Zagazig J. Agric. Res., Vol. 47 No. (2) 2020 499-506

Plant Protection and Pathology Research

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

BIOLOGICAL CHARACTERISTICS OF TWO PREDATORY INSECTS PREYED ON *Bemisia tabaci* (GENNADIUS) UNDER LABORATORY CONDITIONS

Shehta A.M. Ali*

Plant Prot. Res. Inst., ARC, Dokki, Giza, Egypt

Received: 27/01/2020; Accepted: 25/02/2020

ABSTRACT: Laboratory experiments were carried out in Plant Protection Research, Institute, Dokki, Giza, Egypt, Sharkia Branch to evaluate the efficacy of larval and adult stages of the predatory species *Coccinella undecimpunctata* L. and *Chrysopa septempunctata* Wesmael, when reared on *Bemisia tabaci* (Gennadius) at 26± 1°C and 70± 5% RH. *Coccinella undecimpunctata* larva consumed a total average of 563.95 whitefly individuals during its four larval instars. The predator female fed on a total average of 5633.95 individuals during it's longevity (46.15 days). The total average number of eggs laid per female was 1035.65 eggs, with a daily rate of 32.98 eggs. The predator adult male consumed a total average of 3295.75 individuals during it's longevity (30.60 days). The neuropteran predator, *C. septempunctata* larva consumed a total average of 2207.00 individuals during its three larval instars. The predator female fed on a total average of 3314.00 whitefly individuals during its longevity (43.80 days). The total average number of eggs laid per female was 780.50 eggs with a daily average rate of 35.24 eggs. The predator male consumed a total average of 2066.50 whitefly individuals during it's longevity (32.35 days). The results assured the predation activity of these predators when reared on whitefly and they can be recommended for using them as biological control agents for controlling *Bemisia tabaci*.

Key words: *Bemisia tabaci*, *Coccinella undecimpunctata, Chrysopa septempunctata*, biology.

INTRODUCTION

Many coccinellids are well known predators, playing an important role as biological control agents in regulating the population of some insect pests, especially aphids and whiteflies. Several studies have been carried out in different parts of the world and Egypt concerning the predation activity of many coccinellid species such as *Coccinella undecimpunctata* L. and *C. septempunctata* Wesmael. Among those who contributed much to these studies are **Ghanim and El-Adl (1987a), Ghanim *et al.* (1988), Abdel-Gawad *et al.* (1990), Akhiles *et al.* (1996), Mohamed (1996), Mortada (1997), Mangoud (2009) and Saleh and Ali (2012)**. Ladybird beetles are important natural enemies of whitefly that may exhibit various degrees of oligophagy. About 40 species have been reported to prey on *B. tabaci* **(Gerling *et al.*, 2001; Arno *et al.*, 2010)** and 10 species are known to prey on *Trialeurodes vaporariorum* Westw **(Gerling, 1990). Deligeorgidis *et al.* (2005)** determind that *Coccinella septempunctata* L. provided good control of *T. vaporariorum* on tomato.

Chrysopids are important predators of some crop pests and their larvae are know to feed on over 80 species of insects and 10 of tetranychid mites **(Saleh *et al.*, 2017).** Several investigators in different parts of the world have also added to the knowledge on the predation capacity of certain chrysopid species **(El- Maghraby *et al.*, 2008; Shaukat, 2018)**. *Chrysopa septempunctata* is one of the few species among the chrysopids which both its larvae and adults are predaceous (**Abou- Bakr, 1989**). **Hameed *et al.* (2013)** showed that adult female during whole life

***Corresponding author: Tel. :** +201008638802
E-mail address: D.Shehta@yahoo.com

consumed 1519 mealybugs during whole life cycle through devouring 854, 308, 269 and 86 individuals during 1st, 2nd, 3rd larval instars and adult stage of cotton mealybug, respectively. While adult male during entire life consumed 1420 cotton mealybug through consuming 792, 291, 263 and 74 individuals during 1st, 2nd, 3rd larval instars and adult of cotton mealybug. From the literature it is obvious that *C. septempunctata* exists in a wide range of plantations such as field crops, orchards, and ornamental plants **(Legaspi *et al.*, 1984; Ghanim and El-Adl, 1987b; Abd El-Azez, 1991; Ali, 2008).**

Therefore this investigation was outlined to study certain biological characteristics of the two predators, *C. undecimpunctata* and *C. septempunctata* when reared on *B. tabaci* under laboratory conditions.

MATERIALS AND METHODS

Experiments were carried out at the laboratory of Plant Protection Research Institute, Dokki, Giza, Egypt, Sharkia Branch, under 26 ± 1°C and 70 ± 5.0 RH. *Bemisia tabaci* (Gennadius) was used as prey for two predators, *Coccinella undecimpunctata* L. and *Chrysopa septempunctata* Wesmael.

The predators and the prey individuals were collected from cucurbitaceous plants infested with whitefly, *B. tabaci* in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt by means of an insect sweeping net and were brought to the laboratory of Plant Protection Research Institute

Coccinella undecimpunctata L.

The previously collected adults (females and males) of *C. undecimpunctata* were reared in the laboratory on nymphs and pupae of *B. tabaci* infested cucurbitaceous plants. The laid eggs of the predator were collected and incubated until hatching.

Larvae experiment

Newly hatched larvae of the predator were placed individually in a Petri dish (10 cm diameter) with a filter paper on its bottom. The larva of the predator was provided daily with known sufficient number of *B. tabaci* immature stages (nymphs and pupae) as prey. Twenty replicates were used. The predator larvae were examined daily, whereas the surplus number of the prey was removed and provided with newly number of the prey. The daily consumed number of the prey and number of moults were counted and recorded until the pupation of the predator larvae.

Adults experiment

The pupae of the predator was kept in the laboratory until the adults emergence. The newly emerged adults of the predator were introduced singly in a Petri dish and provided daily with known sufficient number of the prey. After seven days of emergence, the predator adults were paired (one female and one male) in a Petri dish, where the copulation takes place. Thereafter, the two sexes were separated and kept singly in a Petri dish. The daily consumed number of the prey was recorded. The preoviposition, oviposition, post-oviposition periods, longevity and number of laid eggs were determined

Chrysopa septempunctata Wesm

The previously collected adults of the predators (females and males) from the field were reared in the laboratory on nymphs and pupae of *B. tabaci*. Adults were placed in glass chimney cage, measured 17 cm height, top diameter 7 cm and bottom diameter 8.5 cm. Each chimney was placed on 9 cm diameter half Petri dish and its top was covered with black muslin kept in position by means of a rubber band. The adults of the predator were provided with the nymphs and pupae of *B. tabaci* as prey. The laid eggs of the predator were collected and incubated until hatching.

Larvae experiment

Newly hatched larvae of the predator were placed individually in a Petri dish (10 cm diameter) with a filter paper on its bottom. The larva of the predator was provided daily with known sufficient number of *B. tabaci* immature stages (nymphs and pupae) as prey. Twenty replicates were used. The predator larvae were examined daily. Whereas the surplus number of the prey was removed and provided with newly number of the prey. The daily consumed number

of the prey and number of moults were counted and recorded until the pupation of the predator larvae.

Adults experiment

The pupae of the predator were kept in the laboratory until the adults emergence. The newly emerged adults were paired (one female and one male) in a previously described glass chimney cage and provided daily with known sufficient number of the prey. After copulation, the adults of the predator were isolated singly in a glass chimney cage. The daily consumed number of the prey was recorded. The preoviposition, oviposition, postoviposition periods, longevity and number of laid eggs were determined.

Statistical Analysis

Statistical analysis of the data (ANOVA), and the means were calculated using Dancans Multiple Range test (**CoHort Software, 2004**).

RESULTS AND DISCUSSION

Biological Characteristics of *Coccinella undecimpunctata* L.

Larval stage

Results presented in Table 1 show that the duration period of *C. undecimpunctata* larvae lasted an average of 13.35±0.33 days when fed on the whitefly, *Bemisia. tabaci.* The averages of total consumption during different four larval instars of the predator were 42.30±2.01, 70.35±3.43, 110.6±4.14 and 340.7±10.44 individuals, respectively. The predator larva consumed a total of average 563.95±12.05 whitefly individuals during its larval stage. The results also showed that the fourth larval instar proved to be the most efficient in its feeding capacity. It consumed 60.40% of the total number of whitefly individuals throughout its larval period (Table 1). The third instar larva came in the second place, as it consumed 19.62% from the total number of the prey.

Ghanim and El-Adl (1987a) found that the larva of *C. undecimpunctata* consumed a total average numbers of 609.9 *Aphis gossypii* Glover during its larval period which lasted ten days. **Ragab (1988)** stated that *C. undecimpunctata* duration period of the larval stage was 8.32±0.10 days and the total consumption was 269.64±5.42 aphid individuals when reared on mixed aphid species. **Saleh and Ali (2012)** showed that the total consumption rate per *C. undecimpunctata* larva from *Aphis gossypii* and *Hyalopterus pruni* (Geoffroy) were 246.55± 7.26 and 190.05±4.75 individuals, respectively. **Imam (2015)** revealed that the mean consumption of *Aphis craccivora* Koch. per *C. undecimpunctata* adult was 80.8 individuals. Whereas, 21.76, 55.67, 107.86 and 231.30 aphids were consumed by single larva during 1st, 2nd, 3rd and 4th instars, respectively.

Adult stage

Male longevity lasted an average of 30.60 ± 0.37 days. Adult male consumed a total average of 3295.75±64.07 individuals. The daily consumed average 107.70±1.28 individuals (Table 2). The predator female fed on a total average of 5633.95±16.50 individuals, with a daily average of 122.08±1.45 individuals of *B. tabaci* during its longevity which lasted 46.15 ± 0.84 days. The pre- oviposition, oviposition and post-oviposition periods were 7.10±0.16, 31.40±0.74 and 7.55±0.14 days, respectively (Table 2). The daily consumption averaged 106.00±0.71, 133.56±0.45 and 91.05±1.33 whitefly individuals during these three periods, successively. The total average number of eggs laid per female was 1035.65±22.73, with a daily rate of 32.98 eggs.

Ragab (1988) reported that *C. undecimpunctata* female at a constant temperature of 25°C devoured an average of 4240.8±379.68 mixed aphid species individuals during its longevity which lasted an average of 52.4 ± 4.6 days. The total number of eggs laid per female ranged from 639 to 1954 with an average of 1318.2±251.76 with a daily rate of 29.03 eggs. The male longevity at 25°C ranged from 40 to 55 days, with an average of 46±2.69 days. During its life span, an adult male consumed 2598 to 3472 aphids with an average of 2888.4±155.05 aphid individuals with a daily rate of 62.75 aphids.

Saleh and Ali (2012) recorded that the average numbers consumed from *Hyalopterus pruni* Geoffroy and *A. gossypii* during adult female of *C. undecimpunctata* were 3046.4±104.29 and 3797±124.72 aphid individuals, consecutively. While adult males consumed 2478.9±66.19 and 2947.5±95.08

Table 1. Durations of larval instars of *Coccinella undecimpunctata* L. and its feeding capacity when fed on *Bemisia tabaci* (Gennadius) immature stages under laboratory conditions

Larval instars	Duration in days	Daily average consumption	Average consumption/instar	Consumption (%)
1st	3.20 ± 0.16	13.22 ± 0.20	42. 30 ± 2.01	7.50
2nd	2.95 ± 0.15	23.85 ± 0.23	70.35 ± 3.43	12.48
3rd	2.60 ± 0.11	42.54 ± 0.34	110.60 ± 4.14	19.62
4th	4.60 ± 0.13	74.06 ± 0.32	340.70 ± 10.44	60.40
Total	13.35 ± 0.33	42.24 ± 13.31	563.95 ± 12.05	100.00

Table 2. Feeding capacity, longevity and fecundity of *Coccinella undecimpunctata* L. adults when fed on *Bemisia tabaci* (Gennadius) immature stages under laboratory conditions

Adult stage	Period in days	Daily average consumption	Average consumption	No. of eggs	
				Daily	Total
A: Female					
Pre- oviposition	7.10 ± 0.16	106.00 ± 0.71	752.62 ± 19.06		
Oviposition	31.40 ± 0.74	133.56 ± 0.45	4193.75 ± 98.52	32.98	1035.65 ± 22.73
Post - oviposition	7.55 ± 0.14	91.05 ± 1.33	687.45 ± 18.98		
Longevity	46.15 ± 0.84	122.08 ± 1.45	5633.95 ± 16.50		
B: Male					
Longevity	30.60 ± 0.37	107.70 ± 1.28	3295.75 ± 64.07		

aphid individuals, respectively. The average number of deposited eggs per *C. undecimpunctata* female was 181.1±5.97 and 301.9±7.3 eggs when reared on *A. gossypii* and *H. pruni*, respectively. Meanwhile, **Imam (2015)** showed that a single female laid 195.0±13.10 eggs during entire life period. Total larval and pupal duration was 23.4±0.35 and 5.3±0.56 days, respectively.

Biological Characteristics of *Chrysopa septempunctata* Wesmael

Larval stage

As seen in Table 3, the duration period of the predator larva lasted an average of 19.40±0.26 days when fed on the whitefly, *B. tabaci*. The average of total consumption during the three larval instars of the predator were 199.75±6.98, 549.50±18.47 and 1457.75±22.58 individuals, respectively. A predator larva consumed a total average of 2207.00±31.86 whitefly individuals during larval instars. The results also showed that the third larval stage was the most efficient in its feeding capacity. It consumed 66.05% of the total number of whitefly individuals throughout the larval period. The second instar larva came in the second place as it consumed 24.90% from the total number of the prey. While the first instar larva consumed only 9.05% from the total number of the prey.

Ghanim and El-Adl (1987b) estimated the efficacy of *C. septempunctata* larvae and found that the larva consumed a total average numbers of 698.7 *Aphis craccivora*, 637 *Gynaikothrips ficorum* (Marshal), 1017.2 eggs, 605.6 larvae of *Spodoptera littoralis* (Boisd), and 1630.14

Saccharicoccus sacchari (Cockerell) during its larval stage. Also, **Saleh *et al.* (2017)** mentioned that total developmental time from egg hatching to adult eclosion were 21.2±1.67, 20.6±1.28 and 23.8±1.36 days for *Chrysoperla carnea* (Steph.) when fed on *Sitotroge cerealella* (Olivier), *Ephestia kuehniella* (Zeller) and *A. gossypii*. The total consumption rate per *C. carnea* larva were 632.93±50.26, 444.08±34.40 and 367.31±50.28 individuals on the previously mentioned preys, respectively.

On the other hand, **Shaukat (2018)** showed that the complete larval developmental period of *C. carnea* was 8.50, 9.50, 12.37, 11.37, 8.25 and 11.00 days on *A. gossypii, Phenacoccus solenopsis* Tinsley*, Helicoverpa armigera* (Hubner)*, Pectinophora gossypiella* Saunders*, S. cerealella* and mixed host diet, respectively. The shortest and the longest larval period of *C. carnea* were recorded as 8.25 and 12.37 days on *S. cerealella*. The third instar larvae of *C. carnea* consumed significantly higher number of 645.9 total first instar nymphs of *P. solenopsis* which differed significantly from 406.0 nymphs consumed by first instar and 426.3 nymphs consumed by second instar larvae of *C. carnea*. Similarly the average number of total second instar nymphs of *P. solenopsis* consumed by first instar larvae of *C. carnea* was significantly less than the other developmental stages of *C. carnea*. The first instar of *C. carnea* consumed minimum number 62.12 of second instar nymphs of *P. solenopsis*. Whereas, third instar of *C. carnea* consumed maximum number 144.7 of second instar nymphs of *P. solenopsis*.

Adult stage

Male longevity lasted an average of 32.35±0.30 days (Table 4). Adult male consumed a total average of 2066.50±49.76 individuals, with a daily average of 63.88±1.36 individuals. The predator female fed on a total average of 3314.00±33.55 individuals, with a daily rate of 75.66±3.40 individuals of *B. tabaci* during its longevity period which lasted 43.80 ± 0.53 days. The preoviposition, oviposition and postoviposition periods were 11.10±0.24, 22.15±0.28 and 10.55±0.37 days, respectively (Table 4). The daily consumption averages were, 76.46±1.14, 102.08±1.24 and 19.34 ± 1.59 individuals during the three periods, respectively. The female consumed 1.60 times more than the male. The total average number of eggs laid per female was 780.50±5.70 with a daily rate of 35.24 eggs.

From the obtained results it was obvious that the feeding capacity of *C. septempunctata* larvae was higher than *C. undecimpunctata,* while, the feeding capacity of *C. undecimpunctata* adults was higher than *C. septempunctata*.

The fecundity of *C. undecimpunctata* was higher than *C. septempunctata* female. The obtained results assured the predation activity of these predators when reared on whitefly and they can be recommended for using them as biological control agents for controlling this important insect pest. *Chrysopa septempunctata* adult can be consuming up to 100 aphids per day (**Arnett *et al.*, 1980**). **Saleh *et al.* (2017)** showed

Table 3. Efficiency and durations of larval stages of *Chrysopa septempunctata* Wesmael reared on *Bemisia tabaci* (Gennadius) immature stages under laboratory conditions

Larval instars	Duration in days	Daily average consumption	Total consumption	Consumption (%)
1st	5.10 ± 0.16	39.17 ± 0.62	199. 75 ± 6.98	9.05
2nd	6.05 ± 0.18	90.83 ± 0.66	549. 50 ± 18.47	24.90
3rd	8.25 ± 0.14	176.70 ± 1.28	1457.75 ± 22.58	66.05
Total	19.40 ± 0.26	113.76 ± 10.62	2207.00 ± 31.86	100.00

Table 4. Feeding capacity, longevity and fecundity of *Chrysopa septempunctata* Wesmael adults when reared on *Bemisia tabaci* (Gennadius) immature stages under laboratory conditions

Adult stage	Period in days	Daily average consumption	Average consumption	No. of eggs	
				Daily	Total
A: Female					
Pre- oviposition	11.10 ± 0.24	76.46 ± 1.14	848.75 ± 20.88		
Oviposition	22.15 ± 0.28	102.08 ± 1.24	2261.25 ± 28.17	35.24	780.50 ± 5.70
Post- oviposition	10.55 ± 0.37	19.34 ± 1.59	204.0 ± 17.32		
Longevity	43.80 ± 0.53	75.66 ± 3.40	3314.00 ± 33.55		
B: Male					
Longevity	32.35 ± 0.30	63.88 ± 1.36	2066.50 ± 49.76		

that the average number of deposited eggs per *C. carnea* female was 184.5 ± 23.36, 237.9 ± 25.61 and 316 ± 21.88 eggs when fed on *S. cerealella*, *E. kuehniella* and *A. gossypii*, respectively. On the other hand, **Shaukat (2018)** mentioned that similarly, significantly higher fertility *C. carnea* eggs was recorded when feed on eggs of *S. cerealella* as larval host, followed by *A. gossypii*. The maximum mean adult male and female longevity was recorded when *C. carnea* was fed on *S. cerealella* as a prey, followed by *A. gossypii*. There was significant male and female variation in adult longevity due to feeding on different Preys.

REFERENCES

Abd El-Azez, M.A. (1991). Studies on certain predators belonging to order Neuroptera in Dakahlia Governorate. M. Sc. Thesis, Fac. Agric., Mansoura Univ., 108.

Abdel-Gawad, A.A., A.M. El-Sayed, F.F. Shalaby and M.R. Abo El Ghar (1990). Natural enemies of *Bemisia tabaci* Genn. and their role in suppressing the population density of the pest. Agric. Res. Rev., 68 (1): 185-195.

Abou-Bakr, H.E. (1989). Biocycle of *Parachrysopa pallens* (R.) as influenced by nourishment on two different preys (Neuroptera: Chrysopidae). Proc. Int. Cont. Econ. Entomol., Cairo, Dec., 11-24 (11): 25-31

Akhiles, K., S.V. Singh, S. Rathi, P.N Singh and A. Kumar (1996). Effect of environmental factors on *Coccinella septempunctata* predating *Aphis craccivora*. Indian. J. Entomol., 58 (4): 314-317.

Ali, Sh.A.M. (2008). Relationship between aphids and aphidophagous insects in El-khattara districts. Ph.D. Thesis, Fac. Agric., Zagazig Univ., 191.

Arnett J., N.M. Ross and H.E. Jaques (1980). How to know the beetles. W.C. Brown Company Publishers, Dub-uque, Iowa.

Arno, J., R. Gabarra, T.X. Liu, A.M. Simmons, and D. Gerling (2010). Natural enemies of *Bemisia tabaci*: Predators and parasitoids. In: Stansly, P.A., Naranjo, S.E. (Eds.), *Bemisia*: Bionomics and management of a Global Pest. Springer, Dordrecht, Heidelberg, London, New York, 385- 421.

CoHort Software (2004). Costate. www. CoHort Com. Monterey, California, USA.

Deligeorgidis, P.N., C.G. Ipsilandis, M. Vaiopoulou, G. Kaltsoudas, and G. Sidiropoulos (2005). Predatory effect of *Coccinella septempunctata* on *Thrips tabaci* and *Trialeurodes vaporariorum*. J. Appl. Ent., 129: 246-249.

El-Maghraby, M.M.A., M.M. El-Zohairy, A.M. El-Gantiry and Sh.A.M. Ali (2008). Biological characteristics and predation efficacy of *Chrysoperla carnea* (Stephens)on certain preys associated with different host plants. Egypt. J. Appl. Sci., 23 (10A): 374-387.

Gerling, D. (1990). Natural enemies of whiteflies: predators and parasitoids. In "whiteflies: Their bionomics, pest status and management" (D.Gerling, Ed-), Intercept Andover, UK, 147- 185.

Gerling, D., O. Alomar and J. Arno (2001). Biological control of *Bemisia tabaci* using predators and parasitoids. Crop Prot., 20: 779-799.

Ghanim, A.A. and M.A. El-Adl (1987a). Evaluation of predation activity and fecundity of the coccinellids, *Cydonia* (*=Chilomenes) vicina isis* Cr.*; Cydonia (=Chilomenes) vicina nilotica* Muls. and *Coccinella undecimpunctata* L. in Mansoura Region. Egypt J. Agric. Sci., Mansoura Univ., 12 (4): 993-1000.

Ghanim, A.A. and M.A. El-Adl (1987b). Laboratory studies on the feeding capacity, development and fecundity of *Chrysopa septempunctata* Wesm. (Chrysopidae: Neuroptera). J. Agric. Sci., Mansoura Univ., 12 (4): 1352-1357.

Ghanim, A.A., O.A. Nassar and M.A. El-Adl (1988). Biological studies on *Chrysopa carnea* Steph., preying on citrus brown mites *Eutetranychus orientalis* (Klein) and whitefly *Bemisia tabaci* (Gennadius). J. Agric. Sci., Mansoura Univ., 13(1): 300-304.

Hameed, A.H.M., S.S. Ahmad, J.I.H. Karar and A. Amin (2013). Predatory potential and life history characteristics of eleven spotted beetle, *Coccinella undecimpunctata* L. reared on cotton mealybug, *Phenacoccus solenopsis* Tinsley. Pak. J. Zool., 45 (6): 1555-1562.

Imam, I.I. (2015). Biological characteristic of eleven spot ladybird *Coccinella undecimpunctata* (Linnaeus), reared on cowpea aphid, *A. craccivora* (Koch) under laboratory conditions. J. Plant Prot. and Path., Mansoura Univ., 6 (6): 909-914.

Legaspi, J.C., R.I. Carruthers and D.A. NordIund (1984). Life history of *Chrysoperla rufilabris* (Neuroptera: Chrysopidae) provided sweetpotato whitefly *Bemisia tabaci* (Homoptera: Aleyrodidae) and other food. Egyptian J. Bio. Pest. Con., 4 (2): 178- 184.

Mangoud, A.A.H. (2009). Controlling the green peach aphid, *Myzus persicae* infesting peach trees by releasing the seven spotted lady beetle, *Coccinella septempunctata* L. Egypt. J. Agric. Res., 87 (3): 647-657.

Mohamed, N.A. (1996). Studies on using certain native predators in the control of certain insect pests. M. Sc. Thesis, Fac. Agric., Mansoura Univ., 153.

Mortada, M.M. (1997). Evaluation of the efficiency of coccinellid predatory insects against certain greenhouse pests. M.Sc. Thesis, Fac. Agric., Mansoura Univ., 119.

Ragab, M.E.M. (1988). Insects attacking corn ears in the field and their natural enemies. Ph. D. Thesis, Fac. Agric., Mansoura Univ., 159.

Saleh, A.A.A., H.M. El-Sharkawy, F.S. El- Santel and Rehab A. Abd El- Salam (2017). Studies on the predator *Chrysoperla carnea* (Stephens) in Egypt. Int. J. Env., 6 (2): 70-77.

Saleh, A.A.A. and Sh.A.M. Ali (2012). Biological aspects of two predators as affected by feeding on two aphid species, *Aphis gossypii* Glover and *Hyalopterus pruni* (Geoffroy) under laboratory conditions. Egypt J. Agric. Res., 90 (4): 1531- 1542.

Shaukat, M.A. (2018). Feeding behaviour and life durations of *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) feeding on a variety of hosts. J. Ent. and Zoo., 6 (1): 691-697.

الخصائص البيولوجية لمفترسين حشريين على الذبابة البيضاء *Bemisia tabaci* (Gennadius) تحت الظروف المعملية

شحتة على محمد على

معهد بحوث وقاية النباتات - مركز البحوث الزراعية – الدقى – الجيزة - مصر

أجريت التجارب المعملية فى معهد بحوث وقاية النباتات، فرع الشرقية لتقدير الكفاءة الافتراسية لطورى اليرقة والحشرة الكاملة لأبي العيد ذو الإحدى عشرة نقطة *Coccinella undecimpunctata* L. وأسد المن الأخضر ذو السبع نقط *Chrysopa septempunctata* Waesmael على الأطوار غير الكاملة لذبابة القطن والطماطم البيضاء *Bemisia tabaci* (Gennadius)على درجة حرارة ٢٦ ± ١°م ورطوبة نسبية ٧٠ ± ٥%، وجد أن متوسط ما تتغذى عليه يرقة أبو العيد ذو الإحدى عشرة نقطة خلال الأربعة أعمار اليرقية ٥٦٣,٩٥ فرداً من الذبابة البيضاء، أما الحشرة الكاملة الأنثي فإنها تغذت على متوسط ٥٦٣٣,٩٥ فرداً من الذبابة البيضاء خلال مدة حياتها وهى ٤٦,١٥ يوماً وكان متوسط ما تضعه الأنثى من بيض ١٠٣٥,٦٥ بمتوسط يومى ٣٢,٩٨ بيضة، أما الذكر فانه تغذى على ٣٢٩٥,٧٥ فرداً ذبابة بيضاء خلال فترة حياته وهى ٣٠,٦ يوماً، أما أسد المن الأخضر ذو السبع نقط فكان متوسط ما تغذت عليه اليرقة ٢٢٠٧ فرداً خلال الثلاثة أعمار اليرقية، أما الأنثى فكان متوسط ما تغذت عليه ٣٣١٤ فرداً غير كامل من الذبابة البيضاء خلال فترة حياتها وهى ٤٣,٨٠ يوماً، وكان متوسط ما تضعه الأنثى من بيض ٧٨٠,٥٠ بيضة بمتوسط يومى ٣٥,٢٤ بيضة، أما الذكر فانه تغذى على ٢٠٦٦,٥ فرداً من الذبابة البيضاء خلال فترة حياته وهى ٣٢,٣٥ يوماً، أكدت النتائج الكفاءة الافتراسية العالية لهذين المفترسين عند تربيتهما على الأطوار غير الكاملة للذبابة البيضاء ويمكن التوصية بإستخدامهما كعاملي مكافحة بيولوجية فى مكافحة الذبابة البيضاء.

المحكمـــــون:

١- أ.د. أحمد أمين أحمد صالح أستاذ المكافحة البيولوجية – معهد بحوث وقاية النباتات – مركز البحوث الزراعية.

٢- أ.د. كامل عبداللطيف حمـاد أستاذ الحشرات الاقتصادية المتفرغ – كلية الزراعة – جامعة الزقازيق.