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EFFECT OF PREY TYPES ON SOME BIOLOGICAL ASPECTS OF *Chrysoperla carnea* (STEPH.) UNDER LABORATORY CONDITIONS.

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ABSTRACT

Effect of prey kind on some biological aspects of *C. Carnea* was studied under laboratory conditions of 28 ±2 ^{o}C and 65±5 %R.H. The studied preys were *Thrips tabaci* Lindr*, Gynaikothrips ficorum* Marshall, *Aphis durantae* Thobald*, Spdoptera littoralis* (Biosd.), and control fed on (*A. craccivora* Koch.).

The obtained results revealed that there were significant differences between the total developmental periods (26.9, 20.6, 23.0, 19.8 days when this predator reared on *T.tabaci,* G*. ficorum*, *A. durantae,* and *S. littoralis* compared with (15.4 ± 0.4) days with (15-16) in control (*A. craccivora*). There were highly significant differences between oviposition periods (17.9, 15, 7.6, and 10.0 days compared with 10.0 days in control (*A. craccivora*), respectively. Adult longevity (female: 30.5, 15.6, 25, 25.1 days but recorded 20.0 days in control *(A. craccivora*). and male: 30, 20.5, 27.2, and 20.9 days) compared with 15.4 days in case of rearing on *A. craccivora*. While fecundity (number of eggs/female: 109, 131, 156, and 43 eggs) compared with 210eggs in control, (*A. craccivora* Koch.). And sex ratio (female: male); 1:2, 1:2, 1:1 and 1: 2 respectively. All results are recorded for the preys: *T.tabaci, G. ficorum*, *A. durantae,* and *S. littoralis,* respectively. While, the control. Fed on *A. craccivora* was (1:1).

Keywords: *Chrysoperla carnea*, different preys, Fecundity, Longevity.

INTRODUCTION

The predator, *Chrysoperla carnea* (Stephens) is one of the most beneficial and prolific predators found on cotton, corn, and other field crops in many parts of the world (Whitcomb and Bell (1964); Van den Bosch and Hagen (1966); Abdel-Salam (1995). It has relatively short generation times, adults lack a prey requirement for reproduction, and thus oviposition is not dependent on large population of prey (Hagen *et al*. 1970); Tuber and Tuber (1974). Larvae have a relatively broad range of acceptable prey (New, 1975; Hydron and wihtcomb, 1979), tolerance to insecticides (Croft, 1990), Wetzel *et al*. (1991); Abdel-Salam (1995) and they are amenable to mass rearing, releasing, and manipulation in the field Ridgway *et al*. (1970); Hagen *et al*. 1976), Tassan *et al*. (1979); (Hasegawa *et al*., 1989); (Tauber and Tauber 1993). The role of *C. carnea* in controlling different aphid species on various crops has been studied by several investigators (Sundby, 1966; Scopes, 1969); Hagley, 1989). Ebert and Cartwright (1997) reported that *C. carnea* was able to cause an overall reduction in aphid abundance when caged on field grown cotton. Also, the effect of prey on the developmental times longevity and fecundity of this predator has been observed (El-Dakroury *et al.* (1977); Awadallah *et al.,* (1978); Afzal and Khan, (1978); Sengonca and Grooterhorst (1985);

(Ghanim and El-Adl, 1987); Ghanim *et al.* (1988); Obrycki *et al.* (1989); Klingen *et al.* (1996); Osman and Selman (1996); Morris *et al.* (1998) and Shalaby *et al.* (1998).Therefore this investigation has been outlined to study the effect of some prey types on certain biological aspects of *C. carnea* under laboratory conditions.

MATERIALS AND METHODS

1-Rearing technique of *Chrysoperla carnea*.

Adults of *C. carnea* were collected by a sweeping net on okra and other field crop plants from Zagazig district, Sharkia, Governorate. The collected adults were transferred immediately to laboratory.The rearing technique was the same as described by (Morels – Shahira, 1980) as follows:- Cylindrical glass cages (17.0cm height and 10.5cm diameter) with upper and lower openings covered with black muslin cloth held position by rubber bands were used for maintenance and rearing the predator. The black muslin was used as a site of ovi-position and it was easy to see and collect the deposited eggs from it. Collecting of eggs was performed daily by cutting off their stalks by means of a fine pair of scissors and using of a fine wet brush. The adults were fed on pieces of cotton wool impregnated with (20-25) % sugar solution. The adults were transferred daily to newly prepared units provided with fresh feeding solution. The collected eggs were placed separately into small plastic vials (3cm.diameter and 6cm.height) plugged with a pieces of cotton wool.

2- Methodology:-

The newly hatched larvae were divided into four groups and an additional group as a control. Each of 50 Larvae of the five groups. Were reared individually in vial tubes (1x3 inch) to avoid cannibalism and rearing took place until emergence at laboratory conditions of 28 ± 2 ^{o}C and R.H. 65 ±5%.

3- Statistical analysis:

Data were statistically analyzed according to complete randomized block design. The appropriate methods were used for the analysis of data according to Fisher (1950), Duncan (1955) and Snedecor (1970).By computer program (Costat, 1990) prograram methods).

RESULTS AND DISCUSSION

A-Effect on immature stages:-

1-Egg stage:-

Data presented in Table (1) showed that the incubation periods of *C. carnea* varied from 3.11± 0.03 to 3.15 ± 0.07 days, compared with 2.3± 0.1 days in control with nonsignificant differences among the four preys.. These results were completely consistent with those obtained by El-Dakroury *et al.* (1977*)* who reported that the incubation period of *C. carnea* averaged 3.2 days when fed on eggs and larvae of *Heliothis armigera* (Hb.) at 27-30^{o}C. Awadallah *et al*. (1978) found that C. *carnea* eggs hatched after 3.11, 2.97, 3.2 and 3.15 days after rearing on *T. tabaci* nymphs, *G. ficorum* nymphs, *S. litoralis* egg-masses and *A. punicae* at 28 ^{0}C. Abdel-Galil *et al*. (1991)

mentioned that the period was 3.7 and 3.1 days when *C. carnea* larvae were fed on *A. gossypii* at 26 and 30 ^{0}C, respectively. Patro and Behera (2002) found that at 26.7±1.3 ^{o}C and 78.2±5.6% relative humidity, the incubation period recorded 6.95±0.56 days. El-Baity and Habashan (2013) showed that the incubation period of eggs was 3.2 and 3.8 days when fed on the fresh eggs of *Sitotroga cerealella* and cooled eggs respectively. On the other hand, Javed *et al*. (2013) indicated that the incubation period was 3.8±0.08 days, and Magar *et al*. (2013) showed that the incubation period recorded 2.93 days when *C. carnea* larvae were provided with different preys**.**

2-Larval stage:-

Duration of the first instar larvae of *C. carnea* fed on the above-mentioned preys recorded 3.6 ± 0.2, 3.1 ± 0.3, 2. 7 ± 0.1 and 3.2 ± 0.1days, respectively with significant variations among the four preys (L.S.D. = 1.045) compared with 1.5 ± 0.2 days in the control. (Table, 1). Which were close to that reported by Javed *et al*. (2013) who indicated that the developmental period of the first instar larvae ranged from 2.0 ± 0.1 to 3.6 ± 0.1 days.

The second instar larval duration lasted 2.5± 0.2, 3.00 ± 0.2, 3.2 ± 0.3 and 2.3 ± 0.3 days, But 2.7 ± 0.2 days in cheek. Using the above-mentioned preys, with highly significant variations (Table, 1). Javed *et al*. (2013) reported that the developmental period of the second instar larvae of *C. crania* ranged from 2.8±0.07 to 3.4±0.11 days. Which were slightly different from the data reported on this study. As For the third instar larvae of the predator, the developmental period recorded 7.5 ± 0.88, 3.9 ± 0.54, 5.4 ± 0.3 and 3.1 ± 0.2 days, respectively, compared with 2.7 ± 0.2 days. When larvae were fed on the above mentioned preys with a highly significant variations between preys (Table, 1) Javed *et al*. (2013) indicated that the developmental period of the third instar was 4.9 ± 0.10, 4.0 ± 0.06, 3.4 ± 0.13 days at different temperatures**.**.

Yuksel and Gocmen (1992) mentioned that the survival time of *C. carnea* third instar larvae in laboratory was 6.2 days. The present study indicated that the total larval developmental period of *C. carnea* ranged from 8.5 ± 0.29 to 14.18 ± 0.64 days using the above-mentioned preys and the control was10.3 ± 0.4 days. While, Salah *et al*. (1995) who showed that the mean duration of the total larval stage of *C. carnea* fed on the grape thrips, *Rethrips syriacus* (Mayet) nymphs was 9.19 ± 0.11 days.But Patro and Behera (2002) studied the developmental period at 26.7±1.3 ^{o}C and 78.2±5.6% relative humidity and the recorded data indicated that the developmental period for the larval stage was 8.40±0.72 days. The present results were slightly lower than that reported by Javed *et al*. (2013) who indicated that the total larval durations were 11.9±0.13, 9.7± 0.31, and 8.2± 0.14 days, at three temperatures, and Magar *et al*. (2013) who showed that the developmental period of the larval stage of *C. carnea* ranged from 9.40 to 15.00 days.

3-Pupal stage:-

Data presented in Table (1) showed that the pupal stage of *C. carnea* recoded 8.4 ± 0.15, 7 ± 0.1, 8.3 ± 0.1 and 8.1 ± 0.1 days while the Control was 6.2±0.2 days. Using the above-mentioned preys with nonsignificant variations between preys. While, Balasubramani Control and Swamiappan (1994) revealed that the pupal period of *C. carnea* was shorter on *B. tabaci* and *A. biguttula* (7.40 days) and longer on neonate larvae of *H. armiger* (8.40 days). Salah *et al*. (1995) showed that the mean duration of the pupal stage was 7.34 ± 0.08 days with grape thrips, *Rethrips syriacus* (Mayet) used as a prey. While, Sarode and Sonalkar (1998) observed that the pupal period of *C. carnea* was 9.17 days. Javed et *al*. (2013) indicated that the pupal duration ranged from 6.8± 0.07 to 9.2± 0.10 days at three different temperatures. El-Baity and Habashan (2013) showed that the pupal period was 11.2 days on *Sitotroga cerealella* fresh eggs and 9.4 days on cooled eggs of *S. cerealella,* there was nonsignificant difference between the two periods. Magar *et al*. (2013) showed that the pupal period of *C. carnea* after larval feeding on *Aphis gossypii*, *Helicoverpa armiger* and *A. biguttula* was 6.2, 6.4 and 6.67 days, respectively.

4- Total developmental period:-

Referring to the data shown in Table (1), the recorded data for the total developmental periods *C. carnea* were 26.9 ± 0.6, 20.60 ± 0.3, 22.95 ± 0.5 and 19.7±0.4 days. But the control was 15.4 ± 0.4 days, using the above-mentioned preys. A highly significant differences between prays were recorded (L.S.D. =1.30). Brycki *et al*. (1989) showed that immature development of *Chrysoperla carnea* requires 20.5, 21.6, and 24.9 days at 27 degrees C, with a photoperiod of LD. 16:8, when fed on eggs of *O. nubilalis* and *Agrotis ipsilon* and neonate larvae of *A. ipsilon*, respectively. Balasubramani and Swamiappan (1994) revealed that the total developmental period (egg to adult) in *C.carnea* was 19.15, 19.35, 19.95, 20.15 20.60 and 22.50 days when larvae were fed on *B. tabaci,* eggs of *Corcyra cephalonica, H. armigera* , *A. gossypii, A. biguttula* and neonate larvae of *H. armigera,* respectively. Saminathan *et al*. (1999) studied the biology and predatory potential of the green lacewing, *C. carnea*, the total developmental period of *C. carnea* on different insect preys ranged from 18.59 (*A. craccivora* (groundnut) to 22.74 days (*H. armigera* neonate larvae). Atlhan *et al*. (2001) revealed that the total duration of the total developmental period in *C.carnea* was 19.15, 19.35, 19.95, 20.15 20.60 and 22.50 days when larvae were fed on *Bemisia tabaci*, eggs of *C. cephalonica*, *H. armigera, A. gossypii*, *A. biguttula* and neonate larvae of *H. armigera*, respectively.Patro and Behera (2002) showed that the life-cycle of *C. canea* (fed on *Aphis craccivora* at 26.7±1.3 ^{o}C and 78.2±5.6% relative humidity) was completed in 19.36±1.18 days. Khan and Mushtaq (2011) showed that the total developmental period ranged from 19-23, 23-25 and 23-24 days respectively. And Javed *et al*. (2013) studied developmental durations of immature stages of *C. carnea* fed on *C. cephalonica* eggs at three constant temperatures 24±1, 28±1^{o}C and 32±1^{o}C .

B- Effect on mature stage:-

1- Longevity of adults (male & female):-

Data in Table (2) indicated that adult male longevities of *C. carnea* were 30.0 ± 0.09, 20.5± 0.6, 27.2± 0.09 and 20.09 ± 2.06 days for adults resulted from larval feeding on the mentioned preys. While the longevities of adult female recorded 30.5 ±1.10, 15.55 ± 0. 1 and 25.0 ± 2.1 and 25.1 ± 2.5 days, respectively. But the control was 23.7±0.4 days. Magar *et al*. (2013) showed that the maximum longevity of male and female were 26.53 and 38.20 days, respectively. Javed *et al*. (2013) indicated that the female and male longevities were 51.2 ± 2.18 and 32.4 ± 2.04 days, respectively which is nearly double that reported on this study.

***Pre -oviposition period:-**

Data in Table (2) showed that the pre-oviposition periods of *C. carnea* females resulted after larval feeding on different preys were 9.4±0.30, 2.6±0.6, 2.5± 0.6 and 3.4±2 days, respectively. While cheek was 3. 5 ± 0.7 days.

**** Oviposition period:-**

Data recorded in Table (2) for the oviposition period of ***C. carnea*** females indicated that the ovi-posional periods were affected by the prey kind, being; 17.86 ± 1.9, 2 ± 0.5, 7.6 ± 0.6, and 10 ± 0.4 days for larval feeding on the preys under study, respectively. While in the control recorded 11.6**±**0.07 d ays**.**

*****Post-oviposition period**:-

The post-oviposition periods were 8.3 ± 2.3, 7.5 ± 0.6, 5.0±0.6 and 3.8±0.08 days, respectively, compared with 4.10 ± 0.1 with (4-6) (Table 2)

3) Fecundity (number of eggs /female):

Referring to the data in Table (2), the total of number of eggs / female of *C. carnea* adult after larval feeding on the above-mentioned preys were 109 ± 8.4, 131.00 ± 8.5, 156.00± 0.9 and 43.4± 2.01days, respectively. Compared with 210 ± 2.00 eggs in control.(*Ahpis craccivora* other authors reported different fecundities for *C. carnea* using other preys, such as Sarode and Sonalkar (1998) who indicated that the maximum highest fecundity was 350.75 eggs/ female. Saminathan *et al*. (1999) studied that the biology and predatory potential of the green lacewing, *C. carnea*. He reported that adults oviposited a maximum of 318.40 eggs when reared on *A. craccivora* collected from cowpeas followed by *A. gossypii* (okra), *A. gossypii* (guava) and *A. gossypii* (cotton) (271.20,266.80 and 262.40 eggs/female, respectively). Atlhan *et al*. (2001) showed that the total number of eggs laid per female was 807.86 and the eggs laid per female per day were 19.67eggs. Khan and Mushtaq (2011) showed that the *C. carnea* adult laid a maximum of 278.3±8.28 eggs per female when reared on ***C. cephalonica*** eggs. Javed *et al*. (2013) results indicated that the female fecundity was 384.2±21.20 eggs per female.

1-2

4) Sex-ratio (female: male):

The sex-ratios among *C. cornea* adults resulted after feeding on the above-mentioned preys were highly affected by the prey kind. The recorded values for the sex ratios were 1: 2, 1:2, 1:1, and 1:2, respectively. Compared with 1:1 in the control. The obtained results showed that highest percentage of females was obtained when the predator's larvae were fed on eggs larvae newly hatching of *insect, S. littoralis.*

REFERENCES

Abdel - Galil, F.A.; Darwish, Y.A.; El Sayed and G. H. Abuel-Hagag (1991): Influence of temperature on the development of the common lacewing, *Chrysoperla carnea* Steph. (Neuroptera, Chrysopidae). Egypt.J.Biol.P.Control. 45-50.

Abdel-Salam, A. H. (1995): The biotic factor sand evaluation of perfo - mance under natural condition in cotton plantation. Ph.D.Thesis. Fac. fecund Agric., Mansoura Univ. pp: 175.

Afzal, M. and M.R.Khen (1978): Life history and feeding behavior of green lacewing, *Chrysopa carnea* Steph. (Neuroptera: Chrysopidae) J. Zool. Pakistan (10): 83 - 90.

Alvarez H., C. F.; G. E. Guzman and R. R. Vergara (2002): Biological features of *Thrips palmi* (Thysanoptera: Thripidae) and consumption capacity of a natural enemy under laboratory conditins.Revist. Colombia. Entomol. 28 (1): 27 - 31.

Atlahn, R.; O, M. S.; A. R.; O. M. S. and M. B. Kaydan (2001): Some biological characteristics of *Chrysoperla Carnea* (Stephens) (Neuroptera: Chrysopidae) on *Hyalopterus* pruni (Geoffer) (Homoptera: Aphididae). . Turkiye Entomol. Dergi. 25 (3): 223-230.

Awadallah, K.T.; N.A. A.-Z. and M.F.S. Tawfik (1978): Development and fecundity of *Chrysopa carnea* Steph. Bull. Ent. Soc. Egypt. (59): 323 - 329.

Balasubramani, V. and Swamiappan, M. (1994): Development and feeding potential of the green lacewing *Chrysoperla carnea* Steph. (Neur. : Chrysopidae) on different insect pests of cotton. Anz.Schad. Pfl. Umwe.67:165-169

Bansod, R. S. and S. V. Sarode (2000): Influence of different prey species on biology of *Ch. Carnea* (Stephens). Shashpa. 7(1):21-24.

Costat Software, (1990) : Microcomputer program analysis, version 4.20, CoHort Software, Berkely, CA.USA.

Croft, B.A. (1990): Arthropod biological control agent's pesticides New York, John Wiley and Sons.

Duncan, D. B. (1955): Multiple range and multiple F tests Biometric. (11): 1-42.

Ebert, T.A. and B. Cartwright (1997): Biology and ecology of *Aphis gossypii* Glover (Homoptera: Aphididae) Southwest. Entomol. (22): 116 -153.

El- Dakrourry, M.S.I. M. S. T. Abbas. A. H. El-Heneidy and K.T. Awadallah (1977): The efficiency of *Chrysopa Carnea* Steph. eggs and larvae of *Heliothis armigera* Hb. (Neuroptera: Chrysopidae, Lepidoptera: Noctuidae). Agric.Res. Rev. (5): 151-156.

El-Baity, S. O. and M.A. Habashan (2013): Rearing of the predator Green lacewing *Chrysoperla carnea* (Stephen) (Neuroptera: Chrysopidae) on *Sitotroga cerealella* (Oilvier) eggs under laboratory conditions. 17(3): 539-544.

Fisher, A. R. (1950): Statical Methods for research worker. Oliver and Poyed.Edinburgh and Londn.312 pp.

Geethalakshmi, L.; Muthukrishnan, N. and M. Raghuraman (2000): Chrysopids biology on *Corcyra cephalonica* and feeding potential on different host insects. Ann. Plan. Protec. Sci. 8 (2):132-135.

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

Ghanim, A. A.; O. A. Nasser and M.A. El- Adl (1988): Biological studies on *Chrysopa carnea* Steph. Preying on citrus brown mites, *Eutetranychus orientalis* (Klein) and whitefly, *Bemisia tabaci* Genn.J. Agric. Sci. Mansoura Uni. (13): 300-304.

Hagely, E.A.C. (1989): Release of *Chrysoperla carrnea* (Nuroptera: Chrysopidae) for control of the green apple Aphid, *Aphis pomi* Degear (Homoptera: Aphididae) Can.Entomol. (121): 309 - 314.

Hagen, K.S.R.L.T.; E.F.S. and Jr. (1970): Some ecophysiological relationships between certain *Chrysopa,* honeydews and yeasts. Boll.Entomol.Agric. Portico. (28): 113- 134.

Hasegawa, M.; M. Matsuka and K. Niijima (1989): Rearing *Chrysoperla carrnea* (Neuroptera: Chrysopidae) on chemically defined diets.Appl. Ent. (86): 315-320.

Hgen, K.S.; S. Bombosch and J.A.McMurtry (1976): The biology and impact of predators, pp. 93-142 .In Huffaker and P.S. Messenger (EdS.).Theory and practice of biological control, Academic, New York.

Hydron, B. and W.H. Whitcomb (1979): Effects of larval diet on *Chrysopa ruiabris.*FLa. Entomol. (60): 393 -398.

Javed, K.; E.U.Haq; H.I. Javed; T.M. A.Rasool; N. Akhtar and S. Abid (2013): Biological parameters and predatory potential of *Chrysoperla Carnea* (Neuroptera: Chrysopidae) feeding on wheat aphid *Schizaphis graminum* (Hemiptera: Aphididae) under laboratory conditions. Pakistan. J. Agric.Res. 26 (4): 328-334.

Jokar, M.; Zarabi and M. Zarabi (2012): Surveying effect kind of food on biological parameters on *Chrysoperla carnea* (Neuroptera: Chrysopidae) under laboratory conditions. Egyptian Acad. J. Biol. Sci. Entomol. 5 (1): 99 - 106.

Khan, A. A. and T. Mushtaq (2011): Biology and feeding activity of *Chrysoperla carnea* (Stephens) on different host insects in Kashmir.J. Insect Sci. (Ludhiana) 24 (1): 71-74.

Klingen, I.; N. S. Johansen and T. Hofsvang (1996): The predation of Ch*rysoperla carnea* (Neuroptera: Chrysopide) on eggs and larvae of *Mamestra brassicae* (Lep: Noctuidae). J. Appl. Ent. 120(6): 363 – 367.

Letardi, A. and V. Caffarelli (1989): Use of a semi-artificial liquid diet for rearing larvae of *Chrysoperla carnea* Stephens (Planipennia: Chrysopidae). Redia. 72 (1): 195-203.

Marels-Shahira, S.F. (1980): Studies on the effect of diet on bionomics of the green lacewing *Chrysoperla carrnea* (Steph.). M.SC. Fac. Agric. Cairo Univ.100 pp.

Meager, P. N.; N. S. Satpute; S. S. Madankar and M. Z. A. Deshmukh (2013): Evaluation of cotton aphid, leafhopper and *Helicoverpa armigera* as hosts against *Ch. Carnea*. Indian. J. Entomol. 75 (1): 83-84.

Morris, T.I.; M. Campos, M. A. Jervis, P.K. McEwen and N.A.C. Kidd (1998): Potential effects of various ant species on green lacewing, *Chrysoperla carrnea* (Nuroptera: Chrysopidae) egg numbers. J. Appl. Ent. 122: 401 - 403.

Muzammil, S. A. G. H.; T. S. Syed (2011): Effect of different hosts on biology of *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) in laboratory conditions. Pakistan J. Zool. 43 (6):1049-1054.

New, T. R. (1975): The biology of Chrysopidae and Hemecobiidae (Neuroptera) with reference to their usage as biocontrol agents; a review .Trans. R. Entomol. Soc. Lond. (127): 115-140.

Obrycki, J. J.; M. N. Hamid; A. S. Sajap and L. C. Lewis (1989): Suitability of corn insect pests for development and survival of *Chrysoperla carnea* and *Chrysopa oculata* (Neuroptera: Chrysopidae) Environ. Entomol. 18 (6): 1126 -1130.

Osman, M.Z. and B.J. Selman (1996): Effect of larval diet on the performance of the predator, *Chrysoperla carnea* (Neuroptera: Chrysopide). J. Appl. Ent. (120): 115 -117.

Patro, B. and M. K. Behera (2002): Biology and feeding potential of Chrysoperla *carnea* (Stephens) (Neuroptera: Chrysopidae) on the bean aphid, *Aphis craccivora* Koch. Biol. Cont. 16 (1): 77 - 79.

Ridgeway, R.L., R.K.Morrison and M. Badgley (1970): Mass rearing a green lacewing. J. Econ.Entomol. (63): 834 - 836.

Salah, F.A.; E.; M. El-Magrby; E.F.Adel. and M.I.Abou-zid. (1995): studies on integrated control of grape pest's .MSc.Thesis. Fac. Agric. Zagazig. Zagazig Univ. 109 pp.

Saminathan, V. R.; B. R. K. M and N. R. Mahadevan (1999): Biology and predatory potential of green lacewing (*Chrysoperla carnea*) (Neuroptera: Chrysopidae) on different insect hosts. Indian. J. Agric. Sci. 69(7): 502-505.

Sarode, S. V. and V. U. Sonalkar (1998): Effect of Corcyra *cerrphalonica* (Stainton) density on the development of *Chrysoperla carnea* (Stephens). J. Biol. Cont. 12 (2): 153-156.

Scopes: N.E.A. (1969): The Potential of *Chrysopa carnea* as a biological control agent of *Myzus persica* on glasshouse chrysanthemums. Ann. Appl. Biol. (64): 433- 439.

Sengoonca, C. and A. Grooterterhorst (1985): The feeding activity of *Chrysoperl Carnea* Steph. on *Barathra brassicae* L. and *Spodoptera littoralis* (Boisd.) J. Appl. Ent. (100): 219 - 223.

Shalaby, F.F.; M. A. Nada; A .A. Hafez and K. A. Hassan (1998): *Chrysoperla carnea* Steph an active predator against *Pectinophora gossypilla* (Saunders). Regional Symposium for Applied Biological Control in Mediterranean Countries. Cairo. Egypt. Book. Abstract. 49.

Snedecor, G.W. (1970): Statistical method applied to experiments in agriculture and biology. Lowa.State. Press, U.S.A.534pp.

Sundby, R.A. (1966): A comparative study of the efficiency of three predatory insects, Coccinella *septempunctata* L. (Coleoptera: Coccinellidae) *Chrysopa* carnea Steph. Neuroptera: Chrysopidae) and *Syrphus ribesii* L. (Diptera: Syrphidae) at Two different temperatures. Ent. (11): 395 - 404.

Tuber, M. J. and C. A. Tuber (1974): Datary influence on reproduction in both sexes of five predacious species (Neuroptera) .Can. Entomol. (106): 921-925.

Van den Bosch and K.S. Hagen (1966): Predaceous and Parasitic arthropods in California cotton fields.Univ.Calif. Agric. Exp. Sta. Bull. 820 pp: 32.

Wetzel, C., H. K. and S.A. Hassan (1991): Investigations to evaluate the side effects of pesticides on the green lacewing, *Chrysoperla crane* Staph. (Neuroptera: Chrysalides) in the field. J .Apple. Entomol. (111): 217-224.

Whit Comb, W.H. and K. Bell (1964): Predaceous insects, spiders and mites of Arkansas cotton fields. Univ. Arkansas Agric. Exp. REC.Bull. 690.

Yuksel, S. and Gocmen0, H. (1992): The effectiveness of *Chrysoperla carnea* (Stephens) (Neuroptera, Chrysopidae) as a predator on cotton aphid, *Aphis gossypii* Glov. (Homoptera: Aphididae) Proceedings of the Second Turkish National Cong. Entomol. 209 - 216.

تأثير أنواع الفرائس الحشرية على بعض الصفات البيولوجية للمفترس أسد المن *Chrysoperla carnea* (Stephens) تحت الظروف المعملية

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تم دراسة تأثير أربع فرائس حشرية (تربس البصل *Thrips tabaci* و تربس الفيكس *G.ficorum* و من الدورنتا *Aphis durantae* ولطع واليرقات حديثة الفقس لدودة ورق القطن) *Spdoptera littoralis* على بعض الخصائص البيولوجية للمفترس أسد المن *Chrysoperla carnea* فكانت هناك اخت افات كبيرة بين فترة النمو الكلية من البيضة إلى الحشرة الكاملة (حيث بلغت فترة النمو الكلية للمفترس ٢٦.٩ ± ٠.٦ يوم في حالة افتراس حوريات تربس البصل وأقل قيمة في حالة التغذيه على بيض أويرقات حديثة الفقس لحشرة دودة ورق القطن فكانت ١٩.٨±٠.٤يوم. مقارنة بالتغذية على *A.craccinora* فكانت ١٥,٤ ± ٠,٤ يوم. بلغت أطول فترة حياة الذكور ٣٠,٠ ± ١,١ يوما وأقصرها ٢٠,٩ ±٢,١ يوم في حالة تغذية المفترس على ودودة ورق القطن واليرقات حديثة الفقس مقارنة *A.craccinora* ١٥,٩ ± ٢,١ يوم. كما بلغت أطول فترة حياة لإناث المفترس التي تغذت على تربس البصل *Thrips tabaci* ٣٠,٥ ±١,١ يوما و أقلها للإناث التي تغذت تربس الفيكس *G.ficorum* ٢٠,١ ± ٢,١ يوما . مقارنة التغذية على من الفول (الكنترول) *A.craccinora* ١٥,٤ ± ٠,١يوم.
تأثرت الكفاءة التناسلية بنوع الفريسة تأثيرا كبيرا حيث وضعت الإناث أكبر عدد من البيض لكل أنثى١٤٥,٠ ±٠,١ بيضة وأقل عدد ماوضعته الأنثى ٤٣,٠ ± ٢,٠بيضة مقارنة بالكنترول *A.craccinora* ٢١٠,٠ ±٢,٩ بيضه
تأثرت النسبة الجنسية تأثرا كبيرا بنوع الفريسة حيث تراوحت النسبة الجنسية)أنثى :ذكر(١ :2) (1 :2) و (١:١) و(١:١) و (٢:١).على الترتيب الفرائس الحشرية السابقة الذكر. بينما كانت في المقارنة كانت بنسبة (١:١) .

Table (1): Duration periods (days) of the developmental stages of *C. carnea* reared on different preys under laboratory conditions of 28 ±2 °C and R.H. 65±5 %.

Prey insect	Mean ± SE / days of Immature stages of *Ch. Carnea*						
	Egg stage	Larval stage				Pupal stage	Total developmental
		1st instar	2nd instar	3rd instar	Total		
Thrips tabaci	3.1±0.03 (3 – 4)	3.6 ± 0.2 (2 – 5)	2.5±0.2 (2-3)	7.5±0.9 (3-12)	14.2±0.6 (9-17)	8.4±0.2 (6-11)	26.9±0.6 (22-30)
Gynaikothrips ficorum	2.97 ±0.0 (2 -4)	3. 1± 0.3 (2 – 4)	3.0±0.2 (2-4)	3.9± 0.5 (3-7)	10.5±0.2 (7-14)	7.2±0.1 (6-8)	20.6±0.3 (16-24)
Aphis durantae	3.2 ±0.1 (2 – 4)	2.7 ± 0.1 (2 – 4)	3.2±0.3 (2-6)	5.4±0.5 (3-8)	8.5±0.3 (10-13)	8.3±0.1 (7-9)	23.0±0.5 (21-25)
Spdoptera littoralis	3.1 ±0.1 (3 – 4)	3.2 ± 0.1 (3-4)	2.3±0.3 (1-4)	3.1±0.2 (2-5)	8.5±0.3 (7-10)	8.1±0.1 (7-9)	19.8±0.4 (18-21)
Control (*Aphis acraccivor*)	2.3±0.1 (2-4)	1.5 ± 0.2 (1-3)	2.7 ± 0.2 (2-4)	2.7 ± 0.2 (2-4)	6.9±0.6 (3-4)	6.2±0.2 (7- 8)	15.4 ± 0.4 (15-16)
F.	2.70	12.50	3.60*	16.9**	40.50**	0.55	80.90**
L.S.D. 5%	.....	0.50	105	1.71	1.46	.....	1.30

Table (2): Effect of Prey kind on some biological aspects of *C.carnea* under Laboratory conditions 28±2°C (27-29) and 65±5% (70-75) R.H%.

Biological aspects	Prey kind Mean ± sx /days					F. value	L.S.D. At 5%
	T. tabaci	*G. ficurum*	*A. durantae*	*S. littoralis*	Control		
Longevity/♂	30.0±0.1 (5-25)	٢٠.٥±0.6 (15-25)	27.2±0.1 (2-33)	20.9±2.1 (8-40)	15.9±2.1 (24-26)	*	4.51
Longevity/♀	30٥.±1.1 (26-43)	21.1±2.11 (16-21)	25.0±2.5 (11-35)	25.1±2.5 (16-25)	15.6±0.1 (12-18))	*	2.33
Preovi-position period	9.4 ± 0.3 (7-11)	2.6±0.6 (2-3)	2.6±0.6 (3-4)	٣.٤±1. 9 (3-5)	3.5±0.7 (2-4)	*	1.56
Ovi-position period	17.9±1.9 (11-26)	15.0±0.6 (10=15)	7.6±0.6 (2-4)	١٠.٠±0.4 (4-12)	11.6±0.1 (14-18)	**	2.66
Post-oviposition period	8.3±2.3 (1-39)	7.5±0.6 (1-7)	5.0±0.6 (1-6)	٣.٨±0.1 (3-6)	4.1±0.1 (4-6)	*	3.66
Total No. of eggs /♀	١٠٩±8.4 (16-79)	131±8.5 (50-110)	145±0.1 (30-109)	43.0±2.0 (19-46)	٢10±2.9 (95-170)	**	2.22
Sex Ratio	1:2	1:2	1:1	1:2	1:1	.....	.....