

Date Palm Challenges and Opportunities in NENA Region

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- Palm cultivation and date production face many challenges and problems, the most important of which are insect infestations and diseases, and the lack of integrated pest control.
- Insect pests cause great damage to palm trees and a significant decrease in crop and in the national income.
- Some of these pests infect the leaves, fruits, and others infect the main trunk.
- Detailed studies have been conducted on some of these pests to identify their symptoms of infestation, lifecycle, behavior, and seasonal activity, thus determine the appropriate time and method of control.

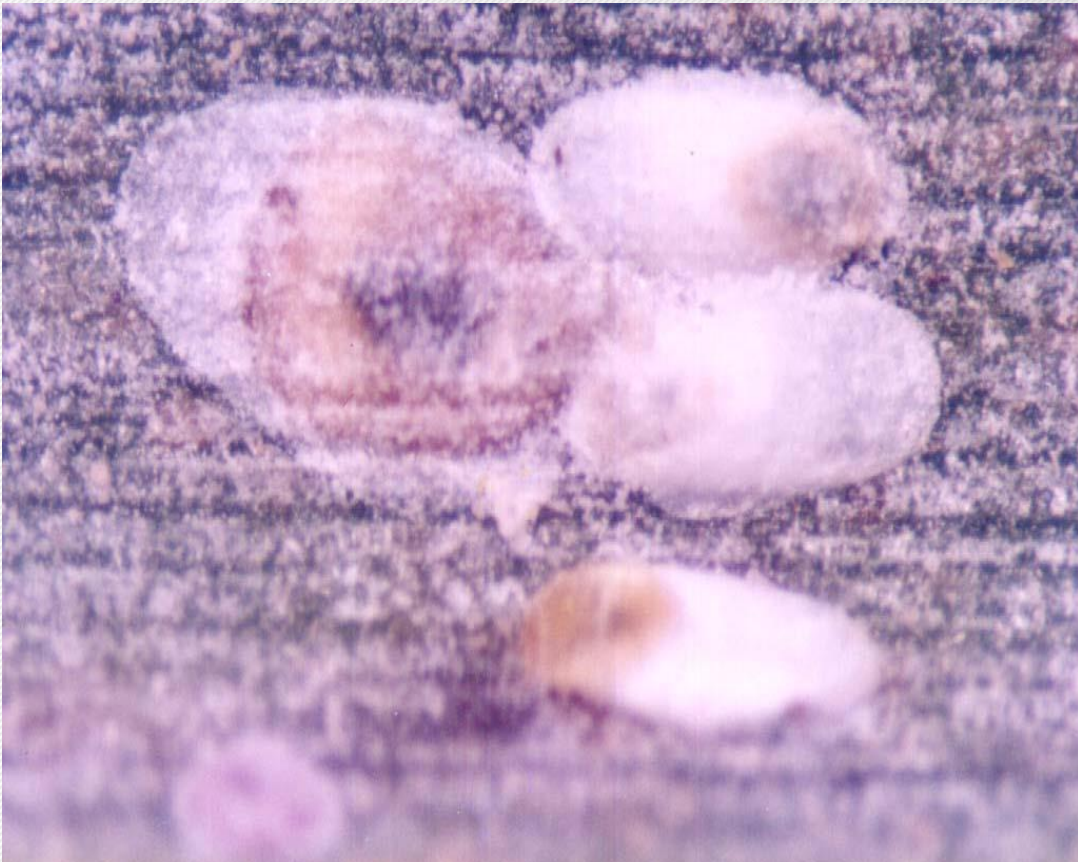
Leaves Pests

Leaves Pests

- *Ommatissus lybicus* دوباس النخيل
- *Parlatoria blanchardi* البارلاتوريا
- *Fiorinia linderæ* الفيورينيا
- *Raoilla indica* عنكبوت
- *Phonapate frontalis* ثاقبة جريد النخيل
- *Enneadesmus trispinosus* حشرة الايناديسمس
- *Platypleura arabica* السيكادا
- *Phoenicoccus marlatti* القشرية الحمراء

Leaves Pests

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Parlatoria blanchardi (البارلاتوريا)



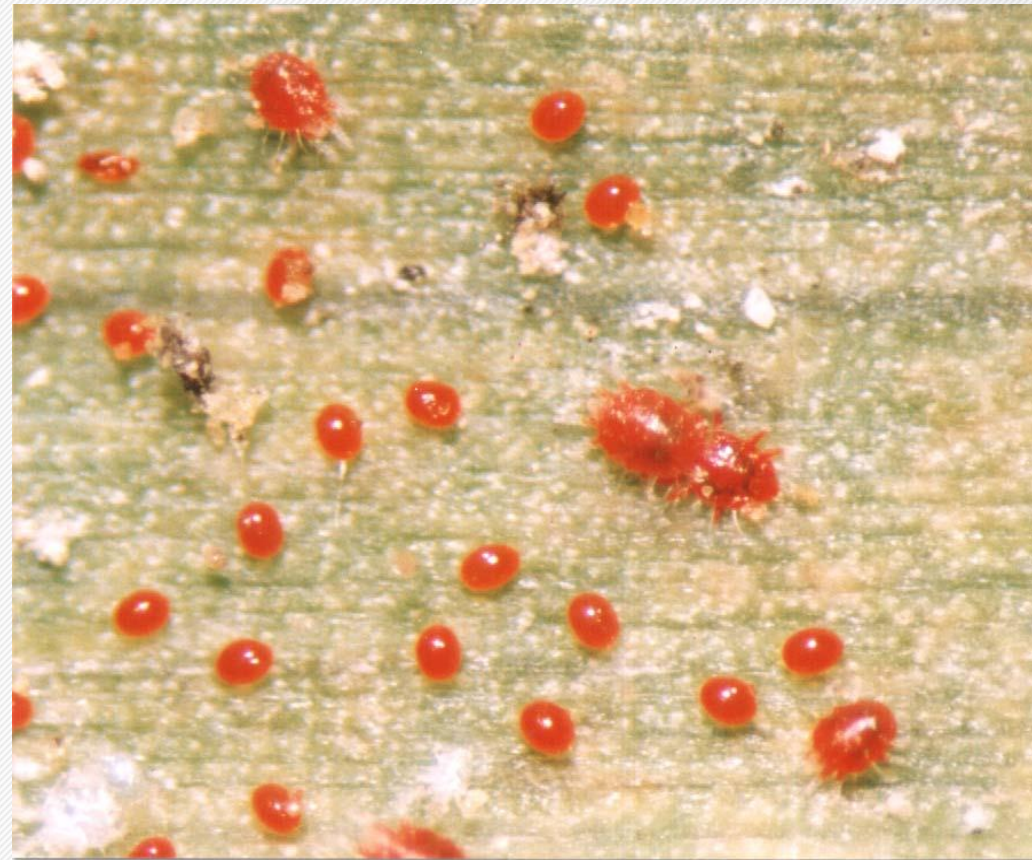
Ommatissus lybicus (دوباس النخيل)

Leaves Pests

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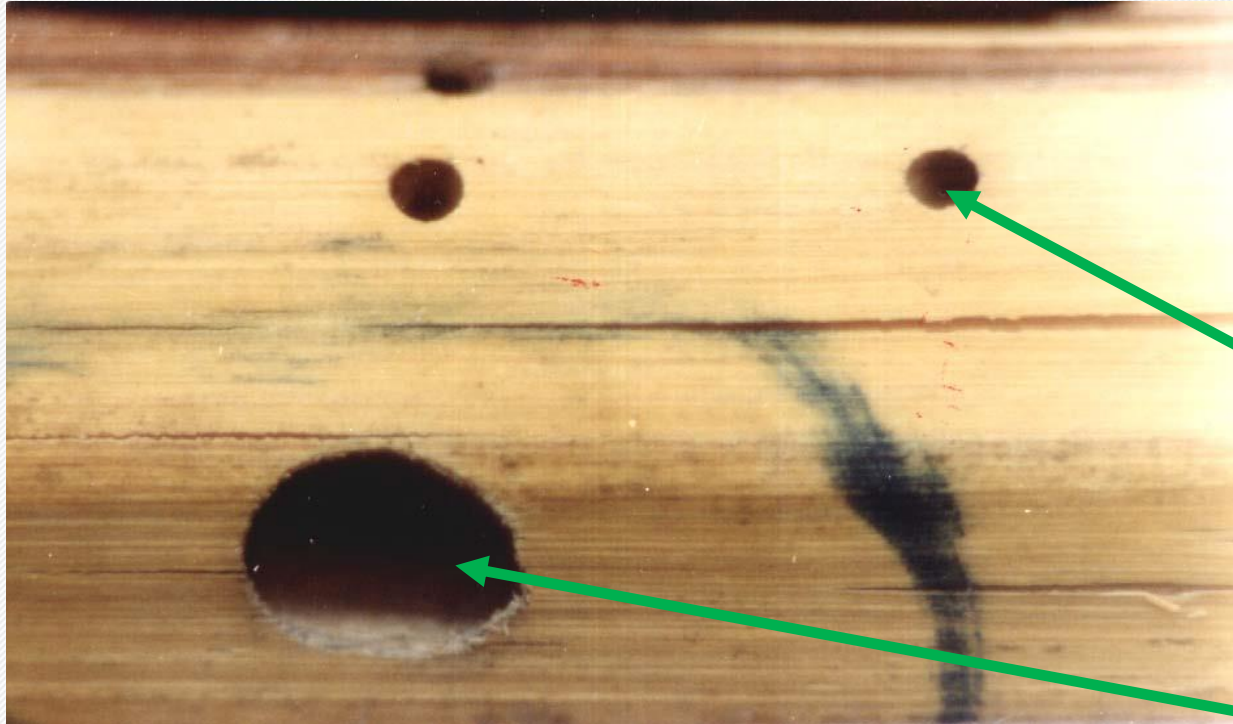
Fiorinia linderae (الفيورينيا)



Raoilla indica (عنكبوت)

Leaves Pests

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Enneadesmus trispinosus (حشرة
الايناديسمس)

Phonapate frontalis (ثاقبة جريد النخيل)

Dubas bug (*Ommatissus lybicus*)

Family: Tropiduchidae Order: Homoptera

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- Host: Palm leaves
- Symptoms of infestation:
 1. The presence of honeydew on the fronds and fruits. In the severe damage, we observe the honeydew on the surface of the ground around the palm trees.
 2. Accumulation of honeydew, dusts and fungi on the surfaces of interplants, thus photosynthesis decreases.
 3. The presence of eggs, nymphs, and adults of dubas bug on palm fronds.



Dubas bug (*Ommatissus lybicus*) Tropiduchidae Homoptera

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Egg



Nymphs



Total nymphal duration of Dubas bug

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nymphal instar Generation	Average /Range	First (Days)	Second (Days)	Third (Days)	Fourth (Days)	Fifth (Days)	Total nymphal duration (Days)
Spring generation in the field	Average	8.8	8.8	7.9	10.3	12.4	48.4
	Range	6 -10	7-11	7-9	7-13	8-14	45-52
Spring generation in the laboratory	Average	5.5	7.7	8.1	9.2	11.7	42..2
	Range	5-7	5-11	6-10	8-10	8-14	37-48
Autumn generation in the field	Average	5.9	9.5	6.7	8.6	12.3	42.6
	Range	4-9	7-14	4-8	6-12	11-14	37-47
Autumn generation in the laboratory	Average	7.3	6	6.9	8.3	10.4	38.7
	Range	5-11	5-8	5-11	6-12	8-13	32-49

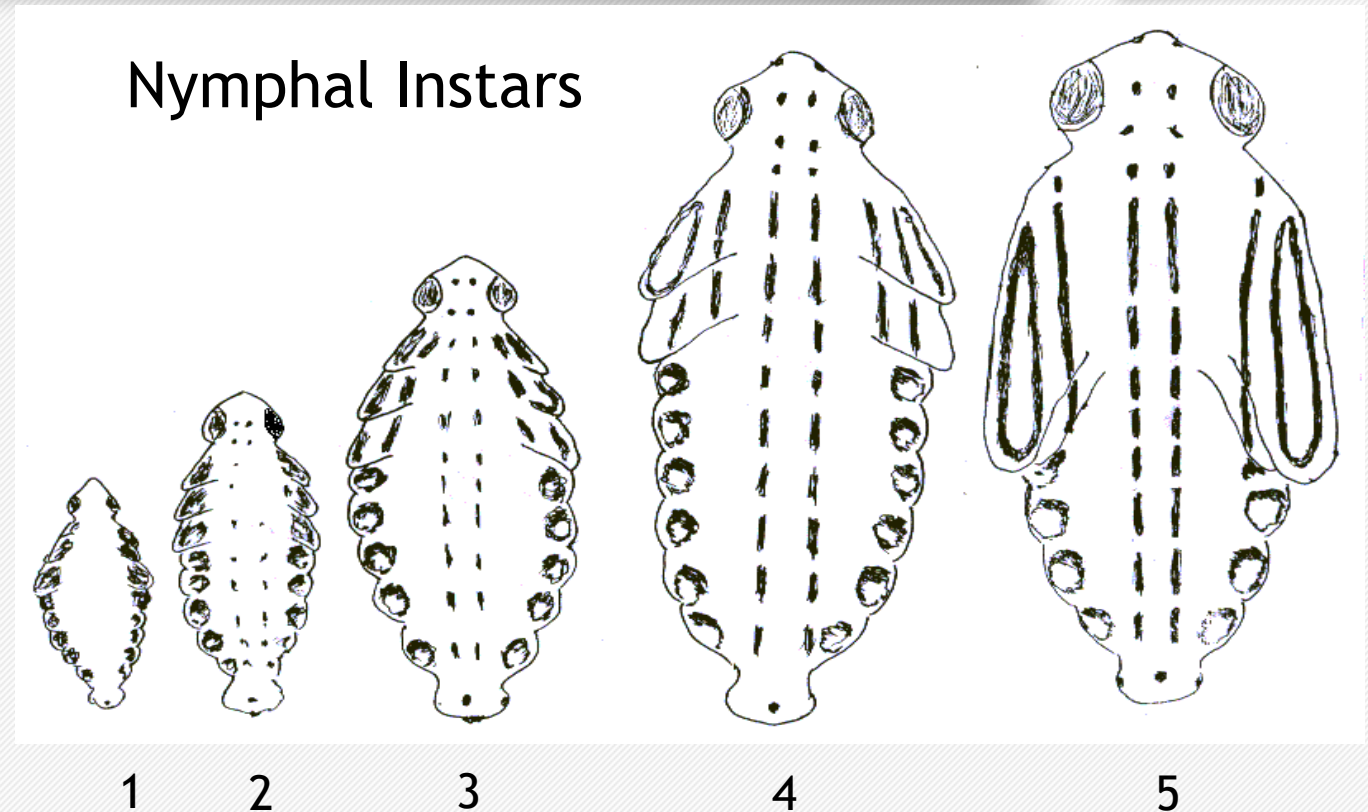
Dubas bug (*Ommatissus lybicus*) Tropiduchidae Homoptera

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- This figure has a significant importance in determining the proper timing for aerial spraying which has to take place before adult emergence.
- The ages of the nymphs differs between areas, depending on humidity and temperature.
- Aerial spraying timing can be determined in a certain area based on the remaining averages of the nymph ages to the adult emergence. Therefore, a schedule can be prepared for all the different areas.

Example:

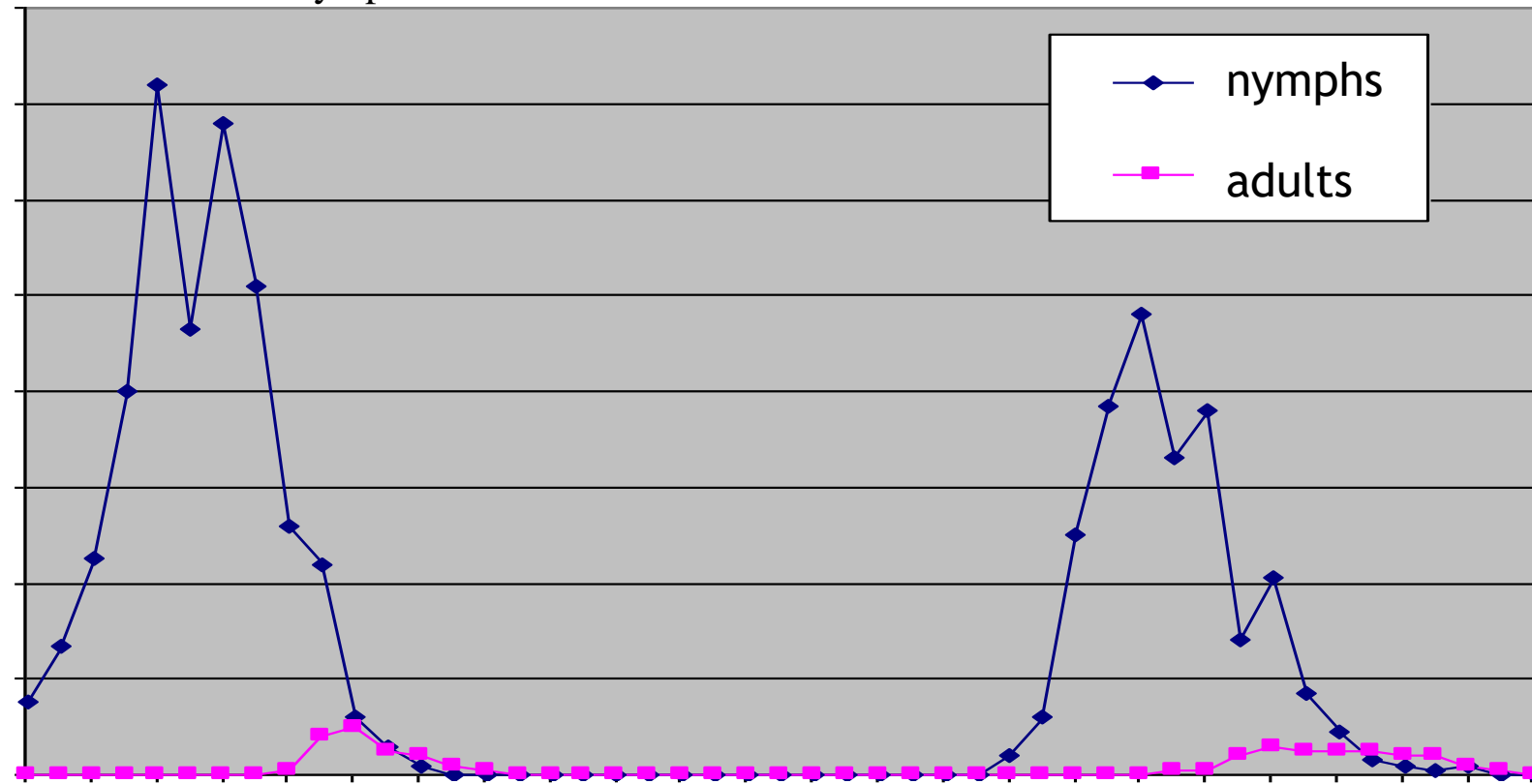
The collected nymphs from a certain area in 2nd instar. so the insects emerge after about 30 days which is the sum of the third, fourth and fifth ages (7.9 days + 10.3 days + 12.4 days)



Seasonal activity of dubas bug

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The number of nymphs and adults



Fruits Pests

Fruits Pests

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- *Batrachedra amydraula* دودة البلح الصغرى - الحميره
- *Arenipses sabella* دودة البلح الكبرى - دودة الطلع
- *Oligonichus afrasiaticus* عنكبوت الغبار
- *Coccotrypes dactyliperda* خنفساء نواة البلح
- *Vespa orientalis* دبور البلح الأحمر
- *Ephestia cautella* الأفسستيا
- *Oryzaephilus surinamens* خنفساء السورينام

Fruits Pests

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Batrachedra amydraula - الحميره
دودة البلح الصغرى



Arenipses sabella دودة البلح الكبرى - دودة الطلع

Fruits Pests

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Oligonichus afrasiaticus عنكبوت الغبار



Coccotrypes (خنفساء نواة البلح)

Lesser date moth (*Batrachedra amydraula*)

Family: Cosmopterygidae Order: Lipidoptera

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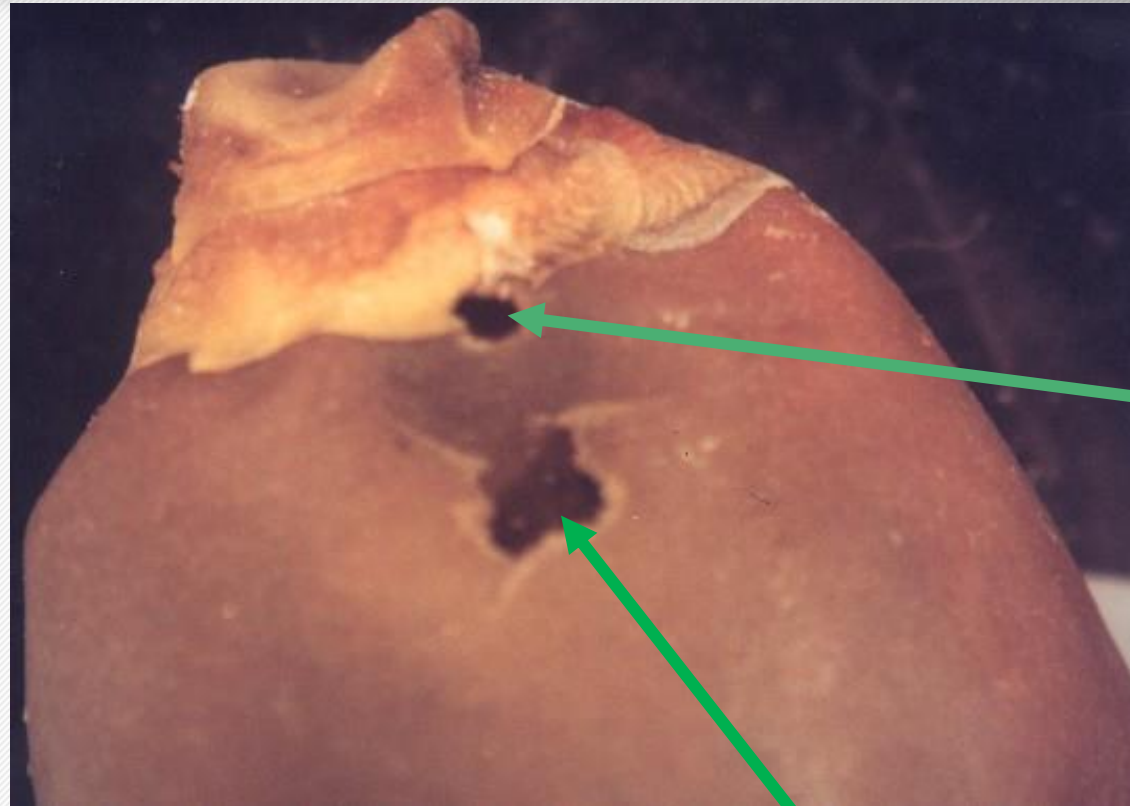
- Host: Date palm fruits
- Symptoms of infestation:
 1. It attacks the fruits in hababok, jemre and khalal.
 2. The larvae spin threads around the fruits and attach them to the flower stalk.
 3. The larvae burrow into the fruits and cause them to turn brown, dry and fall off easily.
 4. Infected fruits can be observed from the presence of waste and remnants of larval pits on the larval entry hole.

Lesser date moth (*Batrachedra amydraula*)

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Larva



Entrance
hole

Exit hole

Lesser date moth (*Batrachedra amydraula*)

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Infested fruit

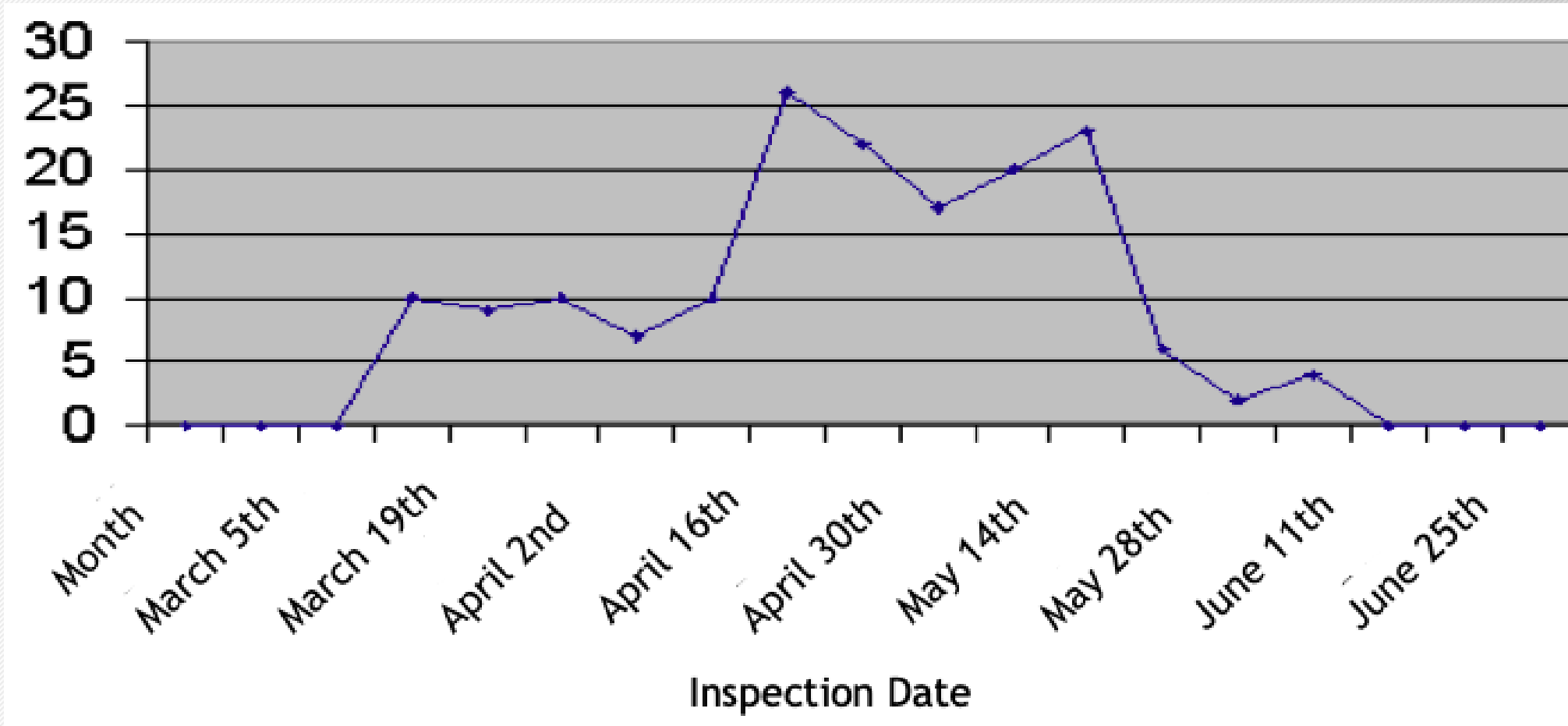
Life cycle of Lesser date moth

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Generation		Incubation Period (days)	Larval Period (days)	Pupal Period (days)	Total Life cycle
1st week of March to 1st week of April	Average	4.2	13.7	14	27
	Range	4-5	12-17	12-15	28-29
1st week of April to 1st week of May	Average	4.1	14.4	13.6	32.7
	Range	4-5	14-15	13-15	32-34
1st week of May to 1st week of March of next year	Average	4.2	278.8	13.2	305.7
	Range	4-5	258-285	12-15	288-313

The average number of infested fruits

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Trunk Pests

Trunk Pests

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- *Rhynchophorus ferrugineus* - سوسة النخيل الحمراء
- *Pseudophilus testaceus* - حفار ساق النخيل
- *Oryctes Agamemnon* - حفار عذق النخيل
- *Oryctus elegans*
- *Oryctus rhinoceros*
- *Microcerotermes diversus* - النمل الأبيض

Trunk Pests

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Rhynchophorus ferrugineus -
سوسة النخيل الحمراء



Pseudophilus testaceus - حفار ساق النخيل



Oryctes Agamemnon - حفار عنق النخيل

Red palm weevil (*Rhynchophorus ferrugineus*)

Family: Curculionidae Order: Coleoptera

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- Host: Date palm trunk
- Symptoms of infestation:
 1. A foul-smelling liquid comes out with sawdust of reddish-brown color.
 2. Ease of removing the bases of the leaves in case of severe injury.
 3. The presence of insect cocoons between the bases of the leaves and the stem of the palm.
 4. As the infection progresses, the sound and movement of the larvae can be heard while they are feeding.
 5. When making a cross section in the affected part of the palm, a laceration is noticed in the internal tissues and the emission of a foul odor from them and the presence of different ages of the larva.
 6. A decrease in the productivity of infected palm trees year after year
 7. It is easy for severely injured palm trees to fall when the wind blows



Red Palm weevil (*Rhynchophorus ferrugineus*) – Symptoms of infestation

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Red Palm weevil (*Rhynchophorus ferrugineus*) - Symptoms of infestation

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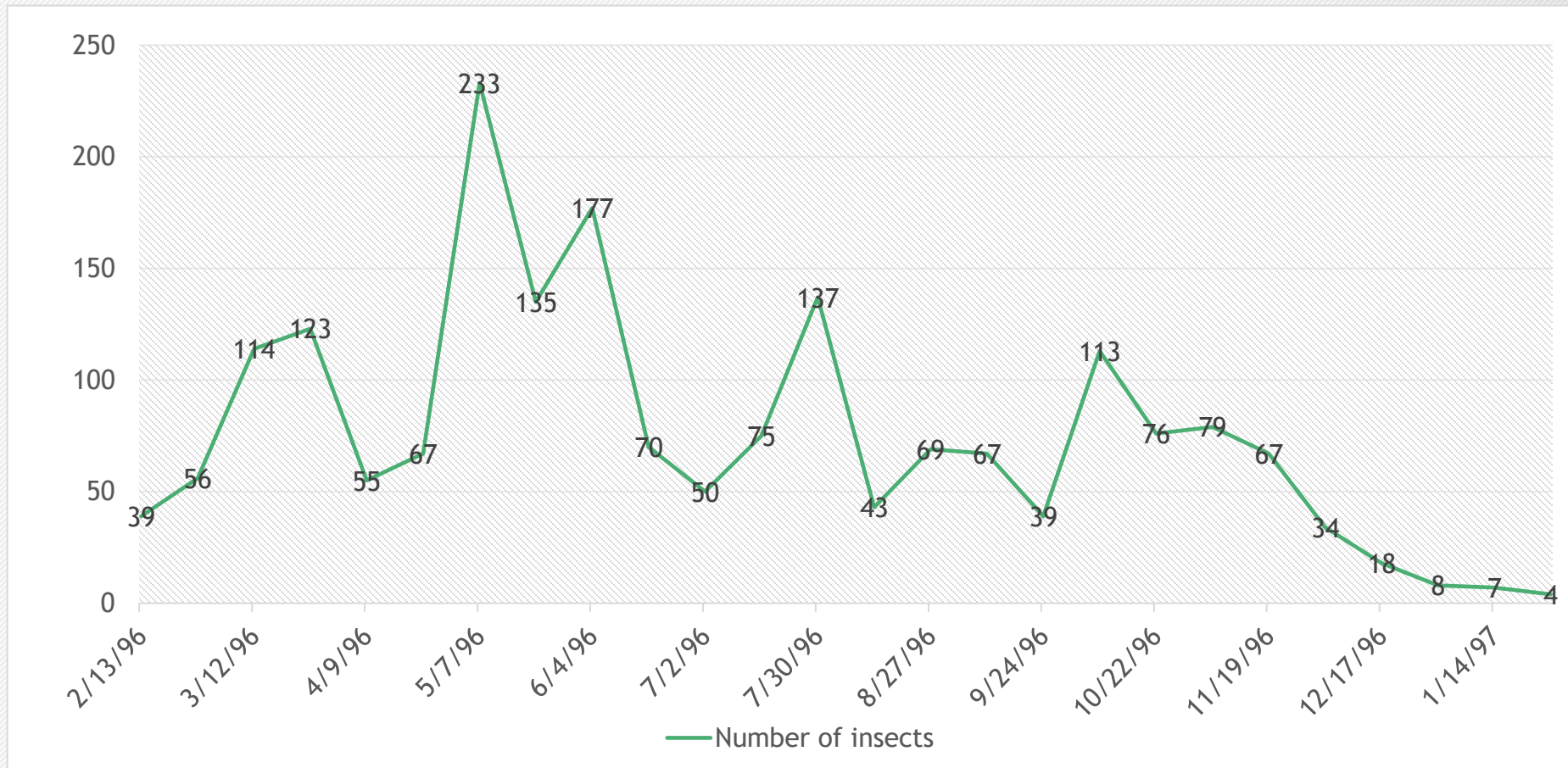
Red Palm weevil (*Rhynchophorus ferrugineus*) – Life Cycle

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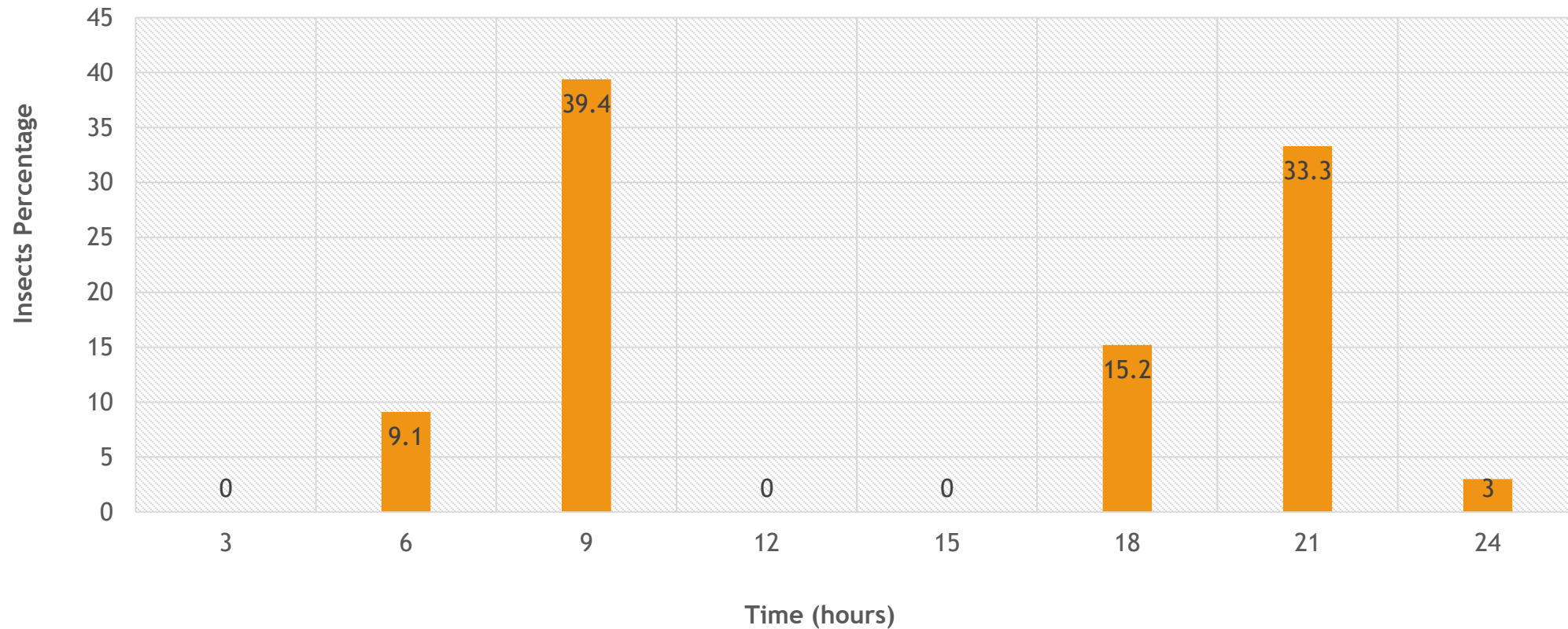
Seasonal Fluctuation in the Population of Red Palm weevil

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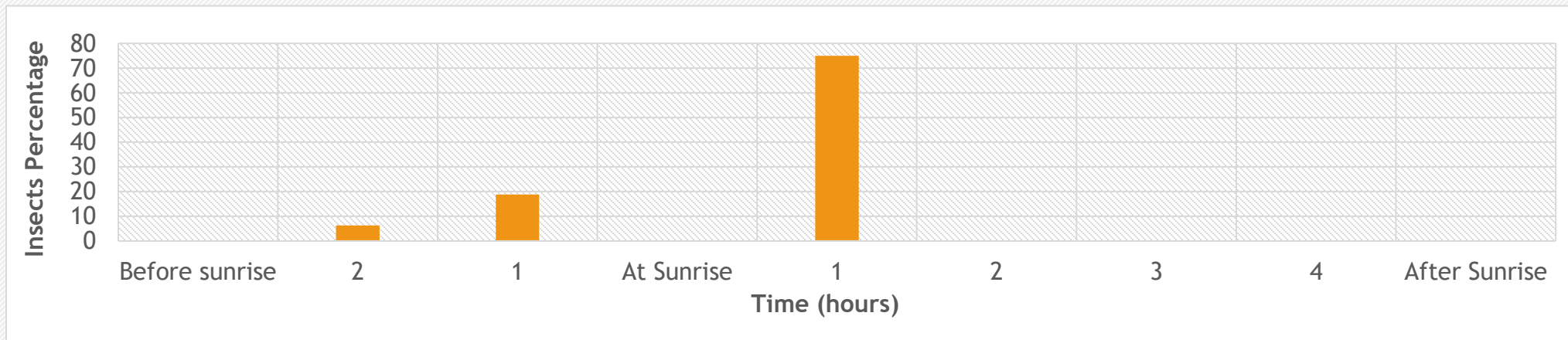
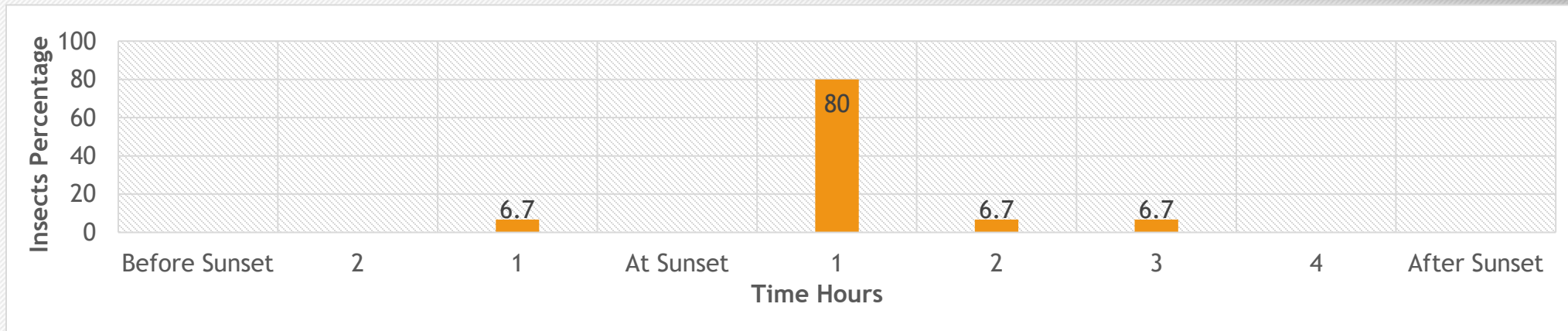
The number of red palm weevil insects fluctuated during the day in the period from 16-20 October 1999

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The fluctuation of red palm weevil insects during their peak activity (the period of sunrise and sunset period) in the period 16-20 October 1999

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Date palm stem borer (*Pseudophilus testaceus*)

Family: Cerambycidae Order: Coleoptera

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- The palm stem borer is spread in many Arab countries and is found in areas where there are weak palms which do not take adequate care in agricultural operations such as irrigation, appropriate fertilization and pruning.



Date palm stem borer (*Pseudophilus testaceus*)

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- Symptoms of infestation:
 1. The existence of exit holes of adults on the stem.
 2. The presence of gummy secretions on the stem of the affected palm. Where these secretions flow from the bases of the larvae's tunnels as a result of their feeding.
 3. The successive infestation leads to the weakening of the trees due to the large number of tunnels in them, and thus the production of the affected palm decreases, and the affected palm becomes susceptible to breakage



Date palm stem borer (*Pseudophilus testaceus*) Life Cycle and Seasonal Activity

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- Life Cycle:
 - The female lays her eggs individually in any cracks on the trunk of the palm or on the bases of the fronds, when the eggs hatch, the larvae burrow directly into the trunk of the palm as they are legless, and the larvae are the harmful stage in this pest.
 - In Iraq Ziaab 1975 reported that the duration of the egg and larval stage were 15 days and 12-14 months, respectively.
- Seasonal Activity:
 - In the Sultanate of Oman, adults begin to emerge in May. The period of insect activity extends until August.
 - The peak of the insect activity is in June.

Fruit stalk borer

Family: Scarabaeidae Order: Coleoptera

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- Oryctes is a group of large beetles that attack the date palm, and there are types of this genus that attack palms in many countries such as: India, Pakistan, Iran, Yemen, Iraq, Saudi Arabia, and others.
- In the Sultanate of Oman recorded three types of Oryctus.
- The beetles of these borers attack the fruit-stalks and palm leaves.

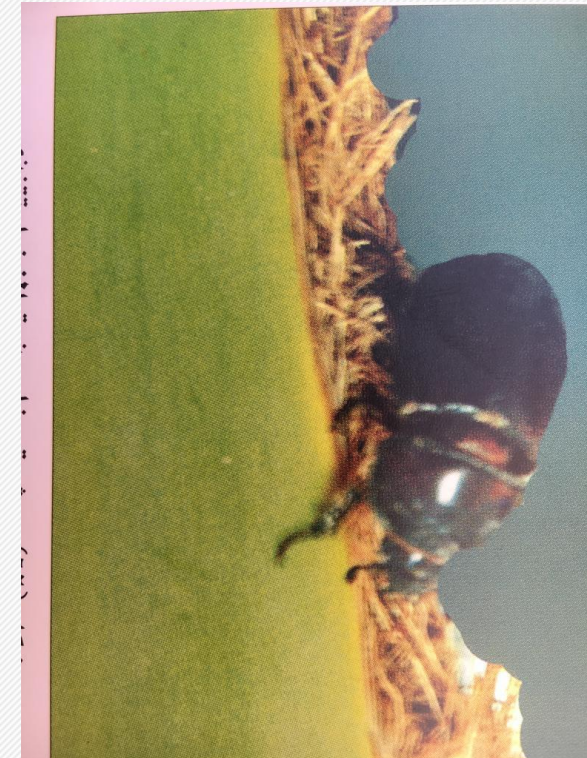


Fruit stalk borer

Family: Scarabaeidae Order: Coleoptera

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- Symptoms of infestation:
 1. The beetles of these borers attack the palm leaf and stalks. We can easily see beetles feeding residues on the infected stalks, which are in the form of dry fibers.
 2. These borers feed by digging superficial tunnels along the stalks
 3. The larvae also dig in the part connected to the soil.



Fruit stalk borer

Family: Scarabaeidae Order: Coleoptera

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4. Oryctes beetles also attack fronds. Where it feeds on the leaves and makes deep tunnels in it, which may lead to breaking the fronds .
5. The beetles also feed on palm pollen and cause it to rot. It was also noted that the beetles of this pest can feed on the live and non-rotting parts inside the trunk.
6. They are very attracted to light at night

Fruit stalk borer - Life cycle

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- The females lay their eggs in heaps of organic fertilizers and decomposing plant residues on the farm. In other words, it lays its eggs on weak or semi-dead palm stalks.
- It was also found that the females of some species may lay their eggs between the fibers at the bases of the leaves.
- The eggs hatch after 6-8 days.
- The duration of the larval stage is from 9-10 months, and the duration of the pupa is about 3 weeks, which means it has one generation per year.

Seasonal Activity

- The adults are present from April until September-October The peak of the insect activity is in June.



Integrated management of palm pests

Integrated management of palm pests

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The main objective of integrated control is to use all possible means to combat the pest, taking into account the safety of the environment and the economic cost, as well as reducing as much as possible the number of insects.

The methods of integrated control include the following:

1. Agricultural control:

- Taking care of palm tree service operations in terms of fertilization, irrigation, and palm planting at appropriate distances, as planting palms at distances helps in the ventilation of the plant and the entry of sunlight between the palm trees.
- Removing offshoots because leaving it leads to crowding of plants, increased humidity and thus increases the infection with scale insects, dubas, red palm weevil, etc.

Integrated management of palm pests

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- Selecting good palm offshoots at the beginning of planting, uninfected and known cultivar, and must be checked well.
- Paying attention to pruning and removing dry leaves, and pruning should be done at the appropriate time. It has been recommended to carry out pruning during the months of December and January, when the numbers of red palm weevil insects are as few as possible.

Integrated management of palm pests

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2. Legislative control:

- It is not to allow the import of palm offshoots from the areas affected by the palm weevil and not to transfer palm offshoots from the infested areas to the healthy areas.

3. Behavioral control:

- The use of some traps to attract insects, such as the use of pheromone traps that attract red palm weevil and the use of light traps that attract palm stalk borers and palm stem borers.

Integrated management of palm pests

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Terrestrial



Terrestrial



Aerial



Light Trap

Integrated management of palm pests

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4. Biological control:
 - A type of *Beauveria bassiana* was recorded that parasitizes the larvae of the stem palm borer .Also fly of *Microthalma disjuncta*, parasitize on *Oryctes* and it was found that the female of this parasite lays her eggs on the larvae.
 - *Baculovirus oryctus* was used against the rhinoceros insect.

Integrated management of palm pests

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5. Chemical control:
 - The use of aerial spraying and ground spraying against dubas bug.
 - Injecting trees with pesticides to combat the red palm weevil and remove highly infected trees.
 - Spray trees against leaves and fruit pests and dust spider
 - Use some recommended soil insecticides to treat the places where *Oryctes* larvae incubate to eliminate the larvae present in these places.