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EFFECT OF PREY TYPES ON CERTAIN BIOLOGICAL ASPECTS OF *Chrysoperla carnea* (STEPH.) (NEUROPTERA: CHRYSOPIDAE) UNDER CONSTANT TEMPERATURE.

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ABSTRACT

Laboratory experiments were carried out in Economic Entomology Department, Faculty of Agriculture, Mansoura University under two constant temperature of 25 ±2 C° and 30 ± 2 C° and relative humidity of 70 ± 5%, to evaluate the effect of six prey types on some biological aspects of *Chrysoperla carnea* (Steph.) The obtained results indicated that the shortest developmental time was obtained when larvae of *C. carnea* reared on *Aphis craccivora* Koch, while the longest time was recorded on *Icerya seychellarum* Westwood eggs. The total consumption rate from the six prey insects by the larval stage of *C. carnea* showed significant difference. Concerning to the food preference for the predator larval among prey insects tested, the average male and female longevity of *C. carnea* was significant longer when fed on *I. seychellarum* eggs, followed by *A. craccivora*, *Aphis gossypii* Glover, *Earias insulana* (Boisd.) eggs, *Myzus persicae* (Sulzer), and shorter on *Aonidiella aurantii* Maskell nymphs. Meanwhile the prey type had a significant effect on female fecundity. The highest number of eggs obtained when females of *C. carnea* fed on *A. craccivora* followed by *A. gossypii*, *A. aurantii* nymphs, *M. persica*, *I. seychellarum* eggs, while the lowest numbers were achieved on *E. insulana* eggs

INTRODUCTION

From neuropterous predators, the green lacewing *Chrysoperla carnea* (Steph.) is one of the most beneficial and prolific predator found on cotton, corn and other field crops in many parts of the world (Whitcomb and Bell, 1964; Van den Bosch and Hagen, 1966; Abd El–Salam, 1995).Only the larval stage can feed on aphids, spider mites scales, psyllids, mealybugs, whitefly, thrips, leafhoppers and other pests, while the adult live longer and lay more eggs when provided nectar , pollen and insect honeydews. It has relatively broad range of acceptable preys(New, 1975; Hydron and Whitcomb, 1979). Some biological characteristics of *C. carnea* were studied in different parts of the world (Awadallah *et al.* 1976; El –Dakroury *et al.*, 1977; Afzal and Khan, 1978; Sengonca and Grooterhors, 1985; Ghanim *et al.* 1988; Obrycki *et al.*, 1989; Abd El –Aziz, 1991; Klingen *et al.*, 1996; Osman and Selman, 1996; Morris *et al.*,1998; Shalaby *et al.*, 1998, El-Serafi *et al.*, 2000, Gautam and Tesfaye 2002 and Sattar et al. 2007). The present study aim to evaluate the effect of different prey types on certain biological aspects of *C. carnea* under constant temperature.

MATERIALS AND METHODS

1. Larval experiments:

Laboratory experiments were carried out in Economic Entomology Department, Faculty of Agriculture Mansoura University under two constant temperature of 25±2Cº and 30±2Cº and relative humidity of 70±5 %. Five insect species belonging to order : Homoptera namely: *Aphis craccivora* Koch ; *Myzus persicae* (Sulzer) ; *Aphis gossypii* Glover ; *Aonidiella aurantii* Maskell nymphs and *Icerya seychellarum* Westwood eggs and *Earias insulana* (Boisd.) eggs which belonging to order Lepidoptera were used as preys for the *Chrysoperla carnea* . The predator and the prey individuals were obtained from a maintained culture in the Insectary.

Newly hatched predator larval each put singly in a petri dish (10cm. dimater) with filter paper on its bottom, have been prepared as replicates for this predator. Twenty replicates have been done from each prey. Known surplus number of each prey was offered and the devoured individuals were replaced daily. Attacked prey individuals were counted daily during the periods of the predator larval stadia. The duration period, feeding capacity of larval stage, the longevity of female and male and fecundity of predator female were recorded and estimated.

2.Adult experiments:

Six experiments each include ten newly emerged adults of the predator were used. A predator female and male were confined together in glass chimneys, open from upper and lower sides. Each chimney was placed on a half, Petri dish (10cm in diamter) furnished with a moisened filter paper to provide humidity for the insects. The artificial diet for adults was prepared by adding yeast oxido : fractose sugar : water as ratio 5:6:10 and put together in a beaker which mixed with a mixar. The diet should be a viscous pulp, which is easy to spread using a bruch or spatula. A piece of cotton with the mixture (artificial diet) was offered to adults. The chimney was covered with a piece of black cloth for attracting females to oviposit . After copulation took place, adult females which their larval stage reared on the six previously preys, were kept singly to deposit their eggs, and number of laid eggs females during oviposition period was recorded daily. The longevity of the predator male and female was calculated.

Data analysis:

Data for developmental time; of *C. carnea* immature stages, consumption rate of larval stage longevity and fecundity of female and longevity of males reared when fed on six insect pests were subjected for one way analysis of variance (ANOVA), and the means were separated using Duncan's Multiple Range Test (COHORT Software, 2004).

RESULTS AND DISCUSSION

Effect of prey type on certain biological aspects of *C. carnea*:

Table (1 and 2) and figures (1 and 2) showed that the effect of prey kinds on developmental times, consumption rate longevity and fecundity of *C. carnea* reared at two constant temperatures of 25±2 C° and 30 ± 2 C° .The obtained results indicated that the shortest developmental time was obtained when larvae reared on *A. gossypii*, while the longest time was recorded on *I. seychellarum* eggs. The total consumption rate from the six prey insects by the larval stage of *C. carnea* showed significant difference. Concerning to the food preference for the predator larval among prey insects tested. From Tables(1 and 2) and Figures (1 and 2) it can be noted that the average male and female longevity of *C. carnea* was significant longer when fed on *I. seychellarum* eggs, followed by *A. craccivora*, *A. gossypii*, *E. insulana* eggs, *M. persica*, and shorter on *A. aurantii* nymphs. Meanwhile the prey type had a significant effect on female fecundity. The highest number of eggs obtained when females of *C. carnea* fed on *A. craccivora* followed by *A. gossypii*, *A. aurantii* nymphs, *M. persica*, *I. seychellarum* eggs, while the lowest numbers were achieved on *E. insulana* eggs.

From previously Tables and Figures it can be notced that the temperature degrees affected on the developmental times, consumption rate longevity and fecundity of *C. carnea*. The results revealed that the developmental times of larval stage were shorter at 30 ±2c° than that at 25 ±2c°. Similarly, the same trend was observed with the consumption rate, longevity and fecundity of *C. carnea*.

Table (1): Effect of prey types on certain biological aspects of *C. carnea* fed on different insect pests at constant temperature of 25 ±2C°.

Biological aspects / Prey types	Duration in days		Consumed /larva	Longevity		Fecundity /female
	Larval stage	Pupal stage		Female	Male	
Aphis craccivora	9.56 ± 0.55 a	7.62 ± 0.15 a	531.83 ± 9.71 e	39.10 ± 1.55 a	30.75 ±0.15 abc	250.35 ± 5.52 a
Aphis gossypii	8.3 ± 0.58 a	7.05 ± 0.58 a	677.85 ± 14.19 b	35.22 ± 2.25 b	31.25 ± 0.18 ab	181.25 ± 4.35 b
Mysus persica	8.77 ± 0.50 a	8.77 ± 0.50 a	508.86 ± 10.7 f	34.35 ± 1.65 b	28.25 ± 0.25 d	168.25 ± 4.28 bc
***Aonidiella aurantii* nymphs**	9.8 ± 0.71 a	7.75 ± 0.58 a	729.17 ± 20.6 a	33.75 ± 2.25 b	28.55 ± 1.15 cd	176.55 ± 4.25 b
***Icerya seychell*arum eggs**	9.72 ± 0.25 a	7.42 ± 0.18 a	562.75 ± 12.53 d	39.61 ± 0.25 a	31.66 ± 0.05 a	153.18 ± 4.25 cd
***Earias insulana* eggs**	9.2 ± 0.19 a	7.63 ± 0.57 a	617.64 ± 15.85 c	34.81 ± 0.54 b	29.11 ± 0.82 bcd	141.59 ± 3.24 d

Means followed by the same letter in a column for each insect species are insignificantly different at the 5% level probability (Duncan's Multiple Range Test).

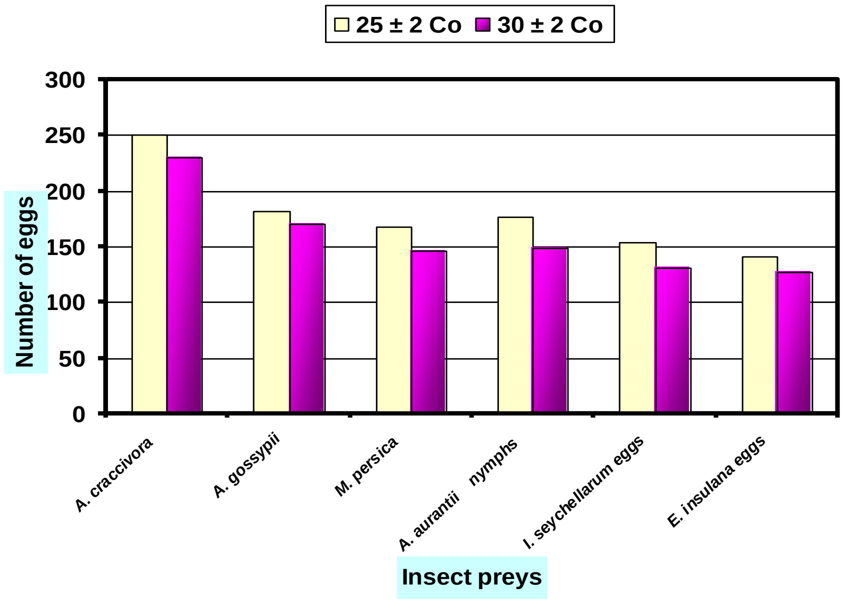

Figure (1): Effect of prey types on the fecundity capacity *C. carnea* fed on different preys at constant temperatures 25 ±2c° and 30

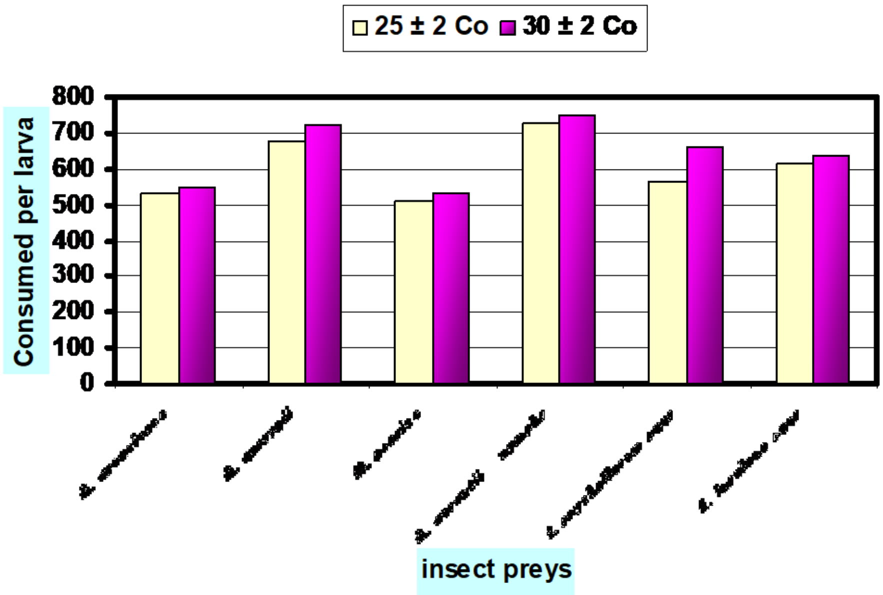

Figure (2): Effect of prey types on the feeding capacity of C. *carnea* fed on different preys at constant temperatures 25 ±2c° and 30 ±2c°.

Table (2): Effect of prey types on certain biological aspects of *C. carnea* fed on different insect pests at constant temperature of 30 ±2Cº.

Biological aspects / Prey types	Duration in days		Consumed /larva	Longevity		Fecundity /female
	Larval stage	Pupal stage		Female	Male	
Aphis craccivora	7.43 ± 0.32 [a]	5.57 ± 0.06 [a]	546.25 ± 10.96 [e]	28.48 ± 1.53 [a]	20.35 ± 0.55 [bc]	230.49 ± 5.25 [a]
Aphis gossypii	6.25 ± 0.08 [a]	5.0 ± 0.10 [a]	721.94 ± 18.96 [b]	28.21 ± 1.52 [a]	23.25 ± 0.65 [a]	170.35 ± 5.25 [b]
Mysus persica	6.95 ± 0.23 [a]	5.25 ± 0.15 [a]	532 ± 18.56 [e]	25.66 ± 1.52 [b]	19.55 ± 0.56 [c]	145.62 ± 4.25 [cd]
***Aonidiella aurantii* nymphs**	7.7 ± 0.16 [a]	5.75 ± 0.15 [a]	749.76 ± 26.24 [a]	28.75 ± 1.52 [a]	22.35 ± 1.55 [ab]	149.25 ± 4.25 [c]
***Icerya seychell*arum eggs**	7.79 ± 0.15 [a]	5.82 ± 0.17 [a]	661.49 ± 15.63 [c]	28.07 ± 1.85 [ab]	22.85 ± 0.15 [a]	130.38 ± 3.15 [d]
***Earias insulana* eggs**	7.30 ± 0.18 [a]	5.37 ± 0.05 [a]	636.43 ± 19.72 [d]	26.50 ± 0.04 [ab]	22.14 ± 0.04 [ab]	127.14 ± 4.15 [d]

Means followed by the same letter a column for each insect species are insignificantly different at the 5% level probability (Duncan's Multiple Range Test).

This finding is in complete agreement with those addressed by (Scopes (1969**)** in England and with El-Dakroury *et al.*, **(**1977) in Egypt**;** Ghanim and El-Adl **(**1987**)** and El-Serafi *et al.*, **(**2000**)** in Egypt**).** Our results declared clearly that the insect preys differed in their degree of suitability for this predator. The suitability of prey resulting in an increasing consumption rate, shorted developmental times, greater survival rate, and higher fecundity female Slansky and Rodriguez, (1987) and Crawley, (1992). In addition, the suitable prey must provide all nutritionally important factors such as proteins, carbohydrates, lipids, vitamins and minerals in balanced proportion and concentration to meet predator metabolic requirements and mobility of prey also play a large role in prey suitability House, (1966); and (1977). Consequently, it could be concluded from these results that *A. craccivora* and *A. gossypii* were the most suitable preys followed by *A. aurantii* nymphs, *M. presica*, *I. seychellarum* eggs and *E. insulana* eggs. It could be concluded that the used of *C. carnea* as a biological control agents against these six insect pests in several economic crops such as vegetables, cotton, corn and wheat.

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تـأثير نـوع الفـرائس علـي بعـض الخصـائص البيولوجيـة لأسـد المـنّ الأخضـر *Chrysoperla carnea* (Steph.)

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**** معهد بحوث وقاية النباتات مركز البحوث الزراعية الدقى الجيزة مصر.**

النتائج المتحصل عليها عند تغذية مفترس أسد المن الأخضر علي ستة فرائس و هي من البقوليات و من القطن و من الخوخ الأخضر و حوريات الحشرة القشرية الحمراء و بيض البق الدقيقي *Icerya seychellarum* و بيض دودة اللوز الشوكية أوضحت النتائج المتحصل عليها أنه في حالة التربية علي من القطن قصرت فترة نمو اليرقات بينما طالت فترة نمو الطور اليرقي عند التغذية علي بيض البق الدقيقي *I. seychellarum*. كما أن معدل تغذية اليرقات يتأثر معنويا و بوضوح عند التغذية علي هذه الفرائس السابقة و يرجع ذلك إلي تفضيل يرقات أسد المن لنوع هذه الفرائس. كما أن متوسط طول فترة حياة الإناث و الذكور تأثرت معنويا و بوضوح عند التغذية علي الفرائس الستة السابقة الذكر فكانت طويلة عند التغذية علي بيض *I. seychellarum* ثم تلي ذلك في طول فترة الحياة من البقوليات ثم من القطن ثم بيض دودة اللوز الشوكية ثم من الخوخ الأخضر و كان أقصي فترة حياة للطور الكامل علي حوريات الحشرة القشرية الحمراء. و النتائج المتحصل عليها تبين أن الكفاءة التناسلية لإناث هذا المفترس تأثرت معنويا بنوع الفرائس فكانت عالية علي من البقوليات ثم كانت علي التوالي من القطن و حوريات الحشرة القشرية الحمراء و من الخوخ الأخضر و بيض البق الدقيقي *I. seychellarum* ووضعت الإناث أقل كمية بيض عند التغذية علي بيض دودة اللوز الشوكية.