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Abstract

A Comprehensive survey study of Red palm weevil (*Rhynchophorus ferrugineus*) (RPW) was conducted during the year 2017 in seven villages of Seiyun, Shibam and Al-Qateen Districts in Wadi Hadhramout. A 7544 palmswere surveyed of these trees 322 palms (4.27%) were found infested by Red palmweevil. The results showed a level of old infestation between 25 – 34% and a level of new infestation between 31 – 37%. The pest incidence was also differenced according to date varieties different among date varieties different. Eighteen investigated date palm varieties showed different response towards infestation by RPW. Sabiahsafra and Khalas were highly affected by 16.67% and 11.67% RPW infestation, whereas Nabootsaif and Mijraf showed just 2.42% and 1.32% degree of infestation respectively. The rest has no infestation. The results indicated that infestation by Red palm weevil was higher in trees groups of 6 - 10 years recording 6.14% followed by 5.77%, 4.46% in groups of 1 - 5 years and 10 – 15 years respectively, however older trees 16 older than years are more resistant to infestation. Place of infestation on the date palm stem correlate negatively with trunk heights maximum infestation of 73.9% occurred in the heights of 0.0 – 0.5 in followed by 20.8%, 4.65% and 0.62 at heights of o.6 – 1.0, 1.1 – 1.5 and 1.6 – 2.0 respectively, however no infestation was detected in trunk heights above 2.5 meter.

Key words: Red Palm Weevil, *Rhynchophorus ferrugineus*, Date Palm, Wadi Hadhramout**.**

Introduction:

Date palm (Phoenix *dactylifera* L.) is an unisexual fruit tree native to the hot arid regions of the world, mainly grown in the Middle East and North Africa. Since ancient time, this majestic plant has been recognized as the tree of life because of its integration into human settlement, well-being, and food security in hot regions of the world, where only a few plant species can flourish (3).

The tree is capable for providing a broad range of products and uses,The fruits of date palm (dates) are rich in carbohydrates, vitamins and minerals, they have immense importance as a healthy food as well as a dessert fruit providing a wide range of essential nutrients (5).

In Yemen, date palm (Phoenix *dactylifera* L.) has beenalways considered for important the economy and food security. In Yemen,date palm ranks first among the fruit crops; in cultivated areas, it constitutes about 25 % of the total fruit area. (7).

Date palm cultivation is found in most Governorates of Yemen. The estimated area ranged from 14,464 to 14,955 ha during the period 2008–2012, producing 55,181–57,849 mt of dates, in the same time period (11).However, it is more concentrated in Hadhramout and Hodeidah Governorates. Hadhramout ranks first in both area and production; the number of date palms there constitutes about 47 % of the Yemeni total. The majority of date palm trees are old and in traditional plantations where both fruit, quality and productivity are low. Local production and supply is insufficient to meet the demands of people (7).

Dates palm trees are infected by many pests, insect, fungal, bacteria and harmful weeds. Some of these pests cause serious damage and are called major pests, with a loss rate of more than 35%in the world. (1).

Many arthropod species are known as pests of the date palm (*Phoenix dactylifera* L.) worldwide (9)**.** In their review of pests and diseases of the date palm. (8) reported on more than 50 species of insects and mites as pests of date palms in various countries Red Palm Weevil Rhynchophorus ferrugineus Olivier (RPW) is a serious pest of date palm and causes severe losses. It belongs to Curculionidae family under the order Coleoptera (beetles & weevils). It is a hidden pest and remains inside the palm during the larval development and makes tunnels and pupates. The adults either emerge outside the stem or remain inside the hollow, damaged stem

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and continue to breed and thus create multiple broods or overlapping generations. (12).

Though external symptoms of attack by RPW are sometimes manifest early, but more often by the time the symptoms are identified, the palm is damaged beyond recovery and has to be eliminated or destroyed. The female weevil after mating deposits eggs into soft tissues of the palm or any fresh wounds caused mechanically. In its life cycle, a female may lay about 200 to 260 eggs. The eggs hatch in 3 to 5 days into larvae which tunnel into stem and remain hidden inside the trunk. The larvae will grow up to 5 cm and reach pre-pupal stage after several instars in about 60 to 90 days. Pupation occurs in a cocoon spun with chewed fibers and lasts for about 20 days. The adult on emergence may remain inside the stem or may disperse and spread the infestations to other palms. . (12).

The date palm is attacked by a number of insects, but in the recent past the red palm weevil, *Rhynchophorus ferrugineus* Oliver (RPW), (Curculionidae: Coleoptera) is causing a menace in Wadi Hadhramout particularly in Seiyun, Shibam and Al-Qateen provinces. It is also reported attacking date palm in UAE, Saudi Arabia, Iraq, Oman, Egypt and a number of other countries. (6).

Scarce information are available on the biology, ecology, and extent of damage, varietal susceptibility and management of RPW on date palms. Keeping in view the seriousness of RPW, the objectives of this study is to carry out a thorough survey of date growing areas in some districts in Wadi Hadhramout to gather certain information about the RPW incidence such as

- identify RPW life stages in infested date palm trees
- Susceptibility of different date palm varieties to Red Palm Weevil(RPW).
- degree of old and new infestation of date palms in surveyed areas
- Evaluation of infestation according to date palm age
- Infestation of RPW at different trunk heights of palms.

Material and Methods:

Surveys of Red palm weevil (*Rhynchophorus ferrugineus*) (RPW) infestation in date palms were conducted during April – July, 2017 in two villages in Seiyun district namely, Madodah and Ard Awn Algably, and four villages in Shibam district namely, Wadi Bin Ali, Shakiah, Khamor and Al-Hazem and one village in Al-Qateen district namely, Hathyah in wadi Hadhramout region, Hadhramout Governorate, Republic of Yemen to gather certain basic information on the infestation of the pest on palm trees.

1- A total number of 10 farms were surveyed, (2) in Seiyun district, (4) in Shibam district and (1) in Al-Qateen, during April – July 2017.

A survey was issued to over 10 date palm farm in some districts in Wadi Hadhramout i.e. Seiyun, Shibam and Al-Qateen in April – July 2017 a 7455 date palms were surveyed. The farms were randomly selected together information about infestation byRPW in those provinces. The same written questionnaire was used for farms alike.

The first questionnaire dealt with the origins of date palm, about the farm, its location, total number of palms, old infestation, new infestation, level of infestation as low, medium and high,As shown in Table (1) division of the infestation if it is old or new, where the degree of infestation is old if it has more than a year In both cases the classification of the degree of infestation to a low infestation and moderate infestation and high, depending on the symptoms of infestation and degree of infestation, and date of recording months. The varieties and infestation due to varieties were also recorded.

The second questionnaire was developed to record the infestation by red palm weevil in palms of different age group. Palms were categorized into 5 age groups as 1-5, 6-10, 11-15, 16-20 and >20 years. Total number of palms and number of infested palms were recorded under each age group.

Data were in the fourth questionnaire collected on red palm weevil infestation in relation to trunk height of date palm. The height levels were categorized into 8 levels as 0 - 0.5, 0.6 - 1.0, 1.1 - 1.5, 1.6 - 2.0, 2.1 - 2.5, 241 2.6 - 3.0, 3.1 - 3.5 and > 3.5 m height from ground level. The number of palms infested by each height group were recorded.

Results and Discussion:

The life stages of red palm weevil(RPW) in different villages:

During the survey in some districts of Wadi Hadhramout (Seiyun, Shibam and Al-Qateen) to determine the incidence of RPW in date palm, typical life stages of red palm weevil(RPW) were observed and were illustrated in figures 1a – 1d.

Figure 1a. Red palm weevil eggs

Figure 1b. Red palm weevil mature larva

Fig. 1c: Pupa (without cocoon)

Figure 1d. Red palm weevil adult

The male and female weevils can be distinguished based on a smooth hairless rostrum in female (Fig. 2) while in males the dorsal surface of rostrum has a tuft of hairs (Fig. 3). Our results agree with (12) who found the four typical life stages of RPW (eggs, larva, pupa and adult male and female weevil.

Fig. 2: Adult female weevil

Fig. 3: Adult male weevil

Infestation level of Red palm weevil (RPW) in different villages:

During year 2017 (Table 1) a total 7544 date palms were observed, 1103 palms in Seiyun district, 2231 in Shibam district, and 4210 in Al-Qateen district. Out of which 322 palms (4.27%), were found infested by RPW. The percent infestation was the highest (5.23%) in Al-Qateen district while it was the least (2.45%) in Seiyun district. In Shibam, the average of percent infestation was (5.07%).

Table 1: Incidence of Red palm weevil (RPW) on date palm in different villages of Wadi Hadhramout (Districts, Seiyun, Shibam and Al-Qateen)

Name of District	Name of the village	Total No. of farms surveyed	Total No. of palms	No. of palms infested		Total No. of palms infested	Infestation %
				Old	New		
Seiyun	Madodah	1	401	2	5	7	2.45
Seiyun	Ard Awn Algably	2	702	13	9	22	
Shibam	Wadi Bin Ali	2	874	15	10	25	5.07
Shibam	Shakiah	1	167	9	11	20	
Shibam	Khamour	1	239	2	6	8	
Shibam	Al-Hazem	2	951	3	17	20	
Al-Qateen	Hathayah	1	4210	70	150	220	5.23
Total			7544	114	208	322	4.27

The results in Table – 2 showed Out of 322 (4.27%) infested palms recorded during the survey, 211 palms were with old infestation and 111 showed new infestation. Among the old infested palms (Table 2) palms 87 (41%) had medium level of infestation and palms 71 (34%) with high level of infestation and 53 (25%) with low level of infestation, and among the palms with new infestation 35 (31.5%) palms had low level of infestation, 35 palms (31.5%) medium and 41 palms (37%) with high level of infestation. This result agrees with (6), who reported that the infestation in the early stage undergoes unnoticed and the symptom appears later when the infestation increases.

Table 2: severity levels of Red palm weevil (RPW) on date palm in certain villages of Wadi Hadhramout (Districts, Seiyun, Shibam and Al-Qateen), Wadi Hadhramout

Districts	Total No. of date palms inspected	Number of infested Date palms							
		Old infestation			Total	New infestation			Total
		Low	Medium	High		Low	Medium	High	
Seiyun	1103	0	2	13	15	3	10	1	14
Shibam	2231	14	12	18	44	12	8	9	29
Al-Qateen	4210	39	73	40	152	20	17	31	68
Total	7544	53	87	71	**211**	35	35	41	**111**
Percent infestation %		**25**	**41**	**34**		**31.5**	**31.5**	**37**	

Response of Date Palm Cultivars to Infestation by RPW:

18 varieties of date palm were inspected. The dominant varieties grown the inspected farms were Barhi (1992 palms), Khalas (1388 palms), Madeni (1140 palms), Naboot saif (466 palms) and Mijraf (461palms). Other varieties were grown in relatively low number but still seen in many farms such as Sabiah safra (126 palms) and Sukkari (285 palms). The rest of the varieties are grown but not infested by red palm weevil (RPW) such as Hamra, Hajri, Hashdi, Fahel, Zamni, Sariaa, Sabiah, Khodry, Sari, Gizaz and Segae. Surveyed date palm varieties showed different level of infestation (Table3), percentages of infestation were Sabiahsafra showed the highest infestation rate by 16.67% followed by Khalas (11.67%) and Sukkari (6.74%). Barhi, Madeni and Nabootsaif showed lower degrees of infestation by (4.62%), (3.26%) and (2.42%) respectively. Mijraf showed the lowest degree (1.32%) and therefore the lightest tolerance towards infestation byred palm weevil (RPM).

The field survey was carried out on date palms mention above, mostly imported from neighboring countries except traditional varieties such as Madeni, Mijraf, Sabiahsafra, Hamra, Hajri, Hashdi, Gizaz and Sariaa.

Evaluation of susceptibility suggests that there was a difference between the varieties towards infestation by Red Palm Weevil (RPW). Sabiahsafra, Khalas and Barhi were more susceptible to infestation as compared to varieties Mijraf, Naboot saif and Madeni showed some tolerance to infestation. So the farmers tended to grow good quality and high yielding Cultivars. The results of the present study agreed with those of others e.g**.** (10) and (6) who found Khalas variety are more susceptibility to red palm weevil (RPW).

The statistical results show the varieties of Mijraf, Nabootsaif, Madeni, Barhi and Sukkari the lowest percentage of infestation by red palm weevils, and there are no significant differences. The percentage of infestation of red palm weevil is moderate and there is a significant difference with other varieties such as Nabootsaif and Mijraf. There are no significant differences between Khalas and other varieties. The results of the statistical analysis showed that the infestation of red palm weevil was high and had a significant difference with most of the varieties except the variety Khalas, which has no significant difference between with Sabiahsafra.

Table 3:Susceptibility of different date palm varieties to red palm weevil infestation

Varieties		Districts			Total	Percent of infestation
		Seiyun	Shibam	Al-Qateen		
Sabiah safra	TP*	108	0	0	108	**16.67**
	INF*	18	0	0	18	
Madeni	TP*	155	471	478	1104	**3.26**
	INF*	4	9	23	36	
Khalas	TP*	98	100	1135	1243	**13.1**
	INF*	3	26	116	145	
Barhi	TP*	90	184	1630	1904	**4.62**
	INF*	4	14	70	88	
Naboot saif	TP*	30	30	395	455	**2.42**
	INF*	0	5	6	11	
Sukkari	TP*	20	92	155	267	**6.74**
	INF*	0	13	5	18	
Mijraf	TP*	110	248	97	455	**1.32**
	INF*	0	6	0	6	
LSD						**8.94**

Total number of Date Palms (TP)*
Total number of Infested Date Palms (INF)*

Infestation of red palm weevil (RPW) in different age groups

Infestation by red palm weevil (RPW) (Table 4) was high 6.14% in palms of the age group of 6-10 years, followed by 5.77 % in palms to the age group of 1-5 years. It was 4.46% in the age group of 11-15 years. While there were no infestation by red palm weevil(RPW) in date palm trees which were aged from 16 – 20 years and above (Table 4). These results is in accordance with (6) and (5) who found that the infestation by RPW increases in the date palm trees from 3 – 10 years, also (2) who mentioned that RPW preferred the palm of less than 20 years of age (10) reported that infestation on 6 – 10 years old palms (64.78%) was higher than infestation recorded in any other age groups and he mentioned that date palms became older they tend to be less susceptible to infestation because they have very hard stems. On the other hand, young palms have well developed soft stems, which are easy to penetrate by the weevils. This indicates that young date palms of age between 6-15 years are prone to attack by RPW and therefore needs protection.

Table 4: Red palm weevil (RPW) infestation in relation to the age of date palm

Sr. No.	Age Group (Yrs)	Total No. of Palms	No. of Infested Palms	Infestation %
1	1-5	3740	216	5.77
2	6-10	1498	92	6.14
3	11-15	314	14	4.46
4	>15	1992	0	0
	total	7544	322	

Infestation of red palm weevil at different trunk heights of palms:

Studies were made on the relationship of RPW infestation with the trunk height of the palm. It is an evident from Table 5 that maximum infestation of 73.9% of RPW was found in palm with trunk height of 0.0 to 0.5m, followed by 20.8 % in trunk height of 0.6 to 1.0 m, 4.62% in trunk height of 1.1 to 1.5 m, while it was just 0.62% in palms with trunk height of 1.6 to 2.0 m. The infestation decreased with the increase in trunk height and became nil in palm with trunk height above 2.5 m. These finding that trunk height of 0.0 to 0.5 m, followed by trunk height of 0.6 to 1.0 m comprised 73.9%, 20.8% respectively of the total infestation date palm is

in agreement with other studies on Infestation of Red palm weevil (RPW). (6) found the infestation of palms with the trunk height of.0.0 to 5.0 and 0.6 to 1 m represented 12.42% and 35.95% respectively. (10) Also indicated that severe infestation (98.01%) was recorded at palms with trunk height of 0-1m. up the stem. (10) indicated maximum infestation at the height of up to one-meter maybe due to the fact that at this height, low temperatures and high humidity are most indecisive for infestation. These conditions are favorable for insect mating, eggs laying and larval hatching; Larvae are known to be the most dangerous stage in the life cycle of the weevil as they are mainly responsible for causing the infestation. Moreover, the weevils are known to fly very low, mostly not more than one-meter high, thus causing damage up this height on the date palm stem.

Table 5: place Infestation of Red palm weevil in relation to trunk height of date palm

Sr. No.	Trunk Height (meter)	No. of infested palms in the height group	Percent infested in the height group
1	0 - 0.5	238	73.9
2	0.6 - 1.0	67	20.8
3	1.1 - 1.5	15	4.65
4	1.6 - 2.0	2	0.62
5	2.1 - 2.5	0	0
6	2.6 - 3.0	0	0
7	3.1 - 3.5	0	0
8	> 3.5	0	0

Conclusions and Recommendation

- Eighteen date palm cultivars were inspected for infestation by red palm weevil (RPW) *Rhynchophorus ferrugineus* Olivier, only seven of which were found infested the rest were infestation free.
- Infestation were limited to date palm trees of the ages of 1 – 15 years. Palms above 15 years old were not affected by this pest insect.
- Infestation was limited to lower parts of the palm trunk. Heights above 2m from the ground were not infested.
- Therefore, we recommend farmers in Wadi Hadhramout to grow date palm cultivars tolerant to this insect and pay special attention to palm trees younger than 15 years old, and
- Conduct recommended hygienic measures in date palm groves for lower parts of the trees.
- It is recommended that farmers should pay more attention to palm trees of the ages of 1 – 15 years, especially removal of old dry branches, and to look carefully for any infestation for early treatment.
- So farmers are advised to clear all dead branches at this height and look carefully for the infestation for early treatment.
- We recommend a regular inspection to check the early infection and being control program.

References:

1- Abdul Majid M,I.,Zidan, H, A and Al-Saadani J.B. (2004). Integrated Pest Management of Date Palm, Kanza Group Publishing, Egypt.

2- Abraham V.A, Koya,K M.A Kurian, C. (1975). Evaluation of seven insecticides for control of red palm weevil *Rhynchophorusferrugineus*Fabr. Journal of Plantation crops 3, 71 – 72.

3- Al-Khayri JM (2007) Micro propagation of date palm *Phoenix dactylifera* L. In: Jain SM, HaggmanH (eds) Protocols for micro propagation of woody trees and fruits. Springer, Berlin, pp 509–526.

4- Al-Maliki Khalil Gharib and Mohammed Reza Ismail. (2000). Integrated control of red palm weevil in Egypt. Launching the first workshop on the control of red palm weevil. Hasa. 20-22 November 2000, pp. 65-78.

5- Ata, S. (2011). A study of date palm market chain and its role in food security and livelihoodsof farmers in the South Punjab Faisalabad, Pakistan Master of Science Department ofAgricultural Extension, University of Agriculture.

6- Azam K.M., Razvi S. A. and IssaAlmahmuli. (2002). Survey of Red Palm Weevil (Rhynchophorus ferrugineus Oliver) infestation in Date Palm in Oman. Department of crop sciences. College of Agriculture, Sultan Qaboos University, Sultanate of Oman.

7- Ba-Angood S. (2015). Date palm status and perspective in Yemen. Department of Plant Protection University of Aden Khormakser. Aden, Yemen.

8- Calcat A. (1959) Diseases and pests of date palm in the Sahara and North Africa. *Bull. Entomol. Res*. 11:287-303.

9- Howard F.W., Moore D., Giblin-Davis R.M. and Abad, R.G. (2001) Insects on Palms. CAB International, Wallingford, UK.

10- Khalifa O., Assal A.H., Ezaby F.A., Murse, M.A., AlNuaimi, S.M. and AlZehli, N.S. (2001). Data base for infestation of date Palm by Red Palm Weevil (Rhynchophorus ferrugineus) in U.A.E and Omanwww.pubhort.org /datapalm /datapalm2 / datapalm2_26.pdf

11- Ministry of Agriculture and Irrigation (MoAI) (2013a) Agricultural Year Book – 2012. Departmentof Agricultural Statistics and Information. Ministry of Agriculture and Irrigation, Yemen.

12- Vidyasagar P.S.P.V and Aldosari S. A. (2011). IPM of Red Palm Weevil. Plant Protection Department. Food and Agriculture collage. King Saud University.

مسح لسوسة النخيل الحمراء *Rhynchophorus ferrugineus* Olivier, Curculionidae, Coleoptera على نخيل التمر في بعض المناطق المصابة في وادي حضرموت

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الملخص

أجريت دراسة استقصائية شاملة لسوسة النخيل الحمراء خلال العام 2017م في سبع قرى من بعض مديريات وادي حضرموت (سيئون، شبام والقطن) حيث تم مسح 7544 شجر نخيل منبين هذه الأشجار وجد ان 322 نخلة كانت مصابة بسوسة النخيل الحمراء. أظهرت النتائج انه في الإصابات القديمة 25% من نخيل البلح كانت الإصابة فيها متدنية و41% متوسطة و34% اصابتها عالية وفي الإصابات الحديثة 31.5% إصابة متدنية و37% إصابة عالية وتفاوتت الإصابة بالسوسة بحسب الأصناف المزروعة في مناطق المسح حيث اظهرت النتائج ان أصناف السبية الصفراء، الخلاص، السكري والبرحى أكثر قابلية للإصابة بسوسة النخيل الحمراء مقارنة بالأصناف الأخرى مثل المجراف، نبوت سيف، والمديني التي تعتبر أصناف متحملة للإصابة. كما إشارة النتائج أيضا ان الإصابة بسوسة النخيل الحمراء كانت اعلى في أشجار النخيل ذات الفئات العمرية من 6 – 10 سنوات حيث بلغت نسبة الإصابة 6.14% يليها 5.77% و 4.46% في أشجار النخيل ذات الفئات العمرية من 1 –5 سنوات و 10 – 15 سنة على التوالي، كما وجد ان أشجار النخيل ذات الفئات العمرية من 16 – 20 سنة واكثر مقاومة للإصابة ، وفيما يخص مكان الإصابة على جذع النخلة فقد أظهرت النتائج ان اعلى إصابة كانت 73.9% وذلك على ارتفاع من 0.0 – 0.5 على جذع النخلة يليها 20.8%، 4.65% ثم 0.62 وذلك على ارتفاعات 0.6 – 1.0، 1.1 – 1.5، 1.6 – 2.0 على جذع النخلة على التوالي، كما انه لم يتم الكشف على أي إصابة على ارتفاع اكثر من 2.5 متر على جذع النخلة.

كلمات مفتاحية: سوسة النخيل الحمراء، نخيل التمر، وادي حضرموت