitary and agronomical tactics, in a compatible manner so as to maintain weevil's population density below economic thresholds under the prevailing social , environmental and economic conditions of date palm farmers in the region.
- ▶ Conduct appropriate toxicology studies and complete registration requirements of bio-pesticides produced in the project.
- ▶ Further explore and develop in-vitro mass-production, formulation and delivery techniques of local entomopathogens.
- ▶ Further enhance regional uptake and ownership of the project through strengthening national networking which is not dependent on the project for its impetus.
- ▶ Transfer and adoption of improved IPM systems in close collaboration with extension personnel and farmers and study their impact on date palm plantations.
- ▶ Further strengthen linkages with other national programs in the region and advanced institutions around the world.

Project components :

The activities of the components of the project in its third phase are geared to achieve the transfer and application of the new bio-control technologies to the farmers via the efforts of the agricultural engineers and extension agents.

The various components of the project include:

* Provision of technical and scientific expertise :

- A regional coordinator.
- An entomo-mycologist.
- An entomo-nematologist.
- An IPM expert.
- A socio-economist.
- Support technical staff.

* Training programme :

a) Post-graduate training (MSc) :

A total of (8) national personnel working in the project will be designated to earn MSc degrees, two persons from each of the two project main centres and one from each of the other GCC countries.

b) Regional training :

One training course of two-week duration attended by the project technical personnel will be executed during the first year of the project. Topics of training include formulation, storage, evaluation, toxicology and commercialization of biopesticides.

c) In-country training :

Local training courses are convened in each of the beneficiary countries, a one-week training course per country . They are to be attended by members of national teams and farmers.

* Operational requirements :

Various material supplies and equipment will be provided for the project. These include field supplies and laboratory

equipments and material. In addition, field vehicles, and office equipment will be provided, too.

* International workshop :

At the end of the first working year of the project, an international workshop will be convened. The objective of this workshop is to review the total sum of the on-going activities of the project and recommend necessary adjustments. The participants

will include distinguished scientists and experts in the field of bio-control technologies.

* Studies and field research :

Multi-location demonstration and on farm trials will be implemented. Studies will include rate of farmer adoption of the new bio-control technologies with emphasis on socio-economic aspects.

* Awareness and extension programs :

In each beneficiary country (3) field days will be convened. The main topic of these field days is the new applicable bio-control technologies to combat the RPW as an important component of the IPM of the RPW.

To raise awareness about the outputs of the project fact sheets, extension leaflets, video-tapes and compact discs-ROM will be prepared.

* Meetings :

The steering committee of the project will meet annually. However, other meetings can be convened if needed.

Meetings between national teams and experts to exchange ideas and experiences to improve project performance will be convened every (6) months.

* Formulation of project biopesticides :

A number of confidentiality and secrecy agreements will be concluded with scientific international institutions and companies with the objective of securing biopesticides required by the project.

* Project evaluation :

This is executed by experts of good repute from neutral institutions specialized in evaluation of IPM projects. AOAD in coordination with financing agencies will appoint the members of the independent evaluation and assessment panel.



Submit three copies of the original work or the nominated research (one original, one copy and the third electronic soft copy (CD).

Works submitted for the Award shall not be returned to the applicants, they are to be kept in the head office of the Award at Al Ain city.

The Award will be granted to

The award is open to individuals or groups of individuals or institutions or companies or cooperatives or civil society organizations and governmental and private authorities, which have undertaken distinguished works with effective and direct results in the field of date palm. Any organization can nominate itself without any recommendation from any other organization or individual. The award can be granted to any party (individual, company, authority) only once under the same category.

The award

The winner will be granted an appreciation certificate, trophy and financial reward in a luxurious ceremony held in Abu Dhabi. Winners of the Khalifa International date palm award are entitled to use the logo of the award on their advertisement and on marketing materials for a maximum 3 years from receiving the award. Recipients for one of the award's category are able to nominate themselves for the next cycle, but for a different category. Recipients may also apply for consideration in same category after 3 years from winning the award. The winners from different categories of the Khalifa International date palm Award will be appreciated and will be introduced positively through different local and international media channels and in the award magazine and website.

Conditions

The First category (Excellent research and study):

Contributions (research / study) previously awarded any Arab or foreign prize are not eligible.

Works submitted for the award (research / study) should be new, distinguished with direct and effective results in the date palm cultivation and processing fields. It should also be authentic, creative and expanding the knowledge in the date palm cultivation field.

The implementation of the submitted works

(research / study) should serve the development of the date palm, with a focus on the market application. The effect of the submitted works should create awareness among society and expand the knowledge in the date palm field.

The (research / study) should be cleared on how the project can be implemented and transferred to other sectors through reflecting the market needs and how easy they can be used.

The second category (Distinguished producers):

The Judging committee should take the following into consideration:

Size of the date palm orchard, production quantity and quality, and the product uniqueness.

Production diversity in regard to produced varieties.

How much modern technical practices are used in the field of drip irrigation, fertilization, protection, thinning, bunch protection and other pre and post harvest techniques.

The Third Category: The Best New Technique:

Similar conditions as applied for the first category will be used.

The new technique must be modern, with a direct effect on the productivity of date palm.

The discovery could be a new date palm clone (a female or a male) with excellent fruits (or pollen) characteristics.

The Fourth Category: The Best Development Project

The proposed development project could be



implemented by either the private or government sector or an international organisation.

The project should be characterised by its direct effect on date production and related industries or by - products, or processing and marketing.

The following will also be taken into consideration:

Project work plan and its practical applications

Size of the project and modern applied techniques.

Project production and marketed quantities at both local and international levels.

The Fifth category (Distinguished Figure):

The Scientific committee members should announce the candidates names and the nominated institutions based on the distinguished work undertaken and submitted for consideration. The award can not be awarded to any person, authority, company, twice consecutively.

The Schedule

Application period from 01 June till 30 September, 2009.

The applicants will be informed that their application has been received and forwarded to the judging committee.

Applications that meet the requirements will be informed of their successful application from 01 till 31 October 2009.

The judging committee will start to study and evaluate the applications from 01 November till 31 January, 2010.

The winners names will be announced in the first week of February, 2010 and the honouring ceremony will be held in March, 2010.

For further information, please contact

General Secretariat
Khalifa International Date Palm Award
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E-mail: kidpa@uaeu.ac.ae
Website: www.kidpa.uaeu.ac.ae
www.kidpa.ae

الشروط العامة

١- تقبل طلبات الترشيح من كافة أنحاء العالم باللغتين العربية (Simplified Arabic Font) أو الإنجليزية (Times New Roman)
٢- تقديم نسخة من السيرة الذاتية للمرشح مع صورة عن جواز السفر، وثلاث صور شخصية.
٣- لا تمنح الجائزة لمرشح سبق له الفوز بجائزة عربية أو أجنبية أخرى .
٤- إرفاق نسختين من العمل أو البحث المرشح (واحدة أصلية ونسخة إلكترونية (CD).
٥- لا تعاد ملفات الترشيح إلى أصحابها سواء فازت أم لم تفز، بل تودع في مقر الأمانة العامة للجائزة بمدينة العين.
٦- يحق للجنة التحكيم حجب الجائزة عن أي فئة إن لم تستوف الشروط ودون إبداء الأسباب.

ترسل طلبات الترشيح باسم سعادة أمين عام الجائزة ومقرر مجلس الأمناء على العنوان التالي:

جائزة خليفة الدولية لنخيل التمر:

ص.ب: ٨٢٨٢٢، العين، الإمارات العربية المتحدة.

الهاتف: ٠٠٩٧١٣٧٨٢٢٤٣٤، الفاكس: ٠٠٦٧١٣٧٨٢٢٥٥٠

البريد الإلكتروني: kidpa@uae.ac.ae

الموقع الإلكتروني: www.kidpa.ae www.kidpa.uae.ac.ae

General Conditions

1- Applications should be filled in Arabic (Simplified Arabic Font) or English (Times New Roman)
2- Applications are accepted from all around the world; there are no nationality restrictions.
3- Works submitted for the Awards should be authentic, creative and expanding the knowledge in the date palm cultivation field.
4- Contributions previously awarded any Arab or foreign prize are not eligible.
5- An applicant shall not object to the Award arbitrators' decisions.
6- Works submitted for the Award shall not be returned to the applicants, they are to be kept in the head office of the Award at Al Ain city.
7- Submit two copies of the original work (one original and one electronic soft copy (CD)).
8- It is in the right of supervised attainees to dismiss the Award without stating any reasons.
9- Fill the application form and submit your curriculum vitae detailing the nominee's academic background, experience, previous positions, and listing all published work.

All applications along with due documents are to be sent to:

General Secretariat of Khalifa International Date Palm Award

P.O.Box. 82872, Al Ain, United Arab Emirates.

Tel: +971 3 783 24 34 , Fax: +971 3 783 25 50

E-mail: kidpa@uae.ac.ae

Website: www.kidpa.uae.ac.ae www.kidpa.ae

