

**ECOLOGICAL STUDIES ON THE RED PALM WEEVIL
RHYNCHOPHORUS FERRUGINEUS OLIV.,
(COLEOPTERA :CURCULIONIDAE)
IN EGYPT.**

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Abstract

Results indicated that, *Rhynchophorus ferrugineus* had two main activity season annually in Egypt. The first adult brood was during April and the second one was during November. It was found that there was no relationship between seasonal population fluctuation and weather factors. Adult female attracted to the traps after laying eggs. Ethyl acetate was effective more 2.5 times for weevils attraction than food at the traps. Females density were more than males and constitutes 52.8 – 57.8 % of total population in the field.

INTRODUCTION

Date palm trees are exposed to the dangerous pest of red palm weevil (RPM) *Rhynchophorus ferrugineus* Oliv.(Coleopetra : Curculionidae) causing severe damage and destroys thousands of trees that considered the cheapest food resources in the world. Accordingly, ecological studies are very essential to help in decision making of control measurements. Moreover, biological studies was already carried out by El-Sebay (2001).

Griffith (1974), Jiron, *et al* (1993), Giblin *et al* (1996) and Oehlschlager *et.al.* (1997), used pheromone trap technique on *R. palmarum* in forecasting of red ring disease. Posada and Aaron (1991), evaluated the baits to study the population fluctuation of *R. palmarum* in Colombia. Chinchilla and Oehlschlager (1993) in Costa Rica, proved that traps baited with pheromone caught more weevils than either untreated or had host plant as much as 6-30 times. The author found that the colour of trap had no effect and the ground traps was better than hanged ones. Oehlschalger *et al* (1997) studied the spatial distribution of 243 traps over a 30 ha area. Weissling *et al* (1994) studied the flight behavior of *R. cruentatus*. El-Garhy (1996) in Egypt, found that the maximum number of *R. ferrugineus* weevils was during April – June, while the lowest one was during December – January.

MATERIAL AND METHODS

The present work was one of the research activities of The Middle East Red Palm Weevil Program in Egypt.

In order to study the seasonal abundance and seasonal activity of Red Palm Weevil (RPW) *R. ferrugineus* Oliv. in Egypt, six infested locations were chosen at Ismaelia Governorate (Al-Qua, Shiekh Sleem, Abu Sayed, Abu Naga1, Abu Naga2 and Abu Naga3). during 1996 - 1999 and continued in two locations at Abu Naga during 1999 to 2001.

During 1996-1999, twenty regular traps were distributed at each location as apart of one trap/5 feddans . Traps maintenance; provided with 2 liters water, 150gm molasses, 10 gm yeast, 250 gm sugar cane, 5gm insecticide (Lanet) and pheromone was carried out regularly. Pheromone lure was used from Chim Tica Company, consists of a mixture of 4-methyl 5-nanol and 4-methyl 5-nanone (9 : 1). Trapped weevils were weekly collected and recorded .

During the period extended from 1999 - 2001, 50 traps were distributed at Abu Naga, followed the same previous technique to get complete data of five years. In addition, weather factors (Maximum, Minimum temperature and relative humidity) prevailing in the infested area were recorded. Trapped weevils were weekly collected and sorted male and female and recorded.

Trapped females were desiccated for eggs detection in their ovaries , number of mature and immature eggs were counted inside 75 weevils distributed in 5 replicates.

The effect of replacement of ethyl acetate as a source of food odor (kairomone) instead of regular food during, 2000-2001 was studied . Another 50 traps were installed, without food (molasses + sugar cane + yeast + insecticide) and just provided with pheromone and ethyl acetate 150ml and the bucket filled with water mixed with soap . Number of weevils caught by these traps were compared with their resembles in regular traps at the same location.

RESULTS AND DISCUSSION

1. Seasonal activity and seasonal abundance of RPW

Data of attracted weevils, Fig 1 and 2, through 5 years as represent number of attracted weevils as indicated by pheromone traps during 1996 - 2001.

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Data of attracted weevils, Fig 1 and 2, through 5 years as represent number of attracted weevils as indicated by pheromone traps during 1996 - 2001.

The largest number of attracted weevils (228, 251, 226 and 167) was during April, 1997 at Al-Qua, Sheikh Sleem, Abu Sayed and Abu Naga1, respectively. While during November, they averaged 99 and 95 weevils at Abu Naga2 and Abu Naga3. The lowest number of weevils was during summer season (June - August) at Al-Qua, (31 weevils) Sheikh Sleem (27 weevils), Abu Sayed (38 weevils) and Abu Naga1 (13 weevils) and during winter season (December - February) at Abu Naga2 (35 weevils) and Abu Naga3 (1 weevil).

In 1998, the largest number of attracted weevils was during April (168, 201, 192, 125 and 118), at five locations, while it amounted 102 weevils during October at Abu Naga1. The lowest number of weevils occurred during summer season at the five locations (28, 20, 20, 18, and 21 weevils) and during winter season at Abu Naga3 (4 weevils).

In 1999, the largest number of attracted weevils (170, 211, 205, 175, 134, and 122) was during April at the six tested locations. While the lowest number (23, 31, and 10, weevils) was during summer season at three locations and during winter season at the three other locations (22, 18 and 22 weevils).

In 2000, the largest number of attracted weevils (138) was during September and April 2001 (96) respectively, while the lowest number was during February (10 and 17) in both years.

Such data in hand, revealed that there were two main peaks of adult brood; the first one (autumn brood) started from December and reached its peak during November 97, 98, 99, 2000 and 2001, and lasted 3 months and the second brood (spring brood) started from February with a peak during April at the five tested years (lasted 3 months). Spring brood is considered the main brood and represented 4-5 folds the number of attracted weevils.

Taking weather factors data into consideration (maximum and minimum temperatures and relative humidity) during 1999 and 2001, Fig.3 in conjunction with number of attracted weevils as indicated by pheromone traps there was insignificant correlation between number of weevils and maximum temperature in both years ($r = +0.352$, and $+0.332$). Minimum temperature had also no significant effect ($r = +0.22$ and 0.114) in addition to relative humidity ($r = +0.281$ and 0.320) in 1999 - 2000 and 2000-2001, respectively.

Obtained results of weather factors effect on the broods activity showed that

the main factor responsible for that was the tree itself which kept under inside stable conditions with slight effect of external temperatures or relative humidity on the internal conditions (sap and insects). The most important reason for emergency was the moisture content of the tree. i.e. when the tree reached to certain case of infestation and started to suffer from sap deficiency, larvae started to pupate to keep its survival.

2. Number of eggs inside attracted females Data in Table 1 showed that, number of mature eggs inside attracted females ranged between 7.8 – 11.5 (averaged 9.86) and 43.3 – 49.3 (averaged 64.1).

According to the biological information about female egg laying averaged 250 eggs through its life span (El-Sebay ,2001). Data revealed that females attracted to the pheromone trap after laying eggs and may had about 4% of total mature eggs and 18.4% of immature eggs still in their ovaries. Such results gave an idea about the efficiency of the pheromone traps as a control method.

3. Effect of ethyl acetate

Data presented in Table 2 and Fig. 4, showed that, the total number of collected weevils in the traps provided with food was 727 weevils /year. while it was 1824 weevils/year in traps provided ethyl acetate and increasing with 2.5 time, T- test supported results with highly significant figures (4.1 at 0.01 level).

Table 1. Number of Eggs inside attracted female weevils

Replicate*	Number of eggs	
	Mature	Immature
1	8.4	44.3
2	7.8	49.3
3	10.8	43.3
4	11.5	44.8
5	10.8	49.0
Total	49.3	230.7
Aver.	9.9	46.1

* each replicate based on 15 females

Traps provided with food, showed that females were 52.8% more than males with a ratio of 1.12 : 1, while traps provided with only ethyl acetate, females represented 57.8% more than male at a ratio of 1.35 : 1. Comparing data from Table 2 proved that number of attracted males in traps with ethyl acetate was more than traps with food with 2.26 times and females with 2.73 times, respectively.

Generally, traps provided with ethyl acetate were more effective than regular traps provided with food for weevils attraction. In addition, ethyl acetate saved food costs and time of maintenance effort approximated 70% of the total cost of traps application.

Table 2. Number of attracted males and females weevils in regular traps provided with food compared with traps provided with ethyl acetate.

Month	Ethyl acetate + lure 2000-2001			Food + lure 2000-2001		
	Number of weevils			Number of weevils		
	Male	Female	Total	Male	Female	Total
Sep.	24	29	53	35	45	80
Oct.	27	27	54	18	22	40
Nov.	41	67	108	35	40	75
Dec.	26	47	73	30	31	61
Jan.	30	33	63	11	14	25
Feb.	32	44	76	8	9	17
Mar.	117	170	287	37	40	77
Apr.	108	200	308	44	52	96
May	124	166	290	44	42	86
Jun.	117	116	233	30	30	60
Jul.	69	74	143	29	31	60
Aug.	61	75	136	22	28	50
Total	776	1048	1824	343	384	727

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دراسات بيئية على سوسة النخيل الحمراء

يسرى السباعي

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - جيژه - مصر

يهدف البحث الى دراسة وتذبذب النشاط الموسمي للمجموع الحشرى لحشرة سوسة النخيل الحمراء وتأثير العوامل الجوية السائدة باستخدام المصائد الفورمونية لمدة خمس سنوات متتالية بمنطقة القصاصين بالإسماعيلية . كما شمل البحث دراسة حالات الإناث المصائدة من حيث وضع البيض قبل الإنجاب للمصائد . وتم دراسة إستخدام مادة الإيثايل استيات كبديل للمواد المتخمرة فى المصائد مما يوفر فى إقتصاديات استخدام المصائد . دلت النتائج أن لسوسة النخيل الحمراء موسمي نشاط فى الحقل (حصنة الحشرات الكاملة) . الموسم الأول يبدأ فى سبتمبر ويمتد لمدة ٢ شهور ويصل الى قمته خلال شهر نوفمبر فى السنوات الخمس تحت الدراسة ويسمى جيل الخريف ثم يبدأ الموسم من شهر فبراير ويصل الى قمته خلال شهر أبريل ويمتد لمدة ثلاث شهور ويسمى جيل الربيع . ويمثل جيل الربيع المصدر الرئيسى لإنتشار الحشرات . ووجد أنه لا يوجد تأثير للحرارة العظمى أو الصغرى وكذلك الرطوبة النسبية العظمى والصغرى على نشاط الحشرات الموسمي . كما وجد أن أنثى سوسة النخيل المصادة قد وضعت معظم البيض قبل إنجابها الى المصائد الفورمونية . . أوضحت الدراسة أن إستخدام مادة الإيثايل استيات قد أعطت نتائج تتفوق على المواد المتخمرة بمقدار ٢,٥ مرة فى اصطياد الحشرات وانعكس ذلك على تكلفة المصيدة حيث قلت بمقدار ٧٠٪ وجدان أن أعداد الإناث تزيد قليلاً عن الذكور حيث كانت النسبة الجنسية ١,٢ : ١ .