

INSECT PESTS ATTACKING DATE PALMS AND DATES IN SULTANATE OF OMAN

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Abstract

A survey was conducted between 1993 and 2000 in different regions of Oman to collect and identify insect and mite pests affecting date palms and of dates. The results indicated that 24 species of insects and 3 species of mites attack date palms. The red palm weevil *Rhynchophorus ferrugineus* Olivier, dubas bug *Ommatissus lybicus* Bergevin, lesser date moth *Batrachedra amydraula* Meyrick and old world date mite *Oligonychus afrasiaticus* McGregor were identified to be of major economic importance, quantitatively and qualitatively affecting growth and yield of date palms. Some new date palm pests were also recorded comprising of *Aphis gossypii* Glover, *Holarthrotrips josephi* Bhatti, *Amitermes stephensoni* Harris, a micro lepidoptera leaf skeletonizer (unidentified), *Rhynchophorus ferrugineus* Olivier, frond date borer *Phonapate frontalis* Fahraeus, *Arenipses sabella* Hampson, *Anacridium melanorhodon arabafrum* Dirsh and *Schistocerca gregaria* Forskal. In stores, seven insect species were found to attack dates, the most economic insect pests attacking dates during storage, being *Ephesia cautella* Walker and *Oryzaephilus surinamensis* Linnaeus.

INTRODUCTION

Date palm (*Phoenix dactylifera*) is one of the major and earliest fruit crops. It is thought to be native to Arabia or India. The area under Date palm cultivation is throughout South West Asia and North Africa. Date palm area in the Sultanate is 35.80 thousand hectares, representing 83% from the total cultivated area (MAF, Statistics department, 1992).

Date palm trees subject to many insect and mite pests that cause a great loss to yield both quantitatively and qualitatively in the field and storage. General survey of date palm insect and mite pests in the Arabian Peninsula and Near East region were reported from Iraq, Qatar, Yemen, Kuwait, Bahrain and United Arab Emirates (El-Haidari, 1981), Egypt (Bodenheimer, 1923), Libya (El-Haidari, 1981; Bitaw and Ben Saad, 1990) and Saudi Arabia (Hammad and Kadous 1989).

In the Sultanate, several researchers and experts recorded insects and mite pests on date palm or dates in the stores through visits or surveys (El-Haidari and Tijani, 1977; Al-Mjeni *et al.*, 1983; Saiidi, 1992; Al-Zadgali, 1995; and El-Wan, 2000.)

However, most of these visits or surveys were carried out either in short periods or in limited locations. Therefore, there was a necessity to conduct a detailed survey on date palm insect and mite pests in different regions of the Sultanate to enable planning of appropriate applied research programs that aim to decrease losses caused by insect and mite pests and also to suggest effective IPM program.

MATERIALS AND METHODS

Selection of farms was determined in collaboration with Extension Departments, Ministry of Agriculture and Fisheries. Four to five farms (Each farm averaging about one hectare in size) were randomly selected and visited once from each Agricultural Development Center. The farms were selected based on the criteria that they represent different agro-ecological zone, have typical farming system in the area, follow the traditional as well as modern agricultural operations and grow exclusively the field crops, vegetables and fruit plants. Average size of the farm was about 10 hectares having at least 0.1 hectare under fruit trees.

The survey of stored date insect pests was carried out based on the agro-ecological factors and the storage conditions. It was carried out during July and August in the Musan'a, Sohar, Rustaq, Nizwa and Dhank willayats that represent major agricultural regions. Five stores were visited once in each willayat and dates were collected randomly and placed in polyethylene bags. Three samples each of 50 fruits were collected from each store and examined in the laboratory. The results were based on percent of infested fruits and standard insect keys were used for the identification of the collected insect pests.

RESULTS AND DISCUSSION

I. INSECT PESTS ON DATE PALM IN THE FIELD. The data of insect and mite pests collected from different regions helped in understanding the exact status of these pests in the Sultanate and in each region specifically. Table 1 indicates that the insect and mite pests occurring in most regions of the Sultanate with varying degrees of infestation and some other minor pests with limited distribution in some regions. Some of these insect and mite pests are new records to the Sultanate. It was found that date palm trees were infested by 23 species of insect, 3 species of mite and one species of rodent pests in the field.

Some new insect pests were encountered and recorded in the field during the survey as follows:

***Amitermes stephensoni* (Harris).** This is the first record of *Amitermes stephensoni* Harris on date palm in the Sultanate. Individuals were found on the trunk of date palm in Al-Sharqiya region and specimens were identified by CAB International Institute of Entomology, London, United Kingdom (1999). *A. stephensoni* is a wood and plant-feeding termite and its biology in the world is poorly known, as it has been collected rarely. Bitaw and Ben-Saad, 1990, identified *Amitermes* genus from Libya. Other termites were also recorded in the region such as *Microtermes najdensis* Harris was recorded in the soil underneath date palm in Al-Hassa Oasis in Saudi Arabia (Hammad *et al.*, 1980), *Acarthotermes ochraceus* Burmeister and *Psammotermes hybostoma* collected from the soil of Al-Hassa (Hammad *et al.*, 1980). In the Sultanate, *Microcerotermes diversus* (Saaidi (1992) and one species of *Psammotermes* (El-Wan, 2000) were reported on date palms.

***Anacridium melanorhodon arabafrum* (Dirsh).** *Anacridium melanorhodon arabafrum* is present in the Sultanate. It occurs in two phases: solitarious and the swarming. In solitarious phase (tree locust) does not cause big threat to the date palm. However, in swarming phase, it was observed feeding on date palm in 1998 in Al-Batinah region, Quriyat, Seeb and Boshier in the Sultanate. It may aggregate and form bands and swarms, which may then invade crops. Breeding of this locust occurs during rainy seasons between October and April. It is probable that there is only one generation a year, but it is possible that in some areas there may occasionally be two. (NRI, 1990)

***Aphis gossypii* (Glover).** Aphids cause substantial reduction in the quality and loss in yield of dates. They were reported to widespread and cause significant losses in Iraq (Carpenter and Elmer, 1978). It is the first record of aphids (*Aphis gossypii*) on date palm in the Sultanate. Nymphs and adults were observed feeding on flowers and strands of female and male inflorescence at Rumais in Al-Batinah region. Two aphid species *Cerataphtis brasiliensis* Hempel and *Schizaphis rotundiventris* Signoret were recorded on date palm and on other palms, two aphid species were recorded; *C. lataniae* Boisduval and *C. formosana* Takahashi (CAB International, 1999).

Date skeletonizer (unidentified). This insect is found throughout the regions in the Sultanate of Oman but most common in Al-Dakhliya, attacking date palm leaflets. However, the infestation is quite within the region. Larvae feed mostly on the upper surfaces of the leaflets. Lower leaf rings are preferred for feeding. They feed on leaflets as skeletonizers. Larvae always feed unexposed under their silken webs and feces. Eggs are deposited on the leaflet. After hatching larvae feed upon the epidermis

of the leaflets. Pupation takes place also on the leaflets. Emerging adults are very similar to those of *B. amydraula*. Dowson and Pansiot (1965) mentioned the presence of a similar insect found in the USA and the West Indies Islands. The available literature does not indicate the occurrence of such an insect in the Near East and North Africa region.

***Holarthrothrips josephi* (Bhatti).** This is the only occasion of recording thrips in the Sultanate. CAB International Institute of Entomology, London, United Kingdom (1999), identified the specimens. Nymphs and adult thrips were observed feeding on flowers and strands of female and male inflorescence. The specimen was collected from Al-Dakhliya region on Hilali cultivar. This is the first record of *Holarthrothrips josephi* on female inflorescence of date palm. However, it was recorded on male inflorescence from Iraq in 1986, along with other thrips, previously known to infest only male flowers. Other species of *Holarthrothrips* were recorded on date palm ; *H. indicus* Bhatti and Ananthakrishnan from India and Bangladesh 1978, *H. jambudvipae* Ramakrishna from India in 1928, *H. tenuicornis* Bagnall from France, Italy and Greece in 1927 (CAB International 1999).

***Phonopate frontalis* (Fahraeus).** *P. frontalis* was recorded in 1992 in Al-Batinah, Al-Dhahira, Al-Sharqiya regions (Saidi, 1992) and Al-Dhakilya (El-Wan, 2000). However, this is the first record at Adam Willayat in Al-Dakhliya region. Adults and larvae of *P. frontalis* were collected, mining in the fronds of date palm. Arafat (1974) recorded this borer in Saudi Arabia .It was recorded in Egypt, Iraq and Tropical Africa (Hussain, 1974).

***Rhynchophorus ferrugineus* (Olivier).** *Rhynchophorus ferrugineus* Olivier is a newly introduced pest on date palms in the Sultanate. It was first recorded from Mahadha in Dhahira region in 1993. It has spread to Al-Batinah region. Recently, it was spread out through Shinas in 1995, Sohar in 1996, in Saham and Khaboura in 1998 and has spread to Yanqul and Waqba in Dhahira region in the same year. Damage of this pest is very difficult to detect since the larvae feeds inside the trunk. The insect oviposit its eggs in the leaf bases of the Date palm and in the wounds made by *Oryctes* spp. The larvae feed inside the trunk and may in the crown of the date palm and make extensive galleries filled with plant fiber and frass.

***Schistocerca gregaria* (Forsk.)**. Desert locust is polyphagous particularly in swarms. Leaves and soft shoots are targeted first, but swarm damage causes total defoliation. It was observed making considerable damage to date palms in the Sultanate.

Major insect and mite pests can be defined as those widely distributed in most of the regions and causing economic losses such as *R. ferrugineus*, *B. amydraula*, *O.*

lybicus and *O. afrasiaticus*. Some insects were found but not causing economic losses except in limited areas such as *J. hammerschmidtii*, which was common in abandoned farms and on the coastal area affected by salinity. In addition to *J. hammerschmidtii* and *O. agamemnon*; some of the insects such as *P. blanchardi* and *P. arabica* were present in most of the visited farms. *P. frontalis* was found causing limited loss to very small number of trees. Minor insect and mite pests are those having limited distribution and causing economic losses, such as *M. diversus*, *P. hyphaniacus* and *R. indica*.

The present survey matches the previous records of insect and mite pests reported by different experts and researchers in the Sultanate. However, some insect and mite pests that recorded earlier were not occurred during the present survey; *Microcerotermes diversus* and *Urophorus humeralis* (Saaidi, 1992), *Unaspis citri* (Beg *et al.*, 1995), *Aonidiella orientalis*, *Maconellicoccus hirsutus*, *Polistes hebraeus* and *Psammotermes* sp. (El-Wan, 2000).

II. INSECT PESTS ON STORED DATES. Insect pests of stored dates are very much important from economic point of view causing considerable damage to dates. Table 2 represents the insect pests attacking dates in the visited stores. Inspections revealed that, dates were infested with six insect species belonging to Lepidoptera and Coleoptera orders of which, *Ephestia cautella* and *Oryzaephilus surinamensis* were the major insect stored pests. This is in accordance with the results of Al-Mjeni *et al.* (1983), who reported *E. cautella* and *O. surinamensis* as the most important pests attacking dates in storage with an average infestation of 16.8% and 34.6% respectively.

The percentage of the infested fruits ranged globally between 0-82.66 % Fig. 1. In the present survey infestations to the extent of 6.7, 12.3, 18.4, 21.8 and 22.7% were recorded in Rustaq, Musan'a, Nizwa, Dhank and Sohar respectively in the Sultanate. This variation was attributed according to the source of the dates and the storage conditions. Infestation begins in the field in wind fallen dates, which are the main source of infestation during storage when stored with healthy one in storages (Saaidi, 1992).

Average infestation in Rustaq and Nizwa Packing House was found to reach more than 20%. It was found that wind fallen dates were infested primarily by *E. spp.* (*E. cautella*, *O. suriumnensis*, *Carpophilus hemipterus*), and secondarily by *Cryptolestes ferrugeni* and *Cocotrypes dactyliperda* (El-Haidari, 1993). Infestation in Rustaq Packing House under cold storage (10 °C) was 13.2-29% for Khasab and Fardh cultivars, respectively. Under cold storage at 5°C in Nizwa Dates Factory, the

infestation was observed between 5% and 70% for Khasab, 14% for Fardh and 18% for Mabseli.

E. cautella and *C. ferrugineus* were the first insect stored pests reported in Samail in 1983 (El-Haidari *et al.*, 1992). Saaidi (1992) reported *Urophorus humeralis* feeding on fruits on date palm (Nighal cultivar) at the beginning of rutab stage and *O. surinamensis*, *C. hemipterus* and *E. spp.* in Barka (South Al-Batinah region) (Saaidi, 1992). El-Wan (2000), reported *P. hebraeus* on dates in the Sultanate.

Accordingly, survey indicates that the dates which exposed to highly infestation would not be acceptable in trade for human consumption, due to poor handling during harvest, packing and post harvest. Handling of dates in cultivation of date palm in the Sultanate is needs more cure and development of harvest and storage as its important national income.

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NSECT PESTS ATTACKING DATE PALMS AND DATES
IN SULTANATE OF OMAN

Table 1. Insect pests recorded on Date palm in the field.

Order Common name	Scientific name	Family	Parts damaged
Homoptera			
Dubas bug	<i>Ommatissus lybicus</i> (Bergevin)	Tropiduchidae	Leaves.
Cicada	<i>Platypleura arabica</i> (Myers)	Cicadidae	Leaves (Midribs).
Parlatoria date scale	<i>Parlatoria blanchardi</i> (Targioni - Tozetti)	Diaspididae	Leaves and fruits.
Red date scale	<i>Phoenicococcus marlatti</i> (Cockerell)	Coccidae	Tender leaf bases and flower stalks.
Date scale	<i>Fiorinia phoenicis</i> (Balachowsky)	Diaspididae	Leaves.
Fiorinia date scale	<i>Fiorinia linderiae</i> (Takagi)	Diaspididae	Leaves.
Date mealy bug	<i>Pseudaspidopectus hyphaenicus</i> (Hall.)	Margarodidae	Roots and leaf bases.
Oriental yellow scale	<i>Aonidiella orientalis</i> (Newst.)	Diaspididae	
Mealy bug	<i>Planococcus citri</i> (Risso)	Pseudococcidae	Leaf bases.
Melon aphid	<i>Aphis gossypii</i> (Glover)	Aphididae	Inflorescence.
Lepidoptera			
Lesser date moth	<i>Batrachedra amydraula</i> (Meyrick)	Cosmopterygidae	Early stages of fruits.
Greater date moth	<i>Arenipses sabella</i> (Hampson)	Pyralidae	Early stages of fruits, spathes, and leaves.
Micro- leaf skeletonizer	Unidentified		Leaves.
Coleoptera			
Fruit stalk borers	<i>Oryctes agamemnon</i> (Burmeister)	Dynastidae	Trunk roots and leaves.
Palm stem borer	<i>Jebusaea hamerschmidtii</i>	Cerambycidae	Trunk and leaf base.
Red palm weevil	<i>Rhynchophorus ferrugineus</i> (Olivier)	Curculionidae	Trunk and leaf bases.
Frond borer	<i>Phonapate frontalis</i> (Fahraeus)	Bostrychidae	Leaves.
Acari			
Old world date mite	<i>Oligonychus afrasiaticus</i> (McGregor)	Tetranychidae	Fruits.
Mite	<i>Tenuipalpus eriophyoides</i> (Baker)	Tenuipalpidae	Leaves.
Date palm scarlet mite	<i>Raoiella indica</i> (Hirst.)	Tenuipalpidae	Leaves.
Hymenoptera			
Oriental wasp	<i>Vespa orientalis</i> (Fabricius)	Vespidae	Developing fruits.
Thysanoptera			
Thrips	<i>Holarthothrips josephi</i> (Bhatti)	Adiheterothripidae	Inflorescence.
Orthoptera			
Tree locust	<i>Anacridium melanorhodon</i>	Acrididae	Leaves.
Desert locust	<i>Schistocerca gregaria</i> (Forsk.)	Acrididae	Leaves and fruits.
Isoptera			
Termites	<i>Amitermes stephensoni</i> (Harris)	Termitidae	Trunk.
Diptera			
Oriental fruit fly	<i>Bactrocera dorsalis</i> (Hend.)	Tephritidae	Fallen fruits.
Rodentia*			
Arboreal Rat	<i>Rattus rattus rattus</i>	Muridae	Leaves and young fruits.

Table 2. Insect pests recorded in the visited stores on fruits.

Order Common name	Scientific name	Family
Coleoptera		
Dried fruit beetle	<i>Carpophilus hemipterus</i> (Linnaeus.)	Nitidulidae
Date stone beetle	<i>Coccotrypes dactyliperda</i> (Fabricius)	Scolytidae
Saw toothed grain beetle	<i>Oryzaephilus surinamensis</i> (Linnaeus)	Silvanidae
Rusty grain beetle	<i>Cryptolestes ferrugineus</i> (Steph.)	Cucujidae
Lepidoptera		
Almond moth	<i>Ephestia cautella</i> (Walker)	Pyralidae
	<i>Ephestia</i> spp.	Pyralidae

الآفات الحشرية التي تصيب نخيل البلح وثماره في سلطنة عمان

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تم حصر الآفات الحشرية التي تصيب أشجار نخيل البلح وثماره في سلطنة عمان خلال الفترة من عام ١٩٩٣ وحتى ٢٠٠٠ م . وأوضحت نتائج الحصر أن هناك ٢٤ نوعا من الحشرات وثلاثة أنواع من العناكب تصيب أشجار نخيل البلح .

سوسة النخيل الحمراء *Rhynchophorus ferrugineus* ، دوباس النخيل *Ommatissus lybicus* ، الحميرة *Batrachedra amydraula* وعنكبوت الغبار *Oligonychus afrasiaticus* تعتبر من أهم وأخطر هذه الآفات والتي تؤثر كميا ونوعيا على أشجار النخيل.

كما تم تسجيل جديد لبعض الحشرات التي تصيب النخيل مثل المن *Aphis gossypii* والتربس *Holarthrotrips josephi* والنمل الأبيض *Amitermes stephensoni* ومن رتبة حرشفية الأجنحة حشرة leaf skeletonizer (لم تعرف) ، سوسة النخيل الحمراء *Rhynchophorus ferrugineus* ، وثاقبة جريد النخيل *Phonapate frontalis* ، ودودة البلح الكبرى *Arenipses sabella* والجراد من نوع *Anacridium melanorhodon arabafum* والجراد الصحراوي *Schistocerca gregaria*

كما وجد ٧ أنواع من الحشرات تصيب ثمار البلح في المخزن واهم هذه الآفات من الناحية الاقتصادية حشرة الافستيا *Ephestia cautella* وخنفساء السورينام *Oryzaephilus surinamensis*.