

BIOLOGICAL STUDIES ON RED PALM WEEVIL, *Rhynchophorus ferrugineus* (OLIVIER) REARED ON SEMI - ARTIFICIAL DIET IN EGYPT

EL-DEEB, M.A. ²; M.K.A. ABBAS¹; M.M.
EL-ZOHAIRY²; AND OLFAT, E. ARAFA^{1*}.

1. Plant Protection Res. Inst., ARC, Dokki, Giza, Egypt.
2. Plant Protection Dept., Fac. Agric., Zagazig Univ., Egypt.

(Manuscript received 6 August 2018)

Abstract

Red palm weevil, *Rhynchophorus ferrugineus* (Olivier) was reared in the laboratory during 2011 under cooling incubator at $30 \pm 1^{\circ}\text{C}$. and $85 \pm 5\%$ in the Plant Protection Department, Faculty of Agriculture, Zagazig University, Egypt on semi-artificial diet (potato diet), all developmental stages were recorded including female and male longevity as follows: The egg incubation period ranged from 2-4 days with a mean of 3 days and the percentage of hatchability was 88%. The total larval period ranged from 45 to 55 days with an average of 50 days and percentage of mortality was 59%. The pre-pupal period ranged from 4 to 7 days and averaged 6 days and percentage mortality was 66%. The pupal stage ranged from 5 to 9 days and averaged 8 days and percentage of mortality was 69%. Adult pre-emergence (remain inside cocoon) period ranged from 3-10 days with mean of 8 days and percentage mortality was 74%. The percent of adult emergence was 80% and the sex ratio percentage was 49.98%. The male and female longevity were with mean of 40 and 68 days, respectively as the mean pre-oviposition period was 11 days, the mean of oviposition period were 50 days and the mean post-oviposition period was 7 days. The life cycle for female and male were 71.3 days. The mean number of deposited eggs (fecundity) was 170 eggs/female with fertility of 78.5%. The generation duration ranged from 71 to 159 days about 115 days for males and ranged from 71 to 181 days 143 days for females.

Keyword: RPW, *Rhynchophorus ferrugineus* (Olivier), biological studies, semi-artificial diet potato.

INTRODUCTION

The red palm weevil, *Rhynchophorus ferrugineus* (Olivier) (Order: Coleoptera, Family: Curculionidae) was first recorded in Egypt in date palm plantations of Sharkia and Ismailia governorates by (Saleh, 1992). Eggs are laid in the injured leaf petioles of date palm trees. Hatching larvae (grubs) tunnel through the soft wood into the heart of the trunk and feed voraciously causing destruction of the palm where they complete their life cycle. Many generations can be passed in the same palm tree. Therefore, neither grubs nor damage caused can be seen directly. Moreover, a brownish viscous liquid can be seen oozing from small holes in the crown or trunk. Often, the attack by the weevil is discernible only when the palm has been extensively damaged (Nirula, 1956). Laboratory rearing of insects is very important to maintain

purity, age and sex based selection for carrying out lab and field test for improving the control strategies. The knowledge of insect biology, behavior population dynamics and availability of various stages in bulk amount facilitates in keeping many factors unbiased (Shahina *et al.*, 2009).

Aims of the present study was to evaluate the effect of a new semi-artificial diet (potato diet) on some biological aspects of RPW under a cooling incubator at $30 \pm 1^\circ\text{C}$. and $85 \pm 5\%$.

III-MATERIAL AND METHODS

1. Biological Studies

The laboratory studies of RPW were conducted in laboratory under controlled conditions during 2011 ($30 \pm 1^\circ\text{C}$ and $85 \pm 5\%$) in the Plant Protection Department, Faculty of Agriculture, Zagazig University.

Adults of RPW were collected from highly infested palm tree orchards at Abo-Nagi farm ,El-Kassassein ,Ismailia governorate. Insects were then transferred to a rearing room and reared on freshly and soft shredded sugarcane stem tissues as a source of food and oviposition site for adults, plastic boxes (30x20x15 cm.) with tight fitting perforated covers were staked side by side. The sugarcane pieces were checked daily and replaced with fresh cuttings when necessary.

1.1.1. Eggs stage

Eggs were collected by using a fine moistened brush and arranged on filter paper into petri dishes. The eggs were kept in an incubator adjusted at constant temperature of $30 \pm 1^\circ\text{C}$ and $85 \pm 5\%$ RH%. Eggs were examined daily and the incubation and hatchability percentage aspects were estimated. Ten replicates (each 10 eggs freshly laid) were used. Both hatchability % and the incubation period were recorded. (Plate 2).

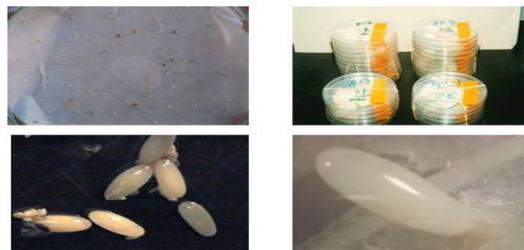


Plate (2): Egg stage

1.1.2. Larval stage

Rearing on semi-artificial diet, according to El-Sebay *et al.* (2003). The diet contents were as follows; 1 kg of sweat potatoes, 250 g fresh carrot, 20 g glucose, 4g casein, 15 g agar, 250 g cereals, vitamin B (1mg) and vitamin D (0.2 mg). Contents

were dissolved in half litter water and mixed carefully together and first stirred in a blinder, then boiled until complete cooking was achieved. Recommended vitamins (B and D) were then added on cold diet, the diet was completed with the recommended components and amounts. The diet was left for normal cooling and poured in plastic cups equal in size and kept in a refrigerator.

A total of 100 newly hatched larvae were collected and divided into 10 replicates; each replicate contains 10 newly hatched larvae. The 10 larvae were grouped as follows: By fine brush, from 1st to 3th instars larvae were introduced individually (one larva into rearing plastic tubes and used for rearing larvae of RPW. The sizes of rearing tubes (diameter and height) were (2 x 5 cm), (4.3 x 8 cm) and (7.5 x11 cm) for the 1st, 2nd and the 3rd larval instar where the 4th, 5th, 6th, 7th, 8th, 9th and 10 instars, where transferred in rearing cups. Cups were tightly covered with a perforated plastic cover. The food was changed, whenever necessary or consumed. These cups were checked daily, at the end of larval development, some of the palm bark fibers were placed near the larvae to help cocoon formation, (Abd El-Fattah, 2010) (Plates 3 and 4).



Plate (3): preprepared semi-artificial diets (potato diet)



Plate (4): larval stage

1.1.3. Pupal stage

Hundred of full grown larvae, were divided into ten replicates, 10 each, and kept individually in a perforated cylindrical plastic containers (10 cm height and 13 cm diameter) between two layers of a dampish date palm bark fibers and covered with a perforated plastic cover plastic. These containers were placed in the same incubator and daily observed. The inspection of these cocoons was carried out by opening each

of them from its posterior end during observation and then enclosed (Hussein, 1998). Durations of pre-pupal , pupal and adults remain inside cocoon periods and mortality percentages were calculated and recorded (Plate 5).



Plate (5): pupal stage

1.1.4. Adult stage

Newly emerged adults were taken and each pair (male and female) were put in 1 liter plastic Jars (13 cm. height x 6 cm.diameter). Ten replicates each contained one couple were placed in plastic jars (13 cm. height x6 cm. diameter) and tightly covered with perforated plastic cover. Insects were reared on soft and freshly shredded sugarcane stem tissues as a source of food and ovipositional site for adults. Eggs were collected by using a fine moistened brush and arranged on a moisted filter paper in petri dishes .Numbers of eggs laid by each female were daily counted . Containers were placed carefully in the incubator, pre-oviposition ,oviposition and post-oviposition periods, longevity of both sexes, fecundity and fertility of adult females, life cycle and generation duration were recorded. (Plate 6 and 7).



Plate (6): Adult stage

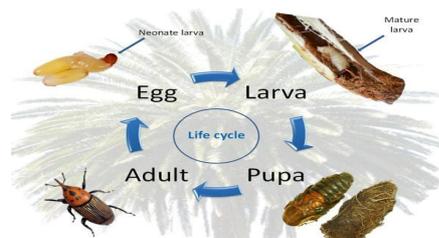


Plate (7): Life cycle of RPW (C.F WaqasWakilet a/ 2015).

IV-RESULTS AND DISCUSSION

1. Biological studies on RPW, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae) reared on semi-artificial diet.

1.1. Egg stage

1.1.1. Incubation period

The data presented in Table (1) and Fig.(2) showed that the mean incubation period of RPW eggs under (30±1C°.and 85±5 R.H.%) was 3 ± 0.15 days , and ranged between 2 to 4 days. Data obtained agreed with those obtained by Rahalkar *et al.* (1985) ; Alfazairy *et al.* (2003) and Abd El-Fattah (2010) who found that egg stage of RPW lasted 2-4, 2-3 and 3.09 ± 0.17 days when reared on coconut cake and potato diet at 29 C°.and 60-70 R.H.%, in the laboratory and 27±2 C°.and 75±5 R.H.% .

1.2. Hatchability

The mean hatchability percentage of eggs of RPW was 88% (S.E ±1.3), Table (1) and Fig.(2) and ranged between 80 to 90%. Data agreed with those obtained by El-Shafie *et al.* (2013) and Abd El-Fattah (2010) who found that egg hatchability percentage was 88.10 and 81.9±4.84 % when reared RPW on potato and coconut cake under laboratory conditions, 27 ± 2 C.° and 75 ± 5 R.H. %. Alfazairy, *et al.* (2003) reported higher value of the hatchability of RPW, averaged 95.3 % ± 1.1 (85.9–100%) when reared in laboratory conditions on potato diet.

2. Larval stage

2.1. Larval duration

Results in Table (1) and Fig.(1) showed that larval duration of RPW was (50 ± 1.06 days) and ranged between 45 to 55 days. Data agreed with Hussein (1998) and Abd El-Fattah (2010) who found that larval duration of RPW was 51.50 and 45.19±2.91 days when reared on potato and coconut cake diets in 29 C°.and 75-90 R.H. % and 27±2 C°.and 75±5 R.H. % under laboratory conditions .Much longer larval duration 127.24 days were obtained by Mahmoud *et al.* (2015) when RPW reared on potato diet under laboratory conditions (29 ± 1 C°. and 85±5 R.H. %).

2.2. Larval mortality percentages

Data given in Table (1) and Fig. (2) revealed that the mean larval mortality percentage of RPW was 59% ± 2.3 and ranged between 50 to70 percent. Data disagree with those reported by Abd El-Fatah (2010) when rearing of RPW under laboratory conditions at 27±2 C.° and 75 ± 5 R.H.% on coconut cake diet much lower larval mortality 11±1.24 %.

3. Cocoonal duration

The obtained results in Table (1) and Fig.(1) revealed that the mean pre-pupal period of RPW was (6 ±0.29 days) and was ranged from (4 -7 days), the mean pupal

stage of RPW was (8 ± 0.42 days) and was ranged from (5 -9 days) and mean adult remain inside cocoon period of RPW was (8 ± 0.68 days) and was ranged from (3-10 days) Obtained data agreed with Hussein (1998) and Abd El-Fattah (2010) who found that pre-pupal stage of RPW was 7.83 days and mean cocoonal duration was 22.54 ± 1.30 days when reared on potato and coconut cake diets in incubator at 29°C . and 75-90 R.H.% and $27 \pm 2^\circ\text{C}$. and 75 ± 5 R.H.% under laboratory conditions and with those obtained by Mahmoud *et al.* (2015) who studied that the mean of the prepupal period of RPW was 5.14 days, the means of pupal period were 10.03 days. While adult pre- emergence from cocoon was 9.06 days when rearing RPW on artificial diet (potato diet) under laboratory conditions ($29 \pm 1^\circ\text{C}$.and 85 ± 5 R.H. %).

3.1. Cocoonal mortality percentages

Data in Table (1) and Fig.(2) showed that the mean pre-pupal mortality percentage of RPW was ($66\% \pm 2.67$) and ranged from 50 to 80%, the mean pupal stage mortality percentage of RPW was ($69\% \pm 2.77$) and was ranged from 60 to 80% and mean adult remain inside cocoon of RPW mortality percentage was ($74\% \pm 2.211$) and ranged from 60 to 80%. Results agreed with Hussein (1998) who reared RPW on artificial media for three generation at 29°C and 75-90 R.H.%. The basic ingredients of the artificial diets were sweet potato tubers and found that the highest pupal mortality was 51.61, 33.53 and 23.67% for the 2nd generation and the 3rd and the 1st generation, respectively Also, Abd El-Fattah (2010) who reared RPW under laboratory conditions ($27 \pm 2^\circ\text{C}$ and 75 ± 5 R.H.%) on semi-artificial diet coconut cake diet the cocoonal mortality percentages was $4.0 \pm 2.66\%$ when reared on potato and coconut cake diets.

4. Adult stage

4.1. Sex ratio

The obtained data given in Table (1) and Fig.(2) showed that the percentage of male from the total number of emerged adults of RPW was $49.98 \pm 0.08\%$ and ranged between 33.3 and 66.6%. Data agreed with Abdel-Fattah (2010) who found that the sex percentage of male was 48.89% when reared RPW under laboratory conditions ($27 \pm 2^\circ\text{C}$.and 75 ± 5 R.H.%) on semi-artificial diet, coconut cake diet and Mahmoud *et al.* (2015) who found that mean percentage of male emerged was 48.89% and 47.81% when reared RPW on artificial diet (potato diet) under laboratory conditions ($29 \pm 1^\circ\text{C}$.and 85 ± 5 R.H.%).

4.2. Adult longevity

4.2.1. Female longevity

4.2.1.1. Pre-oviposition period

As shown in Table (1) and Fig.(1) the mean pre-oviposition period of female of RPW was 11 days ± 1.98 after emergence from the cocoon and ranged from 10 to 18 days. Data disagree with those of Alfazairy *et al.* (2003) who found that the pre-oviposition period was 2 - 4 days and averaged 2.5 ± 0.2 days. Kaakeh (2005) studied rearing of RPW at 24 ± 2 C°. and 70 ± 5 R.H.%, and a photoperiod of 12: 12 (L:D) h. on artificial diets of potato and found that the pre-ovipositional periods ranged from 3.15 to 3.61 days. similar values 3.6 ± 0.37 days obtained by Abd El-Fattah (2010) and 4.80 ± 1.03 days for El-Shafie *et al.* (2013).

4.2.1.2. Oviposition period

The average of oviposition period of RPW was 50 days ± 9.004 ranging from 47 to 80 days. in Table (1) and Fig (1). Data obtained was disagree with those of Kaakeh (2005) who reared RPW in laboratory at 24 ± 2 C°. and 70 ± 5 R.H.%, and a photoperiod of 12: 12 (L: D) h. on artificial diets of potato found that the oviposition periods ranged from 3.2 to 3.8 days. Abd El-Fattah (2010) who found that oviposition period of RPW was 80.2 ± 6.60 days when reared on coconut cake diet under laboratory conditions (27 ± 2 C.° and 75 ± 5 R. H. %).

4.2.1.3. Post-oviposition period

Data in Table (1) and Fig. (1) showed that the post-oviposition period of female of RPW was 7 days ± 1.26 ranging from 5 to 10 days. data obtained agree with Abd El-Fattah (2010) who found that post-oviposition period of RPW was 11.4 ± 0.87 days almost twice as much the current study when reared on coconut cake diet under laboratory conditions (27 ± 2 C.° and 75 ± 5 R.H.%).

4.2.1.4. Total female longevity

In respect of mean longevity of adult female, results tabulated in Table (1) and Fig. (1) show that the total female longevity of RPW was 68 days ± 12.05 and ranged from 65 to 106 days. Data agree with Abd El-Fattah (2010); El-Shafie *et al.* (2013) and Mahmoud *et al.* (2015) who found that total female longevity of RPW were 95.2 ± 6.75 , 74.8 ± 2.20 and 91.2 days when reared on coconut cake and two potato diets under laboratory conditions (27 ± 2 C° and 75 ± 5 R.H.% and 29 ± 1 C°.and 85 ± 5 R.H. %).

4.2.2 Male Longevity

The average male longevity of RPW was 40 days ± 7.61 and ranged 37-75 days. In Table (1) and Fig.(1) Data obtained disagree with obtained by Abd El-Fattah (2010) who reared RPW on the semi-artificial diet coconut cake diet under laboratory conditions (27 ± 2 C.°and 75 ± 5 R.H.%) and found that the average of RPW male longevity was 97.8 ± 5.96 days .El-Shafie *et al.* (2013) determined that the mean

longevity of the males of RPW reared on semi-artificial diet , the potato diet under laboratory conditions was 83.30 ± 1.63 days and Mahmoud *et al.* (2015) who found that male longevity of RPW was 94.6 days when reared on potato diet under laboratory conditions ($29 \pm 1^\circ\text{C}$.and 85 ± 5 R.H. %).

4.3. Female fecundity

Obtained results in Table (1) and Fig. (1) cleared that the mean number of eggs laid by one female (fecundity of female) of RPW was approximately 170 eggs / female ± 29.14 ranging (170–240 eggs / female). Data obtained agree with Hussein (1998); Salama and Abdel-Razek (2002); El-Shafie *et al.* (2013) and Mahmoud *et al.* (2015) who found that female fecundity was 181.0 eggs / female, 184.00 ± 18.68 , 181 and 225.6 eggs when RPW reared one potato diet under laboratory conditions ($29 \pm 1^\circ\text{C}$ and 85 ± 5 R.H.%). Results disagree with Abd El-Fattah (2010) who reared RPW under laboratory conditions ($27 \pm 2^\circ\text{C}$ and 75 ± 5 R.H.%) on artificial diet coconut cake diet and found that the insect RPW fecundity was 275.0 ± 23.55 eggs / female.

4.3.1. Fertility

The mean fertility percentage of RPW was $78.5\% \pm 13.09$ ranging from 94 to 100%. Table (1) and Fig.(2).Results obtained agreed with Salama and Abdel - Razek (2002) who found that fertility percentage of RPW was 94-100 % when reared on potato diet under laboratory conditions.

4.4. Life cycle

Data in Table (1) and Fig. (1) clarified that the total life cycle from egg to egg of RPW was 71.3 ± 12.019 days, ranging from 76 to 94 days. Data agree with Abd El-Fattah (2010) and El-Shafie *et al.* (2013) who found that life cycle lasted 74.42 ± 4.98 and 82.41 ± 1.54 days when RPW reared on coconut cake, potato diets under laboratory conditions ($27 \pm 2^\circ\text{C}$.and 75 ± 5 R.H.%) and ($29 \pm 1^\circ\text{C}$.and 85 ± 5 R.H.%) Results obtained disagree obtained by Salama and Abdel-Razek (2002) who found that the duration of the life cycle for males and females of RPW were 164.97 and 194.61 days on semi-artificial diet potato diet in laboratory conditions.

4.5. Generation duration

The obtained data in Table (1) and Fig.(1) showed that the mean duration of generation period calculated from the date of eggs deposited to the death of adult of RPW was about 115 ± 8.5557 days ranging (71-159 days) and 143 days ± 12.403 ranging (71–181 days) per males and females, respectively. Data obtained agreed with Abd El-Fattah (2010) who found that generation duration of RPW was 166.02 ± 9.78 days when reared on coconut cake diet under laboratory conditions ($27 \pm 2^\circ\text{C}$. and 75 ± 5 R.H.%) and results disagreed with obtained by Hussein (1998) who

mentioned that reared RPW for one generation in incubator at 29°C. and 75-90 R.H.% on potato diet and found that generation duration was about 185 & 189.3 days per males and females, respectively.

Table 1. Some biological aspects of the red palm weevil, *Rhynchophorus ferrugineus* (Olivier) reared at 30±1°C. and 85±5 R.H.%.

Biological aspects	Mean±S.E.	Range
Incubation period of eggs	3 ±0.15 days	2-4
Hatchability (%)	88% ±1.3	80-90
Larval duration days	50 ±1.06 days	45-55
Total larval mortality %	59% ±2.3	50-70
Cocoonal period:	22 ±0.931 days	15-26
1-Pre-pupal period	6 ±0.29 days	4-7
2-Pupal period	8 ±0.42 days	5-9
3-Adult remaining inside cocoon	8 ±0.68 days	3-10
Cocoonal mortality:		
1-Pre-pupal mortality %	66%±2.67	50-80
2-Pupal mortality %	69%±2.77	60-80
3-Adult remaining inside cocoon mortality %	74%±2.211	60-80
Males %	49.98%±0.08	33.3-66.6
Female longevity:		
1-Pre-oviposition period	11±1.98 days	10-18
2-Oviposition period	50 ±9.004 days	47-80
3-Post-oviposition period	7±1.26 days	5-10
Total longevity	68 ±12.05 days	65-106
Male longevity	40 ±7.61days	37-75
Egg fertility %	78.5%±13.09	94-100
Female fecundity	170 ±29.14 eggs	170-240
Total life cycle	71.3±12.019 days	76-94
Generation of male	115±8.5557 days	71-159
Generation of female	143 ±12.403 days	71-181

%=percentage

S.E.=standered error

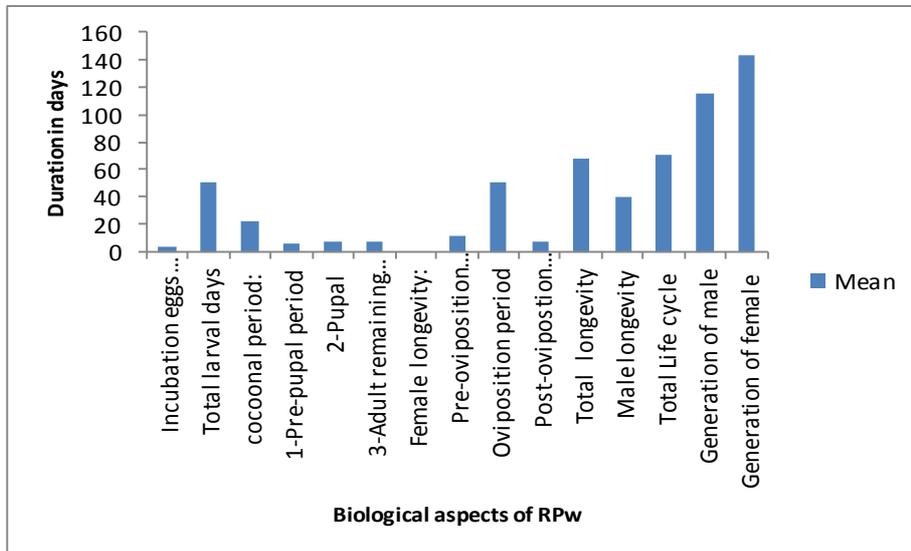


Fig. 1. Some biological aspects of the red palm weevil *Rhynchophorus ferrugineus* (Oliv.) rearing on semi-artificial diet in controlled cooling incubator at 30±1C° and 85 ± 5 R.H.%.

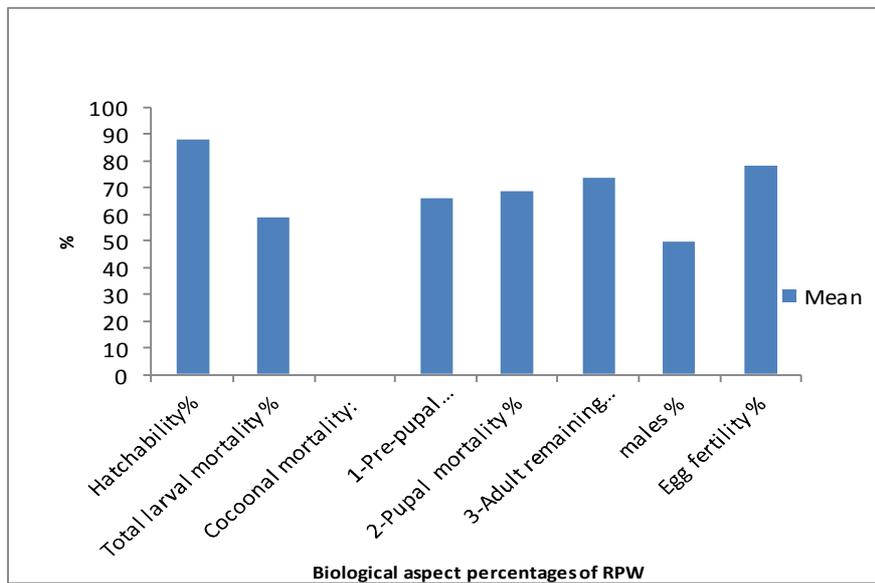


Fig. 2. Some biological aspects percentages of the red palm weevil *Rhynchophorus ferrugineus* (Oliv.) rearing on semi-artificial diet in controlled cooling incubator at 30±1C° and 85 ± 5 R.H.%.

VI. REFERENCES

1. Abd El-Fattah, S.M. 2010. Study of some recent trends on *Rhynchophorus ferrugineus* (Oliv.) infesting date palm trees in Sharkia Governorate. Ph.D.Thesis, Fac. of Agric., Zagazig Univ., 191pp.
2. Alfazairy, A. A.; A.M. EL-Minshawy; H.K. Hedaya and R. Hendi. 2003. An easy and cheap feeding diet of vegetable origin for rearing the red palm weevil,

- Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae). Proceedings of the First Int. Egyptian Romanian Conf., Zagazig, Egypt, Dec., 6-8th : 171-179.
3. El-Sebay, Y.; M.K.A.El-Latif and T. M. Makhoulf. 2003. Laboratory rearing of red palm weevil, *Rhynchophorus ferrugineus*. Oliv. (Coleoptera: Curculionidae) on artificial diet. Egyptian J.Agric. Res. ,81(2): 551-554.
 4. El-Shafie, H. A. F.; J. R. Faleiro; M.M. Abo-El-Saad and S. M. Aleid. 2013. A meridic diet for laboratory rearing of red palm weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae). Scientific Research and Essays, Acad. J.,8 (39):1924-1932.
 5. Hussein, K. M.A. 1998. Biological, ecological and control studies on red palm weevil, *Rhynchophorus ferrugineus* in Sharkia and Ismailia Governorates, Egypt. M.Sc. Thesis, Fac. Agric., Zagazig Univ., 289 pp.
 6. Kaakeh, W. 2005. Longevity, fecundity, and fertility of the red palm weevil, *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae) on natural and artificial diet. Emir.J.Agric.Sci.,17 (1): 23-33.
 7. Mahmoud, M.A.; S.A.Hammad and M.A.E. Mahfouz. 2015. Biological studies on red palm weevil, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae) Middle East J. App. Sci.Volum 5(1):247- 251.
 8. Nirula, K.K. 1956. Investigations on the pests of coconut palm. IV-*Rhynchophorus ferrugineus* F. Indian Coconut J., 9(4): 229-247.
 9. Rahalkar, G.W.; M.R. Harwalker; H.D. Ranavare; A.J. Tamhankar and K. Shantaram. 1985. The biology of red palm weevil, *Rhynchophorus ferrugineus* Olivier, A handbook of insect rearing, Pritam Singh and R.F.Moore (Eds.). Elsevier Sci. Pub., B.V.Amsterdam, Vol. 1: 279-286.
 10. Salama, H.S. and A.S. Abdel-Razek. 2002. Development of the red palm weevil, *Rhynchophorus ferrugineus* (Oliv.) (Coleoptera: Curculionidae) on natural and synthetic diets .Anzeiger fur Schadlingskunde, 75 (5): 137-139.
 11. Saleh, M.R.A. (1992).Red palm weevil, *Rhynchophorus ferrugineus* (Olivier).The first record for Egypt and indeed the African Continent, List No. 10634 Africa, Collection No. 22563. British Museum Report of International Institute of Entomology, 56 Queen's Gate, London, SW 75 JR UK: 1p.
 12. Shahina, F., J. Salma, G. Mehreen, M.I. Bhatti and K. T.Tabassum. 2009. Rearing of *Rhynchophorus ferrugineus* (Oliv.) in laboratory and field conditions for carrying out various efficacy studies using EPNs, Pak. J. Nematol, 27(2): 221-231.
 13. Waqas, W.; J. Flaleiro and T. Mallier. 2015. Sustainable Pest Management in Date Palm: Current Status and Emerging Challenges.Sustainability in plant Crop Protection, Springerlink.:pp 409.

دراسات بيولوجية على سوسة النخيل الحمراء المرباة على بيئة نصف صناعية في مصر

محمد على على الديب¹، منصور محمد منصور الزهيري¹،
محمد كمال عبداللطيف عباس² والفت السيد السيد عرفة²

- 1- قسم وقاية النبات -كلية الزراعة -جامعة الزقازيق - مصر
2- معهد بحوث وقاية النباتات - مركز البحوث الزراعية -الدقى -الجيزة -مصر .

الدراسات البيولوجية:

- تم تربية حشرة سوسة النخيل الحمراء داخل الحضان في حجرة التربية على بيئة نصف صناعية للبطاطس على درجة حرارة 30 ± 1 م° ورطوبة نسبية 85 ± 5 % في قسم وقاية النبات -كلية الزراعة جامعة الزقازيق مصر وملاحظة فترات النمو المختلفة للحشرة و تسجيل التالي:
- 1- بلغت فترة الحضانة البيض (2-4) يوماً بمتوسط 3 يوم وبلغت نسبة الفقس 88%.
 - 2- بلغت فترة الطور اليرقى (45-55) يوماً بمتوسط 50 يوم ونسبة موت 59%.
 - 3- بلغت فترة ما قبل العذراء (7-4) يوماً بمتوسط 6 يوم ونسبة موت 66%.
 - 4- بلغت مدة طور العذراء (9-5) يوماً بمتوسط 8 يوم ونسبة موت 69%.
 - 5- وصلت فترة ما قبل خروج الحشرة الكاملة من الشرنقة (10-3) يوماً بمتوسط 8 يوم ونسبة موت 74%.
 - 6- بلغت نسبة خروج الحشرة الكاملة من الشرنقة 80 % وبنسبة جنسية 98, 49% (1:1) تقريباً.
 - 7- بلغت متوسط فترة حياة الحشرة الكاملة 40 يوم للذكور، 68 يوم للإناث، حيث تراوحت متوسط فترة ما قبل وضع البيض 11 يوم ومتوسط فترة وضع البيض 50 يوم ومتوسط فترة ما بعد وضع البيض 7 يوم.
 - 8- بلغت دورة الحياة 71.3 يوماً.
 - 9- كان متوسط إنتاج الانثى من البيض 170 بيضة وبلغت النسبة المئوية لفقس البيض 78.5%.
 - 10- مدة الجيل بلغت للذكور (71-159) يوماً بمتوسط 115 يوم وبلغت مدة الجيل للإناث (181 إلى 71) يوماً بمتوسط 143 يوم