

**EFFECT OF DIFFERENT MEALYBUG SPECIES AS PREYS ON SOME BIOLOGICAL CHARACTERS AND PREDACEOUS EFFICIENCY OF THE COCCINELLID PREDATOR *Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae) UNDER LABORATORY CONDITIONS**

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**ABSTRACT**

Laboratory experiments were carried out to study the influence of different mealybug species as preys on the biological aspects of *Rodolia cardinalis* (Mulsant) in the insectary of the Economic Entomology, Faculty of agriculture, Mansoura University.

The larval stage of the predator *R. cardinalis* when reared at  $24\pm 1^{\circ}\text{C}$  and fed on the third nymphal instars of *Icerya purchasi* Mask., *Icerya aegyptiaca* Douglas and *Icerya seychellarum* (Westwood) lasted an average of  $14.5\pm 0.60$ ,  $11.8\pm 0.34$  and  $16.6\pm 0.55$  days, respectively.

The average of the total consumption for larval instars at  $24\pm 1^{\circ}\text{C}$  and fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* as preys reached  $68.90\pm 4.01$ ,  $60.50\pm 2.18$  and  $42.65\pm 1.77$  individuals. Meanwhile, results indicated that, the highest total consumption for the predator larvae during its larval stages when fed on *I. purchasi* followed by *I. aegyptiaca* and *I. seychellarum* with significant differences.

The calculated biomass from (carbohydrates, lipids and protein) consumed by a larva when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* reached an average of (88.88, 85.44 and 49.61 mg), (80.47, 77.44 and 45.98 mg) and (49.90, 49.05 and 28.15 mg), respectively.

The adult longevity for female and male when reared at  $24\pm 1^{\circ}\text{C}$  and reared on the third nymphal instar of *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* lasted an average of ( $40.5\pm 2.25$  and  $26.8\pm 1.72$  days), ( $46.4\pm 2.12$  and  $29.0\pm 2.09$  days) and ( $32.5\pm 2.60$  and  $20.8\pm 1.8$  days), respectively.

The average of the total consumption for adult female reached  $263.2\pm 11.25$ ,  $328.2\pm 10.90$  and  $208.7\pm 6.88$  individuals/ female when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum*, respectively, with highly significant differences.

The calculated biomass from (carbohydrates, lipids and protein) consumed by one predator female during its longevity reached (339.53, 326.37 and 189.5 mg), (436.51, 420.10 and 249.43 mg) and (244.18, 240.01 and 137.74 mg) when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum*, respectively, where for the adult male reached (167.57, 161.08 and 93.53 mg), (193.91, 186.62 and 110.81 mg) and (116.65, 114.66 and 65.80 mg), respectively.

The highest total consumption for adult female recorded during the oviposition period especially, when reared on *I. aegyptiaca* ( $289.0\pm 10.53$  individuals/ female) and resulting, the number of deposited eggs/ female was the highest ( $354.30\pm 19.90$  eggs/ female), it could be concluded that the best mealybug species for rearing *R. cardinalis* was *I. aegyptiaca* because the female layed 354.30 eggs/female.

## INTRODUCTION

*Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae) is an important coccinellid predator feeding on mealybug species (Hamed and Saad 1989, Lehane 1998, Ibrahim 2005 and Awadalla 2010). The effect of temperature and mealybug species as prey types on the developmental time, fecundity and the other biological characters were studied by several investigators in different parts of the world (Khalaf 1987, Ragab 1995, Causton *et al.* 2004, Grafton *et al.* 2005, Ghanim *et al.* 2006 and Awadalla 2010).

For integrated pest management program needs the evaluation of the definite role of the natural enemies of these insect pests and knowledge of the population relationships of the insect host and their natural more ecological and biological informations.

A few information is available on the influence of different mealybug species as preys on the biological aspects and on predaceous efficiency of the coccinellid predator *R. cardinalis*.

Therefore, the aim of the present work is to study Influence of different mealybug species as preys on the biological characters and predaceous efficiency of the predator *R. cardinalis*

## MATERIAL AND METHODS

Laboratory experiments were carried out under constant temperature of  $24\pm 1^{\circ}\text{C}$  and  $70\pm 5\%$  relative to study the influence of different mealybug species as preys on some biological aspects of the coccinellid predator *Rodolia cardinalis* (Mulsant). The experiments were carried out in the insectary of the Economic Entomology Department, Faculty of Agriculture, Mansoura University.

To obtain a culture from the predator *R. cardinalis* a large numbers in the pupal stage were collected from ficus, *Ficus nitida* thunb., guava, *Psidium guava* L., persimmon, *Diospyros kaki* L. and citrus trees which were found to be a heavily infested with the three mealybug species namely *Icerya purchasi* Maskell, *Icerya aegyptiaca* (Douglas) and *Icerya seychellarum* (westwood) and transferred to the laboratory until emergence of the adults.

To explain the difference in various biological characters of the predator *R. cardinalis*, chemical analysis was carried out by using one gram of living insects of *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* to determine the total carbohydrates, protein and lipids by using the method of Hedge and Hofreiter (1962), Jones *et al.*, (1991) and A.O.A.C. (1984), respectively.

The total carbohydrates, protein and lipids per individual from the different preys were obtained by dividing these amounts per gram by the individual number representing this gram from each mealybug species. Then the average consumption from these components by the different larval instars and the adult stage of the predator were calculated.

### RESULTS AND DISCUSSION

As shown in Table (1) the larval stage of the predator *R. cardinalis* when reared at 24±1°C and fed on the third nymphal instars of *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* lasted 14.5±0.60, 11.8±0.34 and 16.6±0.55 days, respectively. Statistical analysis indicated a significant differences on the larval instars of the predator when fed on different mealybug species.

The obtained results illustrated in Table (1) showed that the average of the total consumption during the larval instars when reared on different mealybug species as preys at 24±1°C as well as the calculated biomass from carbohydrates, lipids and protein consumed by one predator during its larval instars.

**Table (1): Influence of mealybug species on the duration period of larval instars and predaceous efficiency of *R. cardinalis* when fed on the third nymphal instar of the mealybug species under laboratory conditions of 24±1°C and 70±5% R.H.**

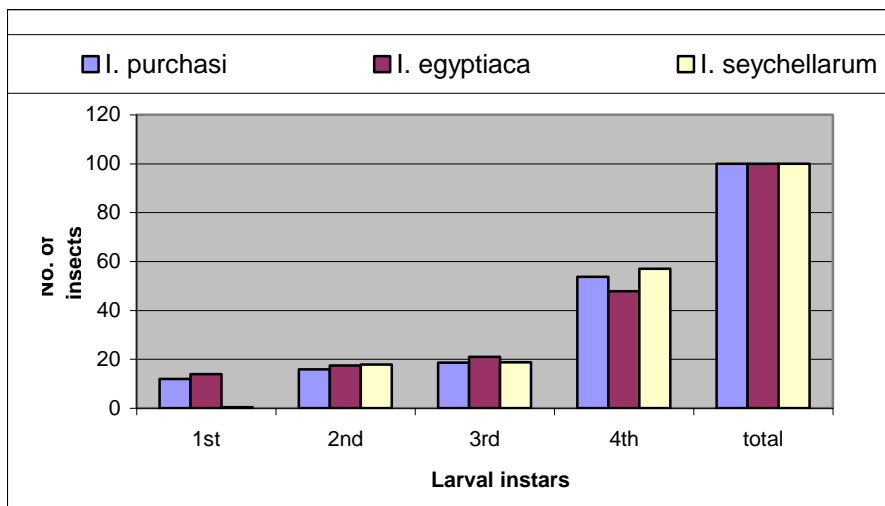
| Larval instars  | Mealybug sp.           | Average duration (days) | Daily average consumption | Total mean consumption | Av. Weight of the main components consumed / larvae (mg.) |        |         |
|-----------------|------------------------|-------------------------|---------------------------|------------------------|---|--------|---------|
|                 |                        |                         |                           |                        | Carbohydrates   | Lipids | protein |
| 1 <sup>st</sup> | <i>I. purchasi</i>     | 4.0±0.34b               | 2.05                      | 8.20±1.09a             | 10.58   | 10.17  | 5.90    |
|                 | <i>I. egyptiaca</i>    | 3.3±0.31b               | 2.58                      | 8.4±0.96a              | 11.17   | 10.75  | 6.38    |
|                 | <i>I. seychellarum</i> | 5.1±0.34a               | 0.54                      | 2.75±0.31b             | 3.22  | 3.16   | 1.82    |
| 2 <sup>nd</sup> | <i>I. purchasi</i>     | 3.4±0.23a               | 3.21                      | 10.90±1.31a            | 14.06   | 13.52  | 7.85    |
|                 | <i>I. egyptiaca</i>    | 3.1±0.23a               | 3.46                      | 10.55±0.91a            | 14.03   | 13.50  | 8.02    |
|                 | <i>I. seychellarum</i> | 3.7±0.23a               | 2.05                      | 7.60±0.50b             | 8.89  | 8.74   | 5.02    |
| 3 <sup>rd</sup> | <i>I. purchasi</i>     | 2.5±0.23a               | 5.22                      | 12.80±1.69a            | 16.51   | 15.87  | 9.22    |
|                 | <i>I. egyptiaca</i>    | 2.3±0.22a               | 5.62                      | 12.65±1.05a            | 16.82   | 16.19  | 9.61    |
|                 | <i>I. seychellarum</i> | 2.6±0.23a               | 3.14                      | 8.00±0.79b             | 9.36  | 9.20   | 5.28    |
| 4 <sup>th</sup> | <i>I. purchasi</i>     | 4.2±0.35b               | 8.81                      | 37.0±4.46a             | 47.73   | 45.88  | 26.64   |
|                 | <i>I. egyptiaca</i>    | 3.2±0.35c               | 9.03                      | 28.9±2.71b             | 38.44   | 36.99  | 21.96   |
|                 | <i>I. seychellarum</i> | 5.2±0.33a               | 4.72                      | 24.30±1.62c            | 28.43   | 27.95  | 16.04   |
| Total           | <i>I. purchasi</i>     | 14.5±0.60b              | 4.90                      | 68.90±4.01a            | 88.88   | 85.44  | 49.61   |
|                 | <i>I. egyptiaca</i>    | 11.8±0.34c              | 5.15                      | 60.50±2.48b            | 80.47   | 77.44  | 45.98   |
|                 | <i>I. seychellarum</i> | 16.6±0.55a              | 2.60                      | 42.65±1.77c            | 49.90   | 49.05  | 28.15   |

Means followed by the same letters in a column for each larval instar are not significantly differences at 0.05 level of probability (Duncan's Multiple Range Test).

As a conclusion, the average of the total consumption for the total larval instars when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* as preys reached 68.90±4.01, 60.50±2.18 and 42.65±1.77 individuals/ predator larva. Meanwhile, results indicated that, the total consumption for the

predator larvae when fed on *I. purchasi* followed by *I. aegyptiaca* and *I. seychellarum* showed significant differences. The calculated biomass from (carbohydrates, lipids and protein) consumed by one predator larva when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* reached an average of (88.88, 85.44 and 49.61 mg), (80.47, 77.44 and 45.98 mg) and (49.90, 49.05 and 28.15 mg), respectively.

Data illustrated in Fig. (1) showed that the percentage of total consumption during the four larval instars when fed on three mealybug species. It can be noticed that, the fourth larval instar was the highest percentage of the total consumption and reached 53.76, 47.77 and 56.97% when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* as preys, respectively.



**Fig. (1): The percentage of the total consumption during fourth larval instars when reared at 24±1°C and fed on three mealybug species as preys**

The obtained results in Table (2) showed that, the adult longevity for female and male when reared on the third nymphal instar of *I. purchasi*, *I. aegyptiaca* and *I. seychellarum* lasted an average of (40.5±2.25 and 26.8±1.72), (46.4±2.12 and 29.0±2.09) and (32.5±2.60 and 20.8±1.8 days), respectively. Statistical analysis showed significant differences on the ovipositional periods as well as the adult longevity for female and male when fed on different mealybug species.

Data represented in Table (2) showed that the average of the total consumption during the ovipositional period, the number of deposited eggs per female and also, the total consumption for adult male. Moreover, the calculated biomass from carbohydrates, lipids and protein consumed by one adult female during its oviposition periods or one adult male during its longevity.

**Table (2): Influence of prey species on the ovipositional period, predaceous efficiency and fecundity of *R. cardinalis* adults reared on the third nymphal instar of the mealybug species under laboratory conditions of 24±1°C and 70±5% R.H.**

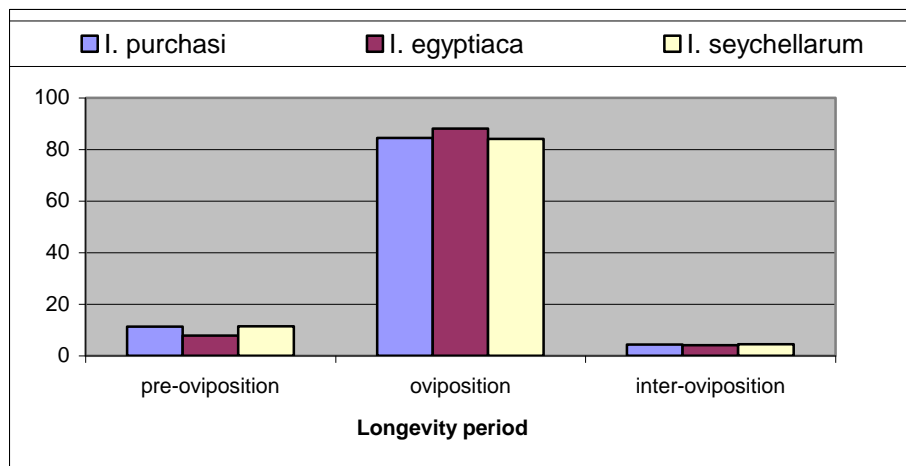
| Biological aspects     | Temp.                  | Period (days) | Daily average consumption | Total consumption | Fecundity    | Average weight of the main components consumed / adult (mg.) |        |         |
|------------------------|------------------------|---------------|---------------------------|-------------------|--------------|--|--------|---------|
|                        |                        |               |                           |                   |              | Carbohydrates  | Lipids | protein |
| Pre-oviposition period | <i>I. purchasi</i>     | 3.8±0.34b     | 7.79                      | 29.6±2.11a        |              | 38.18  | 36.70  | 21.31   |
|                        | <i>I. egyptiaca</i>    | 3.1±0.31b     | 8.26                      | 25.6±1.54ab       |              | 34.05  | 32.77  | 19.46   |
|                        | <i>I. seychellarum</i> | 4.6±0.43a     | 5.20                      | 23.9±1.95b        |              | 27.96  | 27.49  | 15.77   |
| Oviposition period     | <i>I. purchasi</i>     | 33.8±2.21b    | 6.57                      | 222.2±12.08b      | 323.3±19.24  | 286.64   | 275.53 | 159.98  |
|                        | <i>I. egyptiaca</i>    | 40.3±2.04a    | 7.17                      | 289.0±10.83a      | 354.30±19.90 | 384.37   | 369.92 | 219.64  |
|                        | <i>I. seychellarum</i> | 25.0±2.7c     | 4.12                      | 175.4±8.34c       | 205.3±13.60  | 205.22   | 201.71 | 115.76  |
| Inter-oviposition      | <i>I. purchasi</i>     | 2.9±0.38a     | 3.93                      | 11.4±1.25b        |              | 14.71  | 14.14  | 8.21    |
|                        | <i>I. egyptiaca</i>    | 3.0±0.38a     | 4.53                      | 13.6±1.34a        |              | 18.09  | 17.41  | 10.34   |
|                        | <i>I. seychellarum</i> | 3.0±0.38a     | 3.13                      | 9.4±1.01c         |              | 10.00  | 10.81  | 6.20    |
| Adult longevity female | <i>I. purchasi</i>     | 40.5±2.25b    | 6.50                      | 263.2±11.25b      |              | 339.53   | 326.37 | 189.5   |
|                        | <i>I. egyptiaca</i>    | 46.4±2.12a    | 7.07                      | 328.2±10.90a      |              | 436.51   | 420.10 | 249.43  |
|                        | <i>I. seychellarum</i> | 32.5±2.6c     | 4.16                      | 208.7±6.88c       |              | 244.18   | 240.01 | 137.74  |
| Adult longevity male   | <i>I. purchasi</i>     | 26.8±1.72b    | 4.85                      | 129.9±7.79b       |              | 167.57   | 161.08 | 93.53   |
|                        | <i>I. egyptiaca</i>    | 29.0±2.09a    | 5.03                      | 145.8±6.84a       |              | 193.91   | 186.62 | 110.81  |
|                        | <i>I. seychellarum</i> | 20.8±1.8c     | 3.32                      | 99.7±6.79c        |              | 116.65   | 114.66 | 65.80   |

Means followed by the same letters in a column for each period are not significantly differences at 0.05 level of probability (Duncan's Multiple Range Test).

As a conclusion, the average of the total consumption for adult female reached 263.2±11.25, 328.2±10.90 and 208.7±6.88 individuals/female when fed on *I. purchasi*, *I. aegyptiaca* and *I. seychellarum*, respectively, with highly significant differences. On the other hand, results showed that, the highest total consumption for adult female recorded during the oviposition period especially, when fed on *I. aegyptiaca* (289.0±10.53 individuals/ female) and resulting, the number of deposited eggs/ female was the highest (354.30±19.90 eggs/ female). Meanwhile, the calculated biomass from (carbohydrates, lipids and protein) consumed by one predator female during its longevity reached (339.53, 326.37 and 189.5 mg), (436.51, 420.10 and 249.43 mg) and (244.18, 240.01 and 137.74 mg) when fed on *I.*

*purchasi*, *I. aegyptiaca* and *I. seychellarum*, respectively, where for the adult male reached (167.57, 161.08 and 93.53 mg), (193.91, 186.62 and 110.81 mg) and (116.65, 114.66 and 65.80 mg), respectively

Data illustrated in Fig. (2) showed the percentage of the total consumption during female ovipositional periods when fed on the third nymphal instar of *I. purchasi*, *I. aegyptiaca* or *I. seychellarum* at 24±1°c. It can be noticed that, the highest percentage of consumption recorded during oviposition period and reached 84.42, 88.05 and 84.05% on the three mealybug species, respectively.



**Fig. (2): The percentage of total consumption during female Ovipositional periods when reared at 24±1° c and fed on different mealybug species.**

These results are in agreement with those of Matsuka and Watanabe (1981), Hamed and Saad (1989), Ragab (1995) and Hamed and Chemsedine (2001). The adult females of vedalia beetles which fed on adults of *Icerya* scales in a Petri dish at 25°C produce an average of 365 eggs during their adult life span of 29.4 days, including 3.7 days of pre-oviposition. The average developmental period (egg to adult) was 19.7 days (Matsuka and Watanabe, 1981). Meanwhile, Hamed and Saad (1989) reported that, the longevity of females and males was comparatively shorter in association with *I. seychellarum*. Moreover, Ragab (1995) indicated that the fecundity of *R. cardinalis* females was not affected by the prey consumed as adults, and although the longevity of males and females was shorter in associated with *I. purchasi*. This difference was not significant. Moreover, Awadalla (2010) suggested that, the survival percentage of *R. cardinalis* immature stages was the highest rates when the predator reared on *I. aegyptiaca* followed by *I. purchasi* and *I. seychellarum*. According to the predaceous efficiency affected by the prey types the obtained results are in agreement with those obtained by Mousa (1992), Ghanim and El Adl (1987 a,b and c) on *C. septempunctata*, *Cy. Vicina isis*, *Cy. Vicina nilotica* and *C. undecimpunctata*.

They indicated that, the prey type effected greatly the duration, feeding capacity of larval stage as well as fecundity and longevity of the adult stage of the predators.

## REFERENCES

- A.O.A.C. (1984) "Official methods of Analysis" 13<sup>th</sup> Ed. Published by the Association of Official Analytical chemists, Washington. Dc. U.S.A
- Awadalla, Hagar S. S. (2010): Studies on biological and life tables parameters of certain predacious insects which associated with some mealybugs. M. Sc. Thesis, Fac. Agric., Mansoura Univ. pp. 125.
- Causton, C. E.; Lincango, M. P. and Poulosom, T. G. A. (2004). Feeding range studies of *Rodolia cardinalis* (Mulsant), a candidate biological control agent of *Icerya purchasi* Maskell in the Galapagos Islands. Biological control, 29(3): 315-325.
- Ghanim, A. A.; El-Serafi, H. A. K. and Mohamed, N. E. (2006). Effect of mealybug species as preys on the developmental time, feeding capacity and fecundity of vedalia beetle, *Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae) under laboratory conditions. J. Agric. Sci. Mansoura Univ., 31(3): 1679-1687.
- Ghanim, A.A. and El-Adl, M.A. (1987a): Laboratory studies on the feeding capacity, development and fecundity of *Chrysopa septempunctata* Wesm. (Chrysopidae: Neuroptera). J. Agric. Soci. Mansoura Univ. 12(4): 1352-1357.
- Ghanim, A.A. and El-Adl, M.A. (1987b): Evaluation of predation activity and fecundity of the coccinellids, *Cydonia* (= *Chilomones*) *vicina isis* cr; *Cydonia* (= *Chilomones*) *vicina nilotica* Muls. And *Coccinella undecimpunctata* L. in Mansoura region, Egypt. J. Agric. Sci. Mansoura Univ. 12(4): 993-1000.
- Ghanim, A.A. and El-Adl, M.A. (1987c). The feeding capacity and duration of the larval instars of three ladybird beetles fed on different aphid species under natural weather conditions at Mansoura, Egypt. J. Agric. Sci. Mansoura Univ. 12(4): 981-987.
- Grafton, E. E.; Gu, P. and Montez, G. H. (2005). Effect of temperature on development of vedalia beetle, *Rodolia cardinalis* (Mulsant). Biological control, 32: 473-478.
- Hamed, A. R. and Saad, B. (1989). Adaptation of *Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae) to *Icerya aegyptiaca* (Douglas) and *Icerya seychellarum* (Westwood) (Hom., Margrodidae). Proc. First Int. Conf. Econom. Entomol., 11: 33-36.
- Hamed, T. and Chemsedine, M. (2001). Assessment of temperature effects on the development and fecundity of *Pillus mediterraneus* (Coleoptera: Coccinellidae) and consumption of *Saissetia oleae* eggs (Homoptera: Coccidae). J. Appl. Ent., 125(9):527-531.
- Hedge, I.E. and Hofreiter, B. T. (1962). "Carboydrate Chemistry i7 (Eds Whistler R.L. and Be Miller, J.N.) Academic Press New York.

- Ibrahim, M. M. (2005): Ecological and biological studies on persimmon (*Diospyros kaki* L.) pests and their natural enemies. Ph.D. Thesis, Fac. Agric. Mansoura Univ. pp. 154.
- Jones, I.R.; Benton, I.; Wolf, B. and Mills, H.A. (1991). Plant analysis. Hand book, Methods of plant analysis and inter-predation. Micro-Macro. Publishing, inc., USA. P, 30-34.
- Khalaf, J. (1987). Biological control of *Icerya purchasi* in Fars. Entomologie-et-Phytopathologie-Appliquees, 54(2):123-128.
- Lehan, R. (1998). Breadfruit pest succumbs to a ladybird beetle. Partners in infesting persimmon- a new host record. Tropical-Pest-Management, 38(1): 107-108.
- Matsuka, M. and Watanabe, M. (1981). Laboratory rearing of vedalia beetles *Rodolia cardinalis*. Bull. of the Faculty of Agriculture Tamagawa university, 20: 1-8.
- Mousa, gehad M. (1992). Studies on certain coccinellid predatory insects at Mansoura district. M. Sc. Thesis, Fac. Agric., Mansoura Univ. pp. 122.
- Ragab, M. E. (1995). Adaptation of *Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae) to *Icerya aegyptiaca* (Douglas) (Homoptera: Margarodidae) as compared with *Icerya purchasi* Mask. J. Appl. Ent., 119(9):621-623.

تأثير أنواع البق الدقيقي المختلفة كفرائس على بعض الصفات البيولوجية للمفترس أبو العيد فيداليا تحت الظروف المعملية  
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أجريت التجارب المعملية لدراسة تأثير أنواع البق الدقيقي كفرائس بمربي الحشرات بقسم الحشرات الإقتصادية كلية الزراعة- جامعة المنصورة تحت درجة حرارة 24°م ورطوبة نسبية 75%.

\* متوسط فترة الطور اليرقي للمفترس عند تربيته على درجة حرارة 24 ± 1°م وتم تغذيته على حوريات العمر الثالث للبق الدقيقي الأسترالي والبق الدقيقي المصري وبق السيشلارم الدقيقي كانت 14.5 ± 0.6، 11.8 ± 0.34، 16.6 ± 0.55 يوم على التوالي .

\* متوسط الإستهلاك الكلي للأعمار اليرقية للمفترس عند تغذيته على البق الدقيقي الأسترالي، البق الدقيقي المصري وبق السيشلارم الدقيقي كفرائس بلغت 68.90 ± 4.01، 60.50 ± 2.18، 42.65 ± 1.77 فرد/ يرقة مفترس على التوالي- بينما أشارت النتائج أن أعلى إستهلاك كلى خلال الطور اليرقي عندما تمت التغذية على البق الدقيقي المصري يليه البق الدقيقي الأسترالي وبق السيشلارم الدقيقي مع وجود إختلافات معنوية .

\* أوضحت النتائج أن الطور اليرقي للمفترس يحتاج الى كمية من (الكربوهيدرات والدهون والبروتين) قدرت (88.88، 85.44، 49.61)، (80.47، 77.44، 45.98)، (49.90، 49.05، 28.15 مجم) عند تغذيتها على أنواع البق الدقيقي على التوالي .

\* متوسط فترة حياة الأنثى والذكر عند تربيتها على 20 ± 1°م وتغذيتها على حوريات العمر الثالث للبق الدقيقي الأسترالي، البق الدقيقي المصري، بق السيشلارم الدقيقي أستغرقت (40.5 ± 2.25،



التوالى .  
\* متوسط الإستهلاك الكلى للأنثى بلغت (٢٦٦٣.٢ ± ١١.٢٥ ، ٣٢٨.٢ ± ١٠.٩٠ ، ٢٠٨.٧ ± ٦.٨٨ فرد/ أنثى) عندما تم تغذيتها على البق الدقيقي الاسترالى، البق الدقيقي المصرى، بق السيشلارم الدقيقي على التوالى مع وجود إختلافات معنوية .  
\* الكتلة الحيوية المحسوبة من ( الكربوهيدرات والدهون والبروتين) المستهلكة بواسطة انثى المفترس خلال فترة حياتها بلغت (٣٣٩.٥٣ ، ٣٢٦.٣٧ ، ١٨٩.٥ مجم) (٤٣٦.٥١ ، ٤٢٠.١٠ ، ٢٤٩.٤٣ مجم) و (٢٤٤.١٨ ، ٢٤٠.٠١ ، ١٣٧.٧٤ مجم) عند التغذية على البق الدقيقي الاسترالى والبق الدقيقي المصرى وبق السيشلارم الدقيقي على التوالى بينما بلغت لذكر المفترس (١٦٧.٥٧ ، ١٦١.٠٨ ، ٩٣.٥٣ مجم) (١٩٣.٩١ ، ١٨٦.٦٢ ، ١١٠.٨١ مجم) و (١١٦.٦٥ ، ١١٤.٦٦ ، ٦٥.٨٠ مجم) على التوالى.  
\* سجل أعلى إستهلاك كلى للأنثى خلال فترة وضع البيض خاصة عند التغذية على البق الدقيقي المصرى (٢٨٩.٠ ± ١٠.٥٣ فرد/ أنثى) ونتيجة لذلك كان أعلى وضع البيض (٣٥٤.٣٠ ± ١٩.٩٠ بيضة/ أنثى) وخلاصة ذلك أن أفضل أنواع البق الدقيقي لتربية أبو العيد فيداليا كان البق الدقيقي المصرى لأن الإناث وضعت ٣٥٤.٣٠ بيضة/أنثى.

قام بتحكيم البحث

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