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A report on the date palm weevil pest and its onset in the city of Tobruk, eastern Libya

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الملخص:

الموطن الأصلي لحشرة سوسة النخيل هو جنوب شرق آسيا. تم اكتشافها في ليبيا في مدينة طبرق بتاريخ 2009/01/17، ويعتقد أن الآفة جاءت من البلاد المصرية أثناء شحن نخيل الزينة. تم تشكيل لجنة علمية من متخصصين في أمراض النباتات والحشرات بجامعة عمر المختار، حيث قامت اللجنة بزيارة مكان الإصابة والتأكد من وجود الآفة. أوصت اللجنة باستيراد عدد من المصائد الفرمونية لرصد هذه الحشرة ومكافحتها. قام مسؤول مكافحة الآفات بالمنطقة الشرقية باستيراد عدد من المصائد حيث تم توزيعها في عدة نقاط بمدينة طبرق وخارجها. وعقدت أمانة الزراعة بمنطقة البطنان والمؤتمر الشعبي عدة اجتماعات بشأن وضع آلية لمكافحة الآفة ومنع انتشارها، تم اقتلاع وحرق عدد 5355 نخلة وعقلة وشتلة بنوعيها التمور ونباتات الزينة خلال الفترة من 2009/7/28 إلى 2009/11/24. بتاريخ 2009/12/24 توقف العمل بشكل كامل لعدم توفر التخصيصات المالية اللازمة لإتمام هذا العمل. نقل أفرع النخيل من المناطق الموبوءة بسوسة النخيل إلى المناطق الصحية يساهم في انتشار الإصابة بالحشرة. الحجر الزراعي هو الحصن الذي يحمي نباتاتك من الآفات الجديدة القادمة من الأماكن المصابة، لذا يجب الحذر من عدم استيراد نباتات أو شتلات من الخارج إلا بعد استشارة المختصين في الحجر الزراعي.

الكلمات المفتاحية: سوسة النخيل، مكافحتها، مدينة طبرق شرق ليبيا.

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Abstract

The original homeland of the palm weevil is Southeast Asia. It was discovered in Libya in the city of Tobruk on January 17, 2009. It is believed that the pest came from Egypt during the shipment of ornamental palm trees. A scientific committee was formed from specialists in plant and insect diseases at Omar Al-Mukhtar University. The committee visited the site of the infection and confirmed the presence of the pest. The committee recommended importing a number of pheromone traps to monitor and combat this insect. The pest control official in the Eastern Region imported a number of traps and distributed them in several points in the city of Tobruk and outside it. The Secretariat of Agriculture in the Batnan region and the People's Congress held several meetings to establish a mechanism to combat the pest and prevent. 5,355 palm trees, cuttings, and saplings of both types, dates, and ornamental plants were uprooted, and burned during the period from 7/28/2009 to 11/24/2009. On 12/24/2009, work stopped completely due to the lack of financial allocations necessary to complete this work. Moving palm branches from areas infested with the palm weevil to healthy areas contributes to the spread of the insect infestation. Agricultural quarantine is the bulwark that protects your plants from new pests coming from infected places. Therefore, you must be careful not to import plants or seedlings from abroad except after consulting agricultural quarantine specialists.

Key words: Palm weevil, its control, the city of Tobruk, eastern Libya.

Introduction:

The coleopteran insect pests are ranked among the most voracious pests of economically important crops. Among these notorious insect pests, red palm weevil (RPW) *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae) is highly destructive; the insect devastates 29 different palm species, particularly date palms which are economically important crops in the Middle East, Africa and South East Asia Wakil & Miller, (2015), Dembilio & Jaques, (2015). Synonymously, the pest is known as the Asiatic palm weevil, coconut weevil, red stripe weevil, and hidden enemy, and also called AIDS of palm because of the damage caused and the resulting slow death of palm trees Khamiss & Badeea (2013). The pest has a cryptic nature and mostly damages palm trees younger than 20 years Nirula (1956), Abraham et al. (1998) for which the crown, trunk and bole are the natural sites of damage. The crowns are the sites of infestation in older plantations. The larvae spend their early stages within the tree trunk, destroying the vascular system and boring into the heart of host, which may lead to tree collapse Juet al. (2011). The neonate larvae chew plant fibers and advance towards the interior leaving behind the chewed-up frass, which has a typical fermented odor. The completely developed grubs pupate in a cocoon fabricated from chewed fibers, and pupal period lasts for 11–45 days. Adult weevil can interbreed and live within the same host until they are required to colonize to a new palm. If

The plant remains untreated the palm can die within 6–8 months Kurian & Mathen (1971), Faghih (1996), Rajamanickam et al. (1995).

The taxonomy and classification of red palm weevils has undergone a number of changes in understanding and circumscription. The most recent genus-level revision by WATTANAPONGSIRI (1966). Recognized two species of red palm weevil, *ferrugineus* and *vulneratus*, and for decades these were interpreted as separate taxa. A genetic study by Hallett et al. (2004) concluded that *vulneratus* was not distinct from *ferrugineus*, and treated them as synonyms, a view that was accepted until 2013, when yet another genetic study Rugman-Jones et al. (2013). Came to the opposite conclusion, based on more comprehensive geographic sampling.

Palm weevil classification: Friedman (2021)

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Coleoptera

Family: Curculionidae

Genus: *Rhynchophorus*

Species: *R. ferrugineus*

Rhynchophorus ferrugineus

Description of the insect and its life cycle Friedman (2021)**,** Rugman-Jones et al. (2013)**:**

Adult insect is reddish-brown in color with black spots of different size, shape and number on the chest. The length of the insect is 3-3.5 cm and its width is 1.21 cm (Fig. 1). The front wings are shorter than the back of the abdomen with almost two abdominal rings, and the upper end part of the male proboscis is covered with small brown hairs, while the female proboscis is devoid of these hairs, and is longer than the male. proboscis and more cylindrical than it (Figure 2) is.

Figure 2 - Any male proboscis of the red palm weevil and it has brown hairs

Eggs:

Oval in shape, the length of the egg is 2-3 mm, and its color is milky white, gradually changing to light brown. (Fig. 3)

Figure 3: Red palm weevil's eggs

Larva:

They are milky white in color, legless and with a brown head that bears very strong jaws that make them capable of cutting through the palm wood and turning it into bran or paste. The larva has 13 rings, the color of the two rings adjacent to the head is light brown, and the last ring is flat with ends rough structure. The full larva is 30-55 mm long and 18-22 mm in diameter (Fig. 4). The larval stage is the harmful stage, where it is found on living tissues inside the palm tree, which leads to its death.

Figure 4: Red palm weevil's larva

Pupa

The pupa is located inside a cylindrical cocoon of palm fiber bristles, usually under the bark of the palm in the outer circumference of the stem. The color of the pupa inside the cocoon at the beginning of this stage is white and has large prominent eyes, and with age it turns into a light brown color, (Fig. 5)

Figure 5: pupa and the cocoon of

Life cycle:

During its three-month life. The insect lays 200- 300 eggs. Individually laying in holes resulting from infection with other insects, or in holes dug by the insect with its hose in the crown area or in the armpits of the leaves. In addition, the insect prefers to lay eggs in the parts of the newly cut leaf, or in the bases of the raw keep and the meeting of the fluid with its mothers. and the eggs hatch within a period ranging between two and five days, and small, legless larvae emerge that move by contracting the muscles of the body. The phase ranges between 12-21 days, after which the adult insect emerges, mates and lays eggs five days after exiting the cocoon Friedman (2021), Rugman-Jones et al. (2013).

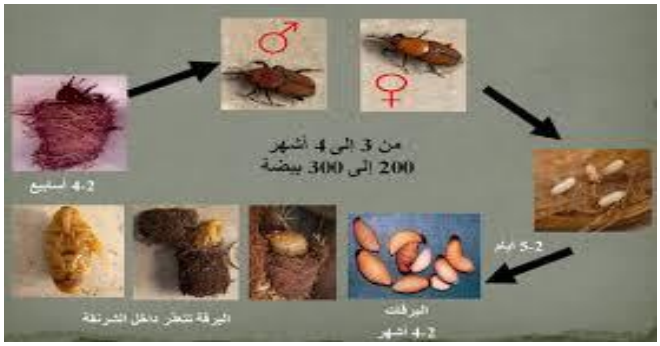

Figure 6: The life cycle of the red palm weevil

Distribution of the pest worldwide:

This pest spreads in many regions of the world such as India (the original home), Pakistan, Sri Lanka, Indonesia, the Philippines, Burma, Bangladesh, Thailand, Malaysia, Iran, Qatar, the Sultanate of Oman, Saudi Arabia, the United Arab Emirates, Kuwait, Jordan, Palestine, Egypt and Spain. It has been registered in recent years in a number of countries, including Morocco,. Syria, Turkey, Greece, Albania, Italy and France Friedman (2021), (17).

Manifestations of injury:

It is difficult to know the stages of the beginning of the infection, as the larvae are inside the trunk and cannot be seen outside the trunk. In addition, the damage cannot be seen directly, but the later stages of infection can be observed, which include the exit of a sticky brown liquid with an unpleasant smell that flows on the stump. The palm is mixed with a soft sawdust that has the same smell on the trunk. The wear of the injury site in the tissues of the leg. In addition, the death of some cysts around the trunk of the mother palm, where there is wear and eat the base of the seedling. Which can be separated easily by hand, and there are some stages of the insect in the area of infestation below the seedling – Yellowing. In addition, staining of some of the fronds in the palm and by removing it. The infestation is noted below the base of the fronds, the presence of some stages of the insect, the death of the growing top of the palm and its head tilting towards one side Friedman (2021).

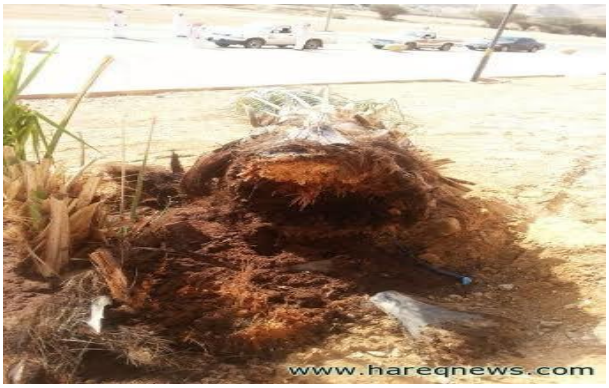

Figure 6: A yellowish white liquid comes out from the site of the injury, turns brown, has a heavy consistency and has an unpleasant odor

Figure 7: The injury site was worn out in the palm stumps

Figure 8: The presence of one of the stages of the insect with the mulch emerging from the infestation

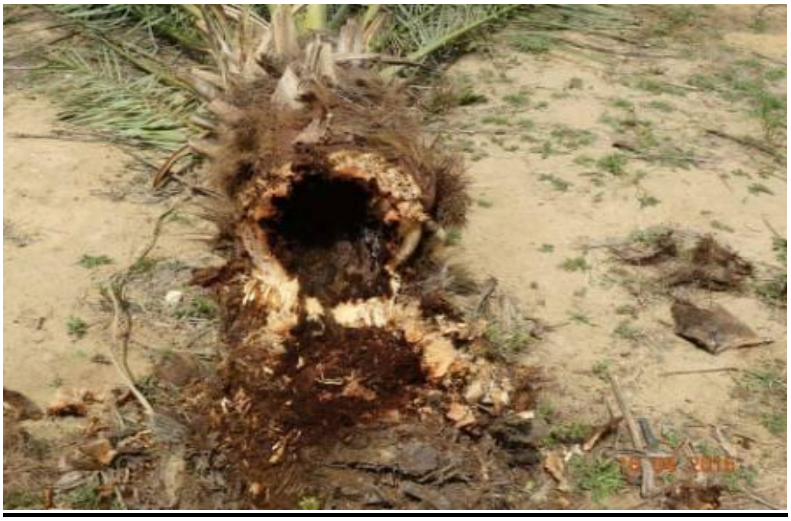

Figure 9: The fall of the palm tree to the hollowness of its trunk due to advanced injury.

The timing of the discovery of the injury in Tobruk, Libya:

It was discovered in Libya, in the city of Tobruk on 01/17/2009, by a student at the Faculty of Science and Arts in Tobruk at Omar Al-Mukhtar University. While students were

collecting insects and this was done on a farm Bou Zazaki in the Bou Dou Valley in the center of Tobruk.

Tobruk is a small coastal city on the Mediterranean basin. Desert surrounds the city from east, west and south. Area of the populated city is about 35 km².

In addition, by virtue of the proximity of the city of Tobruk as a border area of the Arab Republic of Egypt, it is believed that the pest came from the Egyptian country during the shipment of ornamental palms.

A scientific committee was formed from a specialist in diseases and insects at Omar Al-Mukhtar University Al-Bayda through the Director of the Pest Control Office in the Eastern Region, where the committee visited the infestation and confirmed the presence of the pest.

The most important procedures followed by the Ministry (Materials and methods):

Figure 10: The process of spraying trees with pesticides

The General People's Committee for Agriculture, Livestock and Marine Resources

Date: February 17, 2010

A memorandum of the measures and steps taken regarding the control of the red palm weevil, whose appearance is registered in the city of Tobruk, in the Al-Batnan district.

The committee recommended importing a number of pheromone traps to monitor and control this insect.

The Pest Control Office in the Eastern Region imported a number of traps from the Arab Republic of Egypt, where they were distributed at several points in the city of Tobruk and outside, to include the survey process in several conferences, including the Jagboub Oasis.

In addition, through the process of following up on the results of the traps, it was confirmed that the infection was spreading inside the city of Tobruk only.

In addition, based on the repeated visits of the technical committees and relevant authorities, the Secretary of the General People's Committee for Agriculture, Livestock and Marine

Resources issued Resolution No. (138) for the year 2009 regarding the removal of infected palm trees in the city of Tobruk.

After that, the Secretary of the People's Committee for Agriculture, Livestock and Marine Resources in Al-Batnan District and the Director of the Pest Control Office in the Eastern Province issued an assignment order No. 4016 on 07/28/2009 to form a committee to supervise and follow up the implementation of Resolution 138 of 2009 referred to above.

The committee started its work on 07/28/2009, where it located the incinerator in coordination with the Environmental Sanitation Office of the Facilities Secretariat.

Three agricultural police control points have been identified in each of the following:

Land port auxiliary

The eastern entrance to the city of Tobruk.

Tobruk city entrance

With the aim of preventing palm trading operations from and to the city of Tobruk and preventing the entry of any seedlings from outside Libya in coordination with the relevant authorities.

5355 palm trees, cuttings and seedlings of both types, dates and ornamentals, were removed, and burned from 07/28/2009 to 11/24/2009 AD.

On 24/12/2009, work stopped completely due to the lack of financial allocations necessary to complete this work.

Due to the rapid spread of the insect and its danger, which was represented in the fall of a number of palm trees in the center of the city, which indicates the severity of the infection, he:

M. / Director of the Locust and Agricultural Pest Control Office in the Eastern Province, addressing M. / Secretary of the Management Committee of the Locust and Agricultural Pest Control Center on 08/12/2009.

And M. / Secretary of the Palm and Olive Development Office in Al-Batnan Division, to address M. / Secretary of the Administrative Committee of the Palm and Olive Authority on 10/12/2009

In addition, M. / Secretary of the People's Committee for Agriculture, Livestock and Marine Resources in Al-Batnan District, to address M. / Secretary of the General People's Committee for Agriculture, Livestock and Marine Resources on 16/12/2009 AD.

All these correspondences focused on the seriousness of the scourge and its rapid spread, and the demand to secure the necessary capabilities to combat it and reduce its danger.

Organized visit FAO to Tobruk:

The representative of the FAO and the follower of the red palm weevil in the Middle East and North Africa, Dr. Juicy Room Yino Valero visited the cnity of Tobruk. accompanied by a committee commissioned by the Palm Development Authority, during the period from 20-23/02/2010 AD to review the measures taken in this regard, expressing satisfaction with the speedy response taken in taking the measures and recommending the following:

Spray the affected trees around the affected area.

The speed of removing infected trees in the area before the period of insect activity and mating, which usually begins from March to June.

Continue to monitor and monitor the pest even after removal operations.

Other regions in Libya recorded injuries:

It has infiltrated into Libya and appeared at the end of 2009 in Tobruk on ornamental and date palms, then in the Sunday market in Tarhuna 2010 on date palms. Then in Benghazi 2017 on date palms and ornamental palms, and finally in Hun 2019 on date palm.

Control methods:

Mechanical control:

The use of traps to attract whole insects, including poisonous bait traps that attract insects through the smell of fermented materials, as well as food pheromone traps to attract this insect through the use of Aggregation pheromone with pieces of palm stem or sugar cane immersed in the appropriate pesticide. 200) used with pieces of palm trunks and the insecticide was successful in catching large numbers of insects and uses one bait for every 15 palm trees in the case of irregular cultivation and one bait for every 50 palm trees in the case of regular cultivations, and the bait must be renewed every (4-6 weeks). This method is considered one of the indicators of the presence of the insect as it leads to the disposal of large numbers of them Dembilio & Jacas (2011).

Completely spraying the affected trees with one of the pesticides, then completely removing the affected palms, and a fogging process is conducted for the place of the removed trees, and backfills well and the infected trunks are cut into small pieces and these pieces are transported with all their residues to the burning site. Where a hole is made with a depth of 2 m, which the parts of the palm are placed and poured over them Diesel and burn. After the burning process is completed, the pit is filled with 50-100 cm. Thick dirt and well tamped with a bulldozer to prevent, whole insects from escaping and to ensure the elimination of this pest. This method is the best way to prevent the spread of this insect Dembilio & Jacas (2011).

Chemical control:

Clean all the tunnels located on the trunks and trunks of the palm from the remnants of the insect and fill them with one of the pesticides or use phostoxin tablets where (2-5 tablets).

Placed in each slot, covered with palm fiber, and then closed the slots with mud, gypsum or cement to prevent gas leakage. Dembilio & Jacas (2011), Dutta et al. (2010).

Chemical control by using one of the liquid pesticides by installing aluminum or plastic tubes with a diameter of 12 mm and a length of (15-25 cm) in the form of an arc around the place of injury and with a number of (3-5 tubes) according to the size of the infection. The pesticide is injected at a concentration of (1 liter of pesticide for every 10 liters of water). It should be noted that if there is more than one injury on the trunk, each injury is treated by injection alone, because this local treatment treats the area of injury only and does not affect the rest of the palm. Taking into account that the injection site is 20 cm higher than the area of the injury, because the injury is moving from the bottom to the top, noting the flow of the pesticide in the tubes with high efficiency.

As for the infected offshoots, they cannot be dealt with by injection or by fumigation, because there is no woody stem for them.

Soil treatment with granular application Add 30-60 g / palm, of one of the pesticides according to the size of the palm and the number of shoots around it. where the pesticide is spread in a circle with a diameter of 1 m from the trunk and a depth of 25 cm. covering the excavation area and then backfilling and irrigating after that, and this process is repeated once every 3 months Giblin-Davis et al. (2013).

Biological control:

It is intended to encourage and multiply the natural enemies of the insect that live with it in the same environment, such as (parasites, predators, pathogens such as fungi, bacteria and viruses Dutta et al. (2010).

Prevention methods:

Preventive measures to be taken to prevent entry and spread of the pest:

Pay attention to agricultural operations related to palm service, in particular (removal of cuttings), rakes, pruning (removal of dry fronds and the remains of old seedlings) and fertilization with attention to regular fertilization and irrigation.

Combating palm stalk borers and rodents that cause tunnels to occur in palm trunks.

Soak the shoots to be planted before planting with an appropriate herbicide as a precaution.

Spray healthy trees in affected areas with one of the pesticides as a precaution.

Organizing guidance seminars to educate farmers and farmers and clarify everything related to this harmful insect by issuing guidance leaflets and preparing posters and posters for everything related to this insect.

The meticulous application of the plant quarantine regulations on imported palm offshoots. It tightens control over the plants (imagine dates or ornaments) and periodic examination of them.

Actions to be taken in the event of pest infestations:

1. Limit the areas of infection and prevent the exit of any offshoots from them.

2. Removing and getting rid of the infected palm that is difficult to treat.

3. Implementation of internal agricultural quarantine procedures by preventing the exit of shoots from the affected areas.

4. The top of the palm must be cleaned and the palm must be avoided.

5. Treat all wounds that occur because of agricultural operations.

6. When cutting the affected palm, the rootstock should be immersed under the soil surface with an appropriate pesticide until saturation.

7. When removing shoots or performing palm pruning operations, the places of removal must be fumigated with pesticide powders so that the insect is not attracted to the juice of the newly cut tissue.

8. Submerge the bases of the cuttings removed from under the palm for the purpose of planting in the nursery or permanent ground in a chemical pesticide solution.

Conclusion and discussion:

Your commitment not to plant trees and cuttings brought from palm weevil infested areas will prevent you from losing your palms.

When your area is infested with red palm weevil, look periodically for any signs of an infestation on your farm, and if you suspect an infestation, consult a plant protection specialist or agricultural extension workers in your area.

Moving palm shoots from areas infested with palm weevil to healthy areas contributes to the spread of the insect infestation.

Agricultural quarantine is a fortress that protects your plants from new pests coming from infected places, so be careful not to import plants or seedlings from abroad unless after consulting specialists in agricultural quarantine.

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