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## Red Palm Weevil, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae)

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Date palm, *Phoenix dactylifera* L. (Palmaceae), is one of the oldest fruit trees in the world and is mentioned in the Qur'an and the Bible. There are approximately 100 million date palms worldwide, of which 62 million can be found in the Arab region. The origin of the date palm is uncertain. Some claim that the date palm first originated in Babel, Iraq, while others believe that it originated in Dairen or Hofuf, Saudi Arabia, or Harqan, an island on the Arabian Gulf in Bahrain.

The date palm is a perennial and can live about 150 years. The female date palm normally begins to bear dates within an average of five years from the time of planting of the offshoot. The Middle East and North Africa are the major date palm producing areas of the world.

The red palm weevil, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae), is the most dangerous and deadly pest of the date palm, as well as coconut, palm oil, sago and 13 other palm species.

Information on red palm weevil was first published in 1891 in India. This pest was first described as a serious pest of the coconut palm in 1906, while in 1917 it was described as a serious pest of the date palm in the Punjab, India. In 1918, red palm weevil caused serious damage to the

date palm in Mesopotamia (Iraq), but no insect specimens were collected to confirm it. Red palm weevil entered and was discovered during the mid-1980s in the Arabian Gulf countries. However, it has become a most destructive pest of date palms in the Middle East.

## Distribution of Red Palm Weevil

The red palm weevil occurs in the following countries: Bahrain, Bangladesh, Burma, Cambodia, China, Cyprus, Egypt, France, Greece, India, Indonesia, Iran, Iraq, Israel, Italy and Sicily, Japan, Jordan, Kuwait, Laos, Myanmar, Oman, Pakistan, Palestine, Philippines, Qatar, Saudi Arabia, Singapore, Spain, Sri Lanka, Syria, Taiwan, Thailand, Turkey, United Arab Emirates, Vietnam, and in Oceania: Papua New Guinea, Solomon Islands, Western Samoa.

## Life Cycle

All stages (egg, larva, pupa and adult) are spent inside the palm itself and the life cycle cannot be completed elsewhere. The female deposits about 300 eggs in separate holes or injuries on the palm. Eggs hatch in 2-5 days into legless grubs, which bore into the interior of the palm, moving by peristaltic muscular contractions of the body and feeding on the soft succulent tissues, discarding all fibrous material. The larval period varies from 1 to 3 months. The grubs pupate in elongate oval, cylindrical cocoons made out of fibrous strands. At the end of the 14-21-day pupation period, the adult weevils emerge. Thus, the life cycle is about 4 months.

All kinds of palms are probably suitable for the development of the red palm weevil, which has been found on the following palms: coconut palm, date palm, nighbong palm, ornamental palm, palm oil, palmyra palm, royal palm, sago palm, sedang palm, sugar palm, talipot palm, and the wild date (toddy) palm.

## Eggs

The eggs are creamy white in color, long and oval in shape. The average size of an egg is 2.6 mm long and 1.1 mm wide.

## Larva (grub)

The full-grown larva is conical in shape and is a legless fleshy grub. It appears yellowish brown, while the newly hatched larva is yellowish white in color, with a brown head. The length of the full-grown larva is 50 mm and the width is 20 mm. The head is brown in color and bent downwards. Mouthparts are well developed and strongly chitinized, which enables the grub to burrow into the trunk. However, the grub requires a moist environment.

## Cocoon

When about to pupate, the larva constructs a cocoon of fibers from the palm. The cocoon is oval in shape, with an average length of 60 mm and a width of 30 mm.

## Pupa

The pupa is at first cream colored but later turns brown. The head is bent ventrally, the rostrum reaching the tibiae of the first pair of legs. The antennae and eyes are quite prominent. The elytra and wings are brought down ventrally, passing underneath the femora and tibiae of the second pair of legs, overlapping the third pair of legs and meeting in the middle of the abdomen. The average length of the pupa is 35 mm and the width is 15 mm.

## Adult

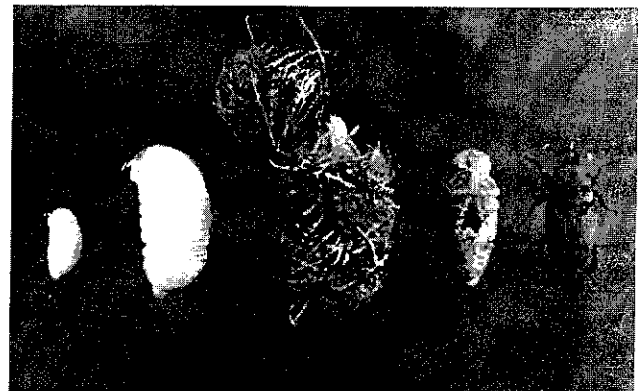
The adult weevil is a reddish brown cylinder with a long prominent curved snout. It varies considerably

in size and is about 35 mm in length and 12 mm in width. The head and rostrum comprise about one third of the total length (Fig. 11).

The mouthparts are elongated in the form of a slender snout or rostrum, which bears a small pair of biting jaws at the end and a pair of antennae near the base. The rostrum is reddish brown dorsally, and ventrally it is dark brown. In the male, the dorsal apical half of the snout is covered with a pad of short brownish hairs; the snout of the female is bare, more slender, curved and a little longer. The antennae consist of the scape and funicle. The eyes are black and separated on both sides of the base of the rostrum.

The pronotum is reddish brown in color and has a few black spots. These black spots are variable in shape, size and number. The elytra are dark red, strongly ribbed longitudinally, and do not cover the abdomen completely. The wings are brown in color and the weevils are capable of strong flight.

The male weevil has a tuft of soft reddish brown hairs along the dorsal aspect of the snout; this tuft is absent in the female. Also, the male produces an aggregation pheromone "ferrugineol" and/or "ferrolure" (4-methyl-5-nonanol), which is a synthetic lure used in the pheromone bucket traps.



Red Palm Weevil, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae), Figure 11 Red palm weevil, *Rhynchophorus ferrugineus*, life cycle: larvae, cocoon, pupa, adult.

## Economic Importance and Damage

Normally, the red palm weevil infests palms below the age of 20 years, where the stem of the young palm is soft, juicy and easily penetrated. The weevils are destructive pests to palms.

The larvae are responsible for damaging the palm, and once they have gained access, the death of the palm generally ensues. The larvae normally never come to the surface, since they begin life inside the palm. Therefore, neither the damage nor the larvae can be seen. However, the trunk of the palm can be infested in any part, including the crown.

The damage caused by only a few larvae is astonishing. Even one larva may cause considerable damage for a young palm (offshoot). It is difficult to assess the actual loss caused by this pest, but undoubtedly it affects the production of date palms.

## Methods of Control

### Integrated Pest Management (IPM)

Because the red palm weevil is difficult to control with just one method, several combinations of control methods should be applied as follows:

### Plant Quarantine

The transport of offshoots as planting material from infested areas can contribute to the spread of the pest. Strict quarantine at international and national levels should be applied.

### Cultural Control

Field sanitation and cultural practices are some of the important components to prevent weevil infestation.

- Clean the crowns of the palms periodically to prevent decaying of organic debris in leaf axils

- Avoid cuts and injuries
- When green leaves are cut, cut them at 120 cm away from the base
- Cutting of steps in palms for easy climbing is to be avoided, as this provides sites for egg laying by weevils
- As palms affected by leaf rot and bud rot diseases are more prone to weevil infestation, they are to be treated with suitable fungicides; after that, application of an insecticide to prevent egg laying by weevils is essential
- Destroy all dead palms harboring the pest by cutting and burning

## Mechanical Control

Dead palms or palms beyond recovery should be split open to expose the different stages of the pest present inside. The debris, including the outer logs and the crowns, should be burned.

## Trapping Weevils

Trapping and destroying the weevils is another method to control the pest population. Trapping also is used to detect the presence of the pest in the field and also to assess the population.

The aggregation pheromone lure of red palm weevil is used to attract the weevils to the bucket traps which contain pieces of palm stem as food and a solution of insecticide.

## Biological Control

No effective biological agent has been found that can be employed for the biological control of the pest.

## Chemical Control

The wounds produced on palms due to cultural practices as well as anther wounds are favorite sites

of oviposition by the female weevils. Treatment of such wounds by soaking them with insecticides can be an effective way to prevent red palm weevil entry into palms.

Once infestation is detected in a palm, curative control must be applied. If the infestation is in the crown, remove the affected and damaged portions and apply insecticide suspension. In case of infestation in the trunk, the infested part should be cleaned and plugged with a mixture of mud and insecticide.

Several insecticides under laboratory and field conditions are tested in order to evaluate the best insecticide that will affect the different stages of the weevil.

## Training and Education

The cooperation of the farmer is essential in order to successfully implement weevil management. For any large-scale pest management program to succeed, it is imperative that farmers cooperate and become involved at the operational level. This can be achieved by making farmers aware of the seriousness of the problem and training them in various IPM skills.

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## Red Ring of Coconut Palms

This insect-transmitted disease of palm trees is caused by nematodes.

► Transmission of Plant Diseases by Insects

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## Redtenbacher, Ludwig

Ludwig Redtenbacher was a noted Austrian entomologist, and a noted coleopterist. His most important contribution was the Coleoptera treatise of "Fauna Austriaca." He also served as director of the Royal Vienna Zoological Museum. He died in 1876 at the age of 63.

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## Reduviidae

A family of bugs (order Hemiptera). They sometimes are called assassin bugs, ambush bugs, or kissing bugs.

- Bugs  
► Assassin Bugs, Kissing Bugs, and Others

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## Red Water Fever

This tick-transmitted disease is also known as Texas cattle fever and splenetic fever.

- Piroplasmosis