

THE POSSIBLE EARLY DETECTION OF RED PALM WEEVIL, *RHYNCHOPHORUS FERRUGINEUS* OLIV. INFESTATION BY MEANS OF A SOUND DETECTOR APPARATUS

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ABSTRACT: *The performed field evaluation for determining the valuability of using this apparatus in detecting the occurrence of red palm weevil infestation confirmed the thorough and possible attainment of early detection of red palm weevil infestation in date palm farm; that sound detector equipment would be useful for and mostly improve the efficiency of, early detection of occurring infestation in date palm trees.*

Key words: *Visual rating and sound detector*

INTRODUCTION

In recent time the red palm weevil, *Rhynchophorus ferrugineus* Oliv., is considered as one of the utmost harmful and destructive insect-pests in date palm orchards, that became under threat in the eastern Arab countries due to the progressive and wide distribution of this insect-pest in Arabian peninsula and Gulf states, then North Africa and Egypt (Saleh, 1992; Cox, 1993; Abraham *et. al.*, 1998 , 2002 ; Kaakeh, *et. al.*,2001; Falerio, 2006). Plenty of control measures were followed to limitate the dangerousity of occurring infestation of this insect –pest and stop the continuuety of its spread, by regular surveys, insecticides application, trapping and trunk injection of infested palms (Oehlschlager; 1999) .

In fact, the infested palm is not detected early and treated often die. Particularly, the symptoms of occurring infestation is usually detected lately, after long time from the beginning of occurred egg-deposition, hatching and larval boring within the infested palm. Herein, the possible use of mean for detecting the boring larvae in palm trunk will be useful and could enhance the early detection of weevils, performance of effective control, avoid the spread of infestation.

Therefore, the present work was adopted to evaluate a sound detector apparatus for sound recordings of larval activity that may serve as a basis for future instrumental detection of red palm weevil infestation within palm trunks.

MATERIALS AND METHODS

Experimental locality and investigated palm orchard:

To examine the possible applicable efficiency and practical accuracy of the evaluated sound detector equipment 'Larven Lauscher', under the agroconditions of investigated date palm farms, small scale field experiment of two subsets was conducted on February the 21st and 22nd -2007 at New-Salhia district, Sharkiya Governorate to test the used equipment.

In the first subset twenty clean and healthy date palm trees with no injury signs or symptoms of red palm weevil's infestation were carefully chosen to be examined by the sound detector apparatus. In the second one a same number of date palm trees with or without injury symptoms of the occurring red palm weevil's infestation were randomly selected to be also examined by sound detector apparatus.

Equipment:

The used sound detector 'Larven Lauscher' (Photos, 1 and 2) was introduced in Egypt by NIR-Service W. Weinard an den Baugrten 22 a D 61118 Bad Vilbel – Germany, has 16MB memory. Built-in directional condenser microphone (mono), 23 mm 16 Ohm speaker, frequency ranges 400HZ- 3400HZ working with two DC "AAA"batteries.

Field Evaluation:

The study was carried out to detect the sound of possibly existing different larval instars of red palm weevil inside the inspected palms in case of occurring infestation. Sound sensor of the apparatus was attached to the examined parts of each randomly selected date palm tree in the farm that not shows any external signs or symptoms of infestation. Then the apparatus was reported by infested palms were discovered by the heard sounds through air phone. Results of determined were recorded and tabulated.

RESULTS AND DISCUSSION

The obtained results of both the inspected groups of date palm trees are included in Tables (1) and (2).

From Table (1), it could be seen that among the carefully chosen twenty date palm trees, in 1st subset that expected to be healthy and not infested by the weevils, six examined ones by the sound detector proved to be infested by the insect. The nextly performed thorough inspection of each of these six palm trees indicated the occurrence of invisible sings of red palm weevil infestation mostly at lower sites of the trunk near the soil surface.

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Photo (1)



Photo (2)

Photomicrograph, 1 & 2- show the used sound detector "Larven Lauscher" and its structural parts.

- (1) Amplifier**
- (2) Adaptor**
- (3) Headphone**
- (4) Electric microphone (which attach to palm date trunk)**

Table 1: The assigned accuracy of tested sound detector apparatus on the proposed healthy and carefully sampled date palm trees on Feb. the 21st 2007 in New-Salhia district, Sharkiya.

| No. of date palm tree | Result of inspection by | | Confirmation of (v.r.) result after (s.d.) inspection |
|-----------------------|-------------------------|----------------------|---|
| | Visual rating (V.R) | Sound detector (S.d) | |
| 1 | CL. | CL. | Correct |
| 2 | CL. | CL. | Correct |
| 3 | CL. | CL. | Correct |
| 4 | CL. | CL. | Correct |
| 5 | CL. | Inf. | Not-correct |
| 6 | CL. | CL. | Correct |
| 7 | CL. | CL. | Correct |
| 8 | CL. | CL. | Correct |
| 9 | CL. | CL. | Correct |
| 10 | CL. | Inf. | Not-correct |
| 11 | CL. | Inf. | Not-correct |
| 12 | CL. | Inf. | Not-correct |
| 13 | CL. | CL. | Correct |
| 14 | CL. | CL. | Correct |
| 15 | CL. | CL. | Correct |
| 16 | CL. | Inf. | Not-correct |
| 17 | CL. | Inf. | Not-correct |
| 18 | CL. | CL. | Correct |
| 19 | CL. | CL. | Correct |
| 20 | CL. | CL. | Correct |

CL. = Clean/Healthy palm. and Inf. = Infested palm.

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Table (2): The assigned accuracy of tested sound detector apparatus on the randomly selected date palm trees on Feb. the 22nd 2007 in New-Salhia district, Sharkiya.

| No. of date palm tree | Result of inspection by: | | Confirmation of (v.r.) result after (s.d.) inspection |
|-----------------------|--------------------------|----------------------|---|
| | Visual rating (V. R) | Sound detector (S.d) | |
| 1 | CL. | CL. | Correct |
| 2 | Inf. | Inf. | Correct |
| 3 | Inf. | Inf. | Correct |
| 4 | Inf. | Inf. | Correct |
| 5 | CL. | CL. | correct |
| 6 | CL. | CL. | Correct |
| 7 | Inf. | Inf. | Correct |
| 8 | CL. | CL. | Correct |
| 9 | CL. | CL. | Correct |
| 10 | CL. | CL. | correct |
| 11 | Inf. | CL. | Not-correct |
| 12 | Inf. | Inf. | correct |
| 13 | Inf. | Inf. | Correct |
| 14 | CL. | CL. | Correct |
| 15 | Inf. | Inf. | Correct |
| 16 | CL. | Inf. | Not-correct |
| 17 | CL. | Cl. | Correct |
| 18 | CL. | CL. | Correct |
| 19 | CL. | CL. | Correct |
| 20 | CL. | CL. | Correct |

CL. = Clean/Healthy palm and Inf. = Infested palm.

Also, the exhibited results in Table (2) declare the highly synchronized results of performed visual rating or/and sound detector inspections on the randomly choised date palm trees of 2nd subset. From the twenty randomizely selected date palm trees in this group, the results of made inspections by visual rating or/and sound detector apparatus for seven infested and and ten clean/healthy palm trees were sinchronizely the same. Versus, one determined palm tree by visual rating as infested one and confirmed by sound detector apparatus as healthy clean one; contravily other one palm also revealed by visual rating as healthy/clean palm tree, but inspection by sound detector proved that it is infested by the insect, (Table, 2).

Similar findings were carried out by Nakash *et al.* (2000), EL-Sebaey *et. al.* (2004) and Soroker *et al.* (2004), who gave confirmation of the possible attainment of thourough results of early detection of red palm weevil infestation by sound detector equipments, and other means of detection.

In Egypt EL-Sebaey *et. al.* (2004) utilized sound detector equipment to detect the infested palms in the field. They showed that detection accuracy in the laboratory tests were 72-100% for 2nd larval instar, 80-100% and 100% for the 4th and 6th larval instars and adult stage respectively. Field accuracy was 85-100% for free infestation trees, while it was 95-100% for infested trees, 85-100% for randomizely chosen trees and 90-100% for treated infested trees. Their obtained results clarified a promising tool for early detection and quarantine inspection.

Also, Soroker *et al.* (2004) evaluated sound equipment for detecting the boring larvae of red palm weevil in the trunks of date palm trees. They found that the use of such equipments would be useful in early detection of occurring infestation and improve the detection efficiency of weevils in palm offshoots. Thereby, avoiding the transfer of infested palms and preventing the spread of red palm weevil infestation.

In this concern, Nakash *et al.* (2000) pointed to the possible and successful use of dogs (as bio-mean) for detecting the occurrence of red palm weevil infestation in date palm farms.

From the above demonstrated results, it could be seen that the tested sound detector equipment confirmed the through and possible attainment of early detection of red palm weevil infestation in date palm farm; that sound detector equipment would be useful for and mostly improve the efficiency of, early detection of occurring of infestation in date palm trees.

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إمكانية الإكتشاف المبكر للإصابة بسوسة النخيل الحمراء بواسطة جهاز الكشاف الصوتي

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الملخص العربي

أكدت الدراسات الحقلية التي أجريت لتقييم كفاءة استخدام جهاز الكشاف الصوتي في تحديد وجود الإصابة بخنفساء سوسة النخيل الحمراء ، إمكانية و دقة التوصل إلي الإكتشاف المبكر بحدوث الإصابة بهذه الآفة في مزارع النخيل . كما أوضحت مدى فائدته في تحسين كفاءة الإكتشاف المبكر للإصابة بالمراحل التطورية المختلفة ليرقات الآفة في أشجار النخيل المصابة.