

## IMPACT OF CERTAIN FACTORS AND AGRICULTURAL PRACTICES ON INFESTATION OF DATE PALM TREES BY THE RED PALM WEEVIL (*RHYNCHOPHORUS FERRUGINEUS* (OLIV.))

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### Abstract

The aim of the present work was to study the Effect of certain agricultural practices on infestation of date palm by the red palm weevil (RPW) *Rhynchophorus ferrugineus* (Oliv.). Results showed that palm tree pruning without dusting with agricultural sulfur showed the highest infestation rate while, pruning of date palm and dusting with agricultural sulfur resulted in lower infestation rate. Flooding irrigation resulted in significantly higher infestation of date palm by RPW compared to dripping, which showed lower % infestation. The RPW infestation rates in date palm plantation were maximum in stem position of 0-50 cm. Meanwhile the lowest infestation rate was at the date palm top (growing area). Data also indicated that about 75% of date palm infestations were found at the first meter from the ground. The most susceptible date palm cultivars to RPW were seedling and Zaghloul followed by Samany and Hayany while the least susceptible cultivar was Amhat.

### INTRODUCTION

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 offshoot planting of. The Middle East and North Africa are the major date palm producing areas of the world.

The red palm weevil, *Rhynchophorus ferrugineus* (Oliv.) (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. The symptom of *R. ferrugineus* attack to date palm was summarized by Kaakeh *et. al.* (2001). Damage was categorized by the presence of tunnels on the trunk and base of leaf petiole, oozing out of thick yellow brown fluid from the tunnels, appearance of frass in and around the openings of tunnels, fermented odor of the fluid inside the infested tunnel, appearance of a dried offshoot, production of a gnawing sound by the grubs, presence of cocoon/adults in the leaf axiles, and breaking of the stem or toppling of the crown when the palm is severely infested. Current strategies for management of *R. ferrugineus* infestations involve monthly surveys of all palms in infested regions.

Infested palms are removed and infected parts are sectioned and buried. As a preventative measure all palms in infested areas are sprayed to run off with a variety of insecticides. Because of the environmental pollution and economic costs of continuous insecticide spraying, more environmentally and economically acceptable alternatives are being sought to aid in the management of this pest.

Very little information is available on the agricultural control practices of RPW which is a very safe to environment and have a good control effect. The objective of this study was investigating the effect of certain agricultural practices on infestation of date palm by RPW.

## **MATERIALS AND METHODS**

### **1. Effect of pruning on date palm infestation by RPW**

In order to study the effect of the pruning on the percentage of the infestation by RPW, five farms were chosen at Abu- Ghalep Village, 6<sup>th</sup> October Governorate during two successive season of 2009&2010 with respect to variety (Zaghlole) and age of palm tree (15-20) year, 45 palms in each farm were determined, 15 palms were marked for each treatment . The treatments were as follows.

- a- Palm plantation in which pruning was practiced without spraying insecticides.
- b- Palm plantation which pruning was not conducted.
- c- Palm plantation in which pruning was practiced with spraying insecticides. The insecticide used was Agricultural sulfur as powder.

The palm trees which marked were pruned in March and checked by looking for the symptoms of the infestation during March and April every 2 weeks, and the result was recorded. The experiment was designed as randomized completely block design with five different locations as replicates.

### **2. Effect of the type of Irrigation (flooding or dripping) on the infestation by red palm weevil**

The effect of the Irrigation types on the percentage infestation by RPW was investigated. Five farms were chosen, irrigated by flooding and five by dripping at Wardan Village, 6<sup>th</sup> October Governorate during two successive seasons of 2009-2010 with respect to variety (Zaghloul) and age of palm tree (15-20years). Then infested date palms were grouped according to their type of irrigation flooding or dripping.

### **3. Infestation position by RPW on date palm stem**

A survey was conducted to determine the infested palm trees, infested date palms with RPW were grouped according to the position of infestation at the height of (0-50, 50-100, 100-150, 150-200 cm and the infestation at the top). The infested palm was measured from the ground level (Soil surface) to the position of infestation in the same orientation of pest attack. This study was carried out during 2009-2010 years.

#### **4. Response of date palm varieties to the infestation of RPW**

A survey of different date palm varieties, which were infested by RPW was carried out to determine infestation rate of the palm trees. Then infested date palms were grouped according to their known Cultivars Zagloul, Seedling, Samany, Hayany and Amhat and the percentage of infestation was recorded for each variety.

#### **Statistical analysis**

The obtained data were subjected to regular analysis of variance of randomized complete block design (RCBD), T test distribution outlined by **Gomes and Gomez(1984)**.

## **RESULTS AND DISCUSSION**

### **1. Effect of pruning on date palm infestation by RPW during 2009 and 2010**

Data in Table (1) showed that palm pruning without dusting with agricultural sulfur showed the highest infestation rate by RPW (32%) and (28%). On the other hand, pruning of date palm and adding of agricultural sulfur resulted in lower infestation rate by RPW (5.33%) and (4.00%). Moderate percentage of infestation (12%) and (10.67%) was recorded for the non pruned date palm. In this context, Zagatti *et. al.* (1997) attracted the curculionids by allelochemicals released by the fermenting tissues of wounded host-plants. Male adults on palms emitted an aggregation pheromone that attracted adults of both sexes. This pheromone acted in synergy with plant allelochemicals. By collecting the effluvia produced by males, the aggregation pheromones were identified and synthesized.

Table 1. Effect of pruning on date palm Infestation by RPW during 2009 and 2010.

Treatments	infestation by RPW %	
	2009	2010
T1(Pruned Without Treating with Sulfur)	32.00 a	28.00 a
T2(Pruned and Treated with Sulfur)	5.33 c	4.00 b
T2(non Pruned )	12.00 b	10.67 b
LSD 0.05	5.926	6.927

## 2. Effect of the type of Irrigation (flooding or dripping) on the infestation of date by red palm weevil during 2009 and 2010

Results in Table (2) indicated that Flooding irrigation resulted in significantly higher % infestation of the date palm by RPW (21.10%) and (14.14%) during 2009 and 2010 compared to Dripping ,which showed lower % infestation (6.11%) and (6%).

The obtained results are in harmony with the findings obtained by (Krishnakumar and Maheswari 2003b and Al-Ayedh and Rasool 2009).

In this context , Krishnakumar and Maheswari (2003b) showed that the mean number of red palm weevils caught by pheromone baited trap were significantly higher in lowlands followed by that in garden lands and uplands in most of the trapping periods, which may be due to the succulence of the tissues of the trunk in those palms in wetlands and garden lands, facilitating easy egg laying by the adults and also easy penetration of larvae into the trunk. Also, Al-Ayedh and Rasool (2009) mentioned that the relative humidity (RH) had influence on the mating behavior of the red date palm weevil (RDPW), *Rhynchophorus ferrugineus* (Oliv.), and RH significantly affected egg laying as well as egg hatching. Significantly lower egg laying and hatching were recorded at 25% RH than at higher humidity levels, suggesting that low humidity conditions are better for successful control.

Table 2. Effect of the type of Irrigation (flooding or dripping) on the infestation of date by red palm weevil during 2009 and 2010.

Types of Irrigation	% Infestation by RPW	
	2009	2010
Flooding	21.10 ± 11.70	14.14 ± 11.70
Dripping	6.11 ± 5.80	6.00 ± 1.93
T value	- 2.55	- 2.81
Probability	0.034	0.023

### 3. Infestation position on date palm stem by RPW during 2009-2010

Data in Table (3) revealed that the RPW infestation rates in date palm plantation was maximum in stem position of 0-50 cm with an average of Infestation of 53.27 % followed by the position from 50-100 cm from ground with infestation percentage of 22.11%, then the average of infestation was more decreased than formers and could be arranged in descending order as follows: (13.07%) and (7.54%) at the positions of 100-150 cm and 150-200cm during the 2009-2010 respectively. Meanwhile The lowest infestation rate was 4.02 % at the date palm top (growing area). Data also indicated that about 75% of date palm infestations were found at the first meter from the ground.

The obtained results are in agreement with the data obtained by other investigators (Azam *et. al.* 2001, Osman *et. al.* 2001, Lukmah and Alquat 2002 and Aldryhim and Khalil 2003). In this respect Azam *et. al.* (2001) reported that infestation by RPW at different trunk heights of palms showed maximum infestation by RPW of 35.95% at height of 0.6 to 1m, followed by 22.22% at 1.1 to 1.5 m. However, infestation was detected in trunk height above 3.5 m. Osman *et. al.* (2001) indicated that infestation by RPW on the date palm stems showed that infestation at the height of 0-100 cm was significantly more as compared to infestation occurring at any other height. Also, Lukmah and Alquat (2002) reported that the infestation with red palm weevil mostly occurred in the lower part of the trunk, less than one-meter above the soil surface. In addition, Aldryhim and Khalil (2003) mentioned that the infestations by red palm weevil are mostly occurred in the trunk in the lower part, less than one-meter above the soil surface.

Table 3. Infestation rates of RPW at various positions of date palm stem during 2009-2010.

Infestation position on date palm stem	Date palm stem Infestation percentage of RPW (%)
0-50 cm	53.27
50-100 cm	22.11
100-150 cm	13.07
150-200 cm	7.54
Top	4.02

#### 4. Response of date palm varieties to the infestation of RPW during 2009-2010

Data presented in Table (4) showed that the most susceptible date palm cultivars to RPW were seedling and Zaghloul with % infestation of 13% , 11.7% respectively , followed by Samany , Hayany with % infestation 9.7 ,6.9 respectively. While the least susceptible cultivar was Amhat when compared with other date palm varieties .This result is in agreement with the findings of Abdel-Salam *et. al.* (2008b) when they compared the percentage of infestation on date palm varieties (Zaghloul and Samany ) .the authors found that 4348(16.88%)and 3132 (12.94%) date palm were found infested by RPW on Zaghloul and Samany cultivars.In this respect,Al-Ayedh(2008) evaluated the development of RPW on 4 popular cultivars of date palm, viz., 'Khalas', 'Sukkary', 'Khasab', and 'Sillaj' for 2 consecutive generations. the weevils reared on 'Sukkary' showed significantly better growth expressed in most parameters Such as length, width and weight at larval, pupal and adult stages. Significantly greater numbers of eggs were laid on cv. 'Sukkary' as compared to the other 3 cultivars. This might be because of higher sugar content of cv. 'Sukkary'. Adult lifespan was significantly longer on cv. 'Khasab'. Though more cocoons were harvested from 'Khalas', frequency of adult emergence was better on 'Sukkary'. Male to female ratio was similar on all date palm cultivars.

Table 4. Response of date palm varieties to the infestation of red palm weevil during 2009-2010.

Varieties	Total inspected Number	Infested number	Infestation %
Zaghloul	1903	222	11.7
Seedling	61	8	13
Samany	103	10	9.7
Hayany	175	12	6.9
Amhat	80	5	6.3

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تأثير بعض العوامل والعمليات الزراعية على اصابة اشجار نخيل البلح بسوسة النخيل الحمراء

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٦ أجريت هذه الدراسة خلال عامى 2009 و2010 فى قرى وردان وابو غالب بمحافظة  
أكتوبر بهدف دراسة تأثير بعض العوامل والعمليات الزراعية على نسبة الاصابة بسوسة النخيل  
الحمراء . وجد ان اعلى نسبة اصابة كانت فى النخيل المقلم بدون التعفير بالكبريت الزراعى يليها  
النخيل الغير مقلم وكانت اقل نسبة اصابة فى النخيل المقلم وتم تعفيره بالكبريت عقب التقليم مباشرة.  
وبدراسة تأثير طريقة الري (غمر - تنقيط) على نسبة الاصابة اظهرت النتائج ان المزارع الى تروى  
بالغمر تزيد فيها نسبة الإصابة بمعنوية عالية عن التى تروى بالتنقيط. تبين أن أعلى نسبة إصابة  
بالحشرة كانت على ارتفاع صفر-50سم يليها من 50-100سم ووجد ان نسبة تمثل 75% من نسبة  
الإصابة الكلية تقع على مسافة واحد متر للنخلة ثم يليها الاصابة على ارتفاع 100-150سم و 15-  
200سم على التوالى وتبين ان اقل نسبة إصابة كانت فى القمة النامية والتي اقتصرت على النخيل  
المتقدم فى العمر. اظهرت النتائج ان أعلى إصابة بالحشرة كانت موجودة فى النخيل البدرى يليه  
الزغلول ثم السمانى ثم الحيانى وكانت اقلها فى الصنف امهات.