

## Population of Adults of the Red Palm Weevil, *Rhynchophorus Ferrugineus* (Coleoptera: Curculionidae) in Date Palm Farms in Ismailia Governorate, Egypt

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**Abstract:** This is a continuous study started 2009. However, in the part of this year the natural population of the adult stage of the **red palm weevil**, (RPW) *Rhynchophorus ferrugineus* was studied in date palm farms without interrupting or stress unusual factors like control treatments and or determining cultural practices e.g. pruning or off-shooting. The study took place in two sites (Wadielmollak and Kassaseen) 40 km apart from each other in Ismailia governorate, Egypt. The study lasted 31 weeks from the 2<sup>nd</sup> week of October 2009 until the 3<sup>rd</sup> week of May 2010. The weekly population of RPW adults in Wadielmollak site ranged from 0.75 to 12.25 weevils/trap. The maximum population was recorded in mid October, while the minimum population was recorded in mid December, 2009. Two peaks of population abundance were noticed, the first was during October (9- 12.25 weevils/trap), while the second was during April and May (7.75- 9.75 weevils/trap). The RPW population was remarkably low during the period from mid December to mid February (0.75 – 2.75 weevils/trap). Total number of trapped weevil from Wadielmollak reached 732 weevils. Mean number of captured weevils throughout the season was 5.9 weevils/ trap/ week. Similar population trend of adults of the RPW was recorded in date palm farms in Kassaseen site during 2009-2010 season. Weekly population throughout the season ranged 1.5-10 weevils/trap. The maximum was recorded in late October, while the minimum was recorded in early February. Two peaks of population abundance were monitored; The first during October (8-10 weevils/trap) and the second during the last week of April to mid May (3.38-4.75 weevils/trap). Total trapped reached 806 weevils throughout the season.

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### 1. Introduction

The red palm weevil (RPW), *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) is the most destructive pest of the date palm in Egypt and Arab countries since its invasion coming from the east (Saleh 1992; Murphy and Briscoe 1999). Adults of the RPW are attracted to palm trees especially to wounded and soft tissues where eggs are laid. The hatched larvae tunnel into the trunk or the terminal bud leading directly to the death of the tree (Griffith 1987; Sivapragasam *et al.*, 1990). Because of the cryptic feeding habit of larvae their control has been difficult. Primary infestations always escape attention and symptoms may not become evident until extensive damage has already occurred. Each infested tree may spread the infestation to other 7 healthy trees (Hanounik *et al.*, 2000). Larval stage lasts 2-3 months. The female may lay 370 eggs during its 2-3 month-life. The insect has 4 generations annually. Males excrete aggregation pheromone that attract both sexes for food, shelter and egg laying. This pheromone is synthetically produced in Costa Rica and used in pheromone traps for monitoring and controlling the pest. The chemical composition of the

pheromone is: 4-methyl-5-nonanol (9parts) and 4-methyl-5-nonanon (1 part) (Sanchez *et al.*, 1996; Faleiro *et al.*, 2003).

Despite the intensive efforts and the high costs of controlling RPW, it is continuously spreading everywhere and destroying the holy date palm tree. Management programs of RPW depend mainly on chemical insecticides (Girgis *et al.*, 2002). Infested trees usually injected with chemical insecticides. Date palm orchards are sprayed periodically with insecticides for protection against the pest. Chemicals may go through sandy soil to ground water and subsequently to all living organisms causing many environmental and health hazards. Biological control with safe measures is aggressively required for management of this pest.

This two-year project aimed to study of the distribution of population of RPW adults in infested regions using pheromone traps in preparation for field application of Entomopathogenic nematodes in infested date palm farms for controlling the RPW.

## 2. Materials and Methods

This study has been started (2008-2009) and continued during season (2009-2010). Four date palm farms, 10 feddans each, two farms in Wadielmollak and two farms in Kassaseen (Ismailia governorate, Egypt) were selected for the field work. About 40 kilometers distance was between the two sites. Population of the RPW adults in the four date palm farms was recorded weekly starting from October 2009. For monitoring the population of adults of RPW in studied farms, pheromone-kairomone traps designed and applied by ( Hanounik *et al.*, 2000) in Arab Gulf countries were used . The AOAD pheromone- kairomone trap consists of 10 liter plastic container with 3 circular holes in the cover and 6 holes near the upper edge of side walls. A slow release bag containing 700 mg of RPW aggregation pheromone attached to the cover beside a bag of kairomone extracted from dates. The trap is baited with 0.5 kg of dates, one teaspoon of yeast and water to fill 75% of its capacity. The traps were distributed at 100 meters distance between traps i.e. 4 traps/farm.

The aim behind this study was to monitor the population of adults of the RPW in Ismailia governorate, Egypt and to assess the effect of pheromone traps as a tool of controlling the pest in our country.

## 3. Results and Discussion

### A- Wadielmollak site

Data in Table (1) show that the weekly population of *Rhynchophorus ferrugineus* adults in Wadielmollak site ranged from 0.75 to 12.25 weevils/trap. The maximum population was recorded in mid October 2009 while the minimum population was recorded in mid December. Two peaks of population abundance were noticed, the first was during October (9 - 12.25 weevils/trap) while the second was during April and May (7.75- 9.75 weevils/trap). The RPW population was remarkably low during the period from mid December to mid February (0.75 - 2.75 weevils/trap). Total number of trapped weevil from wadielmollak reached 732 weevils. This number was captured by four traps throughout 31 weeks. Trap #3 caught the maximum (209 weevils) while trap #4 caught the minimum (158 weevils) during the season. Mean number of captured weevils throughout the season was 5.9 weevils/ trap/ week.

### B- Kassaseen site

From Table (2) like wadielmollak site, a similar population trend of adults of the RPW was recorded in date palm farms in Kassaseen site during 2009-2010 season. Weekly population throughout the

season ranged 1.5-10 weevils/trap. The maximum was recorded in late October while the minimum was recorded in early February. Two peaks of population abundance were monitored. The first during October (8-10 weevils/trap) and the second during from last week of April to mid May (3.38-4.75 weevils/trap). Wave of flight activity was recorded during mid March (4.13 weevils/trap) with unexpected increase in temperature.

Total trapped weevils by 8 traps in Kassaseen site reached 806 weevils throughout the season (30 weeks) with a mean of 3.36 weevils/ trap/ week. Trap #1 caught the maximum (175 weevils) while trap #5 caught the minimum (73 weevils) throughout the season.

Fig (1) illustrates a comparative population density of RPW adults in Wadielmollak and Kassaseen sites, Ismailia governorate, Egypt. Similar population trend with two peaks, in October and in April-May is clearly shown. Higher population density in Wadielmollak is also observed. Some irregularity in Kassaseen population trend came from the unexpected flight activity of the insect that happened in the second week of March.

We studied the natural population trend without interrupting or stress factors. Similar population trend was observed in both Wadielmollak and Kassaseen sites, Ismailia governorate, Egypt ,where two peaks of population abundance were found, the first in October and the second in April and May. Peaks of population occurred with moderate temperatures while population decrease was noticed with too hot or too cold weather. Waves of increased flight activity of the insect were observed with unexpected increase in temperature. Hanounik *et al.* (2000) studied the population of RPW in Eastern Saudi Arabia and found two peaks of abundance with four overlapping generations.

In our study, numbers of RPW adults caught by only 12 traps reached over 1500 weevils. This result agrees with other reports that pheromone mass trapping is an efficient control method of the RPW in palm orchards. Nine years ago El Sebay (2003) mentioned similar results in Sharkia and Ismailia governorates, Egypt. Pheromone traps have been reported as effective tools for monitoring and trapping RPW Nirula (1956), Binns and Nyrop (1992), El Ezaby *et al.* (1998), Hanounik *et al.* (2000), Vidhyasagar *et al.* (2000), Faleiro *et al.* (2002) and Faleiro (2005).

**Table (1)** Numbers of trapped adults of *Rhynchophorus ferrugineus* by pheromone-traps in Wadielmollak, Ismailia governorate, Egypt during 2009- 2010

Date	Trap1	Trap 2	Trap 3	Trap 4	Mean
14/10/2009	14	12	11	12	12.25
21/10/2009	07	12	12	06	9.25
28/10/2009	06	13	10	05	8.50
04/11/2009	04	09	14	04	7.75
11/11/2009	03	09	12	04	7.00
18/11/2009	06	06	03	02	4.25
25/11/2009	06	04	02	00	3.00
02/12/2009	03	03	05	02	3.25
09/12/2009	02	01	03	04	2.50
16/12/2009	01	00	00	02	0.75
23/12/2009	02	00	01	03	1.50
30/12/2009	02	01	01	03	1.75
06/01/2010	04	02	02	04	3.00
13/01/2010	02	02	02	02	2.00
20/01/2010	02	01	03	02	2.00
27/01/2010	01	02	03	02	2.00
03/02/2010	01	02	05	03	2.75
10/02/2010	02	01	02	02	1.75
17/02/2010	03	03	02	03	2.75
24/02/2010	06	05	08	03	5.50
03/03/2010	10	07	10	04	7.75
10/03/2010	08	09	08	05	7.50
17/03/2010	10	06	09	05	7.50
24/03/2010	09	06	08	04	6.75
31/03/2010	09	05	09	06	7.25
07/04/2010	08	07	09	07	7.75
14/04/2010	10	07	09	08	8.50
21/04/2010	09	07	11	08	8.75
28/04/2010	10	08	09	09	9.00
05/05/2010	09	09	09	12	9.75
12/05/2010	08	10	09	12	9.75
19/05/2010	09	10	08	10	9.25
Total	186	179	209	158	732

**Table (2)** Numbers of trapped adults of *Rhynchophorus ferrugineus* by pheromone-traps in Kassasin, Ismailia governorate, Egypt during 2009- 2010

	Trap 1	Trap 2	Trap 3	Trap 4	Trap 5	Trap 6	Trap 7	Trap 8	Mean
21/10/2009	15	10	7	7	5	8	4	8	08
28/10/2009	13	14	14	11	7	10	6	5	10
04/11/2009	5	2	4	3	2	2	5	6	3.63
11/11/2009	3	6	2	4	6	5	8	2	4.50
18/11/2009	10	4	2	4	3	2	1	4	3.75
25/11/2009	5	4	3	6	7	2	0	1	3.50
02/12/2009	8	7	4	3	2	0	1	3	3.50
09/12/2009	6	4	2	3	4	2	3	4	3.50
16/12/2009	11	4	0	2	1	1	0	6	3.13
23/12/2009	5	3	3	2	2	1	0	4	2.50
30/12/2009	3	5	0	3	0	2	1	2	2.00
06/01/2010	3	3	1	2	1	3	2	2	2.13
13/01/2010	5	3	0	3	2	3	4	3	2.88
20/01/2010	5	1	0	2	0	4	2	6	2.50
27/01/2010	3	2	2	0	1	2	3	2	1.88
03/02/2010	2	1	1	1	1	2	2	2	1.50
10/02/2010	5	3	4	0	2	0	7	4	3.13
17/02/2010	5	4	3	3	0	1	2	0	2.25
24/02/2010	4	6	3	7	2	0	1	2	3.13
03/03/2010	5	6	2	3	4	5	2	3	3.75
10/03/2010	6	6	2	4	4	3	2	6	4.13
17/03/2010	7	4	2	0	3	2	1	0	2.38
24/03/2010	6	5	2	0	1	0	1	3	2.25
31/03/2010	4	4	2	1	1	3	2	2	2.38
07/04/2010	2	5	1	2	0	2	1	1	1.75
14/04/2010	3	3	6	2	3	0	2	3	2.75
21/04/2010	5	2	1	0	0	2	1	3	1.75
28/04/2010	5	5	3	3	2	3	3	3	3.38
05/05/2010	7	7	4	3	3	2	5	2	4.13
12/05/2010	9	6	4	2	4	4	3	6	4.75
Total trapped weevils	175	139	84	86	73	76	75	98	806

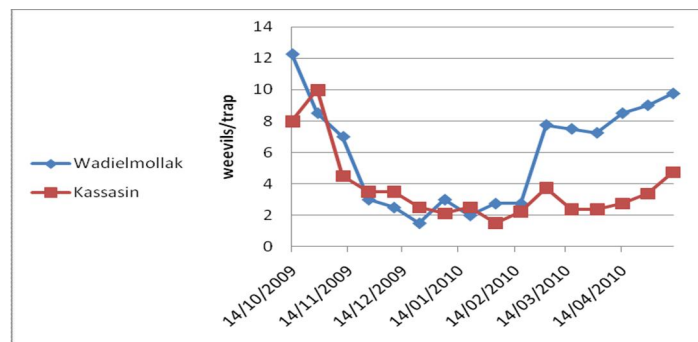


Fig. (1) Population of the red palm weevil adults in two sites in Ismailia governorate, Egypt during 2009- 2010

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