SURVEY THE NEUROPTEROUS PREDATORS AND THE RELATIVE ABUNDANCE OF *Chrysoperla carnea* (STEPH.) AND *Chrysopa septempunctata* WESM. BY USING A LIGHT TRAP AT MANSOURA DISTRICT

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ABSTRACT

A survey of certain neuropterous predators and the relative abundance of the important neuropterous predatory insects were studied by using a light trap during two successive years at Mansoura district. The obtained results recorded four neuropteruos predators trapped during the two years of study. These species belonging to two families : Chrysopidae and Myrmeleonidae. These predators were namely: *Chrysoperla carnea* (Steph.) ; *Chrysopa septempunctata* Wesm.; *Cueta variegata* Klug. and *Palpares cephalotes* Klug. The dominant species was *C. carnea* during the two years of investigation. The data showed that *C. carnea* had six peaks in the first year and five peaks in the second year of study. These peaks were recorded in the fourth week of March; fourth week of April; first week of June; third week of July; third week of August and second week of October; while in the second year these peaks were recorded in the first week of April; first week of June , first week of July, first week of August and fourth week of September, respectively. The obtained data revealed that *C. septempunctata* had four peaks in the first years and three peaks in the second years. These peaks were recorded in the first week of June, third week of July, fourth week of August and second week of October, respectively in the first year, Meanwhile, these peaks were found in the second year of study, in the first week June, first week of July and fourth week of August. The statistical analysis assured that, there was a highly positive significant correlations between the biweekly catch of *C. carnea* and *C. septempunctata* and temperature parameters during the two years of study. While, the relative humidity parameters had insignificant effect on the population density of the two predators during the two years of investigations.

INTRODUCTION

Neuropterous insects are fairly diverse and about 4.500 species are already known. These species are found about vegetation and often near bodies of water, since many have aquatic larvae. They feed on fluid materials and various soft-bodied insects. Many species of order group are known as very effective predaceous insects for more than 80 species of insect pests and ten species of mites (Butler and Ritchie , 1978 ; Kharizanov and Babrikova , 1978 ; Kharizanov , 1982; Sengonca and Grooterhorst , 1985; Ghanim *et al.*, 1988 and Abd El-Aziz , 1991). Several investigators had studied the flight activity and population density of certain neuropterous predatory insect species by using the light traps(Hassanein , 1956 ; Honek , 1977; Nielsen , 1977; Tadic , 1979 ; Stang, 1980; Honek and Kraus 1981;

Abd El-Aziz,1991; Gunther, 1991; Szenthiralyi *et al.* 2001; Soliman, 2004; Deutsch *et al.* 2005. and Jeyakumare *et al.* 2007).

Therefore, the purpose of this investigation was to survey the important neuropterous predators and studying the relative abundance and flight activity of *Chrysoperla carnea* (Steph.) and *Chrysopa septempunctata* Wesm. at Mansoura district.

MATERIALS AND METHODS

For studying a survey neuropterous predators and the relative For studying a survey of certain neuropterous predators and the relative abundance of the important neuropterous predatory insects by using a light trap at Mansoura district, samples were taken daily during two years from 1st August 2006 till 31st July 2008.

A Robinson and Robinson (1950) light trap previously proposed by Williams (1923), was used. The trap consists of an inverted metal cone, 24 inches in diameter, and contains six radial vanes projecting two inches above the upper aperture. These vanes obstruct the flight of insects circling or heading for the light and thus reduce their flight speed causing them to stall and fall into the sloping cone and then into the receptacle. At the lower aperture of the cone and in the center of the Vanes, a 250 watt clear mercury vapour lamp is fixed in a socket and so adjusted that its light is unobstructed above the upper structure of the trap. This upper structure is fitted tightly on a barrel-like 24 inches deep receptacle which forms the base of the apparatus. Sodium cyanide, put in a glass jar, is used as killing agent inside the trap. The light trap was set off daily for a period of 12 hours from sunset to sunrise. The trap was placed in the Agricultural Experimental farm of Mansoura University at a height of 3.5 meters. The trap catch was collected every morning and brought to laboratory for identification. The daily catch was separated, identified and counted in the same day. The daily catch was accumulated biweekly. Daily records of temperature and relative humidity of Mansoura district were obtained from the Meteorological Organization, Ministry of Defense and Cairo. These records have been calculated as biweekly means related to the date of accumulated biweekly catch.

Data analysis:

For the purpose of statistical analysis, data were analyzed by using correlation coefficient using computer advanced statistical program Cohort software (Costat 2004).

RESULTS AND DISCUSSION

1. Surviving neuropterous predators by using a light trap:

Four neuropterous predators were caught by a light trap during the two years of study belonging to the two families namely: Chrysopidae and Myrmeleonidae . The names and the total numbers of each species together with their percentage to total catch during the two years of investigation are given in Table (1). From this table, it can be seen that the total number of

7171 neuropterous predator individuals had been trapped by a light trap during the two years of investigation . The total catch of the first year was 3554 individuals , while that of the second year was 3617 individuals . The obtained results showed that most dominant family was Chrysopidae(83.86%)in 2006/2007and(84.32%)in 2007/2008. This family was represented by two species , the number and percentages of these species during the two years were as follows :

C. cranea (1654 individuals = 55.47%) in 2006/2007 (1617 individuals = 53.02%) in 2007/2008 ; C. septempunctata (1328 individuals = 44.53%) in 2006/2007 and (1433 individuals = 46.98%) in 2007/2008 . The dominant Chrysopidae species among them was C. cranea . In addition , the results showed that family Myrmeleonidae represented 16.14 % and 15.68% of the total catch in 2006/2007 and 2007/2008 respectively . This family was represented by two species . The numbers and percentages of these species during the two years were as follows : C. variegata (276 individuals = 48.08%) in 2006/2007 and (324 individuals = 57.14%) in 2007/2008 ; and P. cephalotes (298 individuals = 51.92%) in 2006/2007 and (243 individuals = 42.86%) in 2007/2008. Semeira (1980) in France, used a light trap for surveying the Chrysopid predators during the period of Mayt till October 1979. He found that nine species of Chrysopids belonging to four genera were recorded . These included C. carnea which represented 15.8% of the total catch. Similar results were reported by Abd El-Aziz (1991) in Egypt , found that the most dominant family caught by a light trap was family Chrysopidae , as it represented 92.81% of the total catch , while family Myrmeleonidae formed 7.19% of the total catch. Deutsch et al. (2005) in France, studied light trapping collections of Chrysopids predator over ten years. They found that the main species were members of the C. canea complex. These complex were increased from 38.00 to 72.00 % of the total Chrysopids in samples.

Table (1): Total numbers and percentages of neuropterous predatory insect species cought by a light trap during the two years of study at Mansoura district.

Families and species	2006 / 2007			2007 / 2008		
	Total number of species	% of species to family	% of species to total	Total number of species	% of species to family	% of species to total.
Chrysopidae:						
C. camea	1654	55.47	46.51	1617	53.02	44.71
C. septumpunctata	1328	44.53	37.35	1433	46.98	39.62
Total	2982	100	83.86	3050	100	84.32
Myrmeleonidae:						
C. variegata	276	48.08	7.76	324	57.14	8.96
P. cephalotes	298	51.92	8.38	243	42.86	6.72
Total	574	100	16.14	567	100	15.68
General Total	3554		100	3617		100

2. Population density of the two important neuropterous predators caught by a light trap :

A . *Chrysoperla cranea:*

1. Relative abundance and flight activity of *C. carnea* adults :

Figure (1) shows the relative abundance of *C. carnea* adult in the first year of study. The adult of *C. carnea* start to appear in the fourth week of February, then the population increased gradually and reached the first peak in the fourth week of March. The biweekly catch showed that *C. carnea* had six peaks in the first year of the investigation. Meanwhile in the second year, these peaks were recorded in the fourth week of March, fourth week of April, first week of June, third week of July, third week of August, and in the second week of October, respectively in 2006 / 2007. The highest peak was found in the third week of August .

It can be concluded from Figure (1) that adults of *C. carnea* disappeared completely from the first week of December till the second week of February.
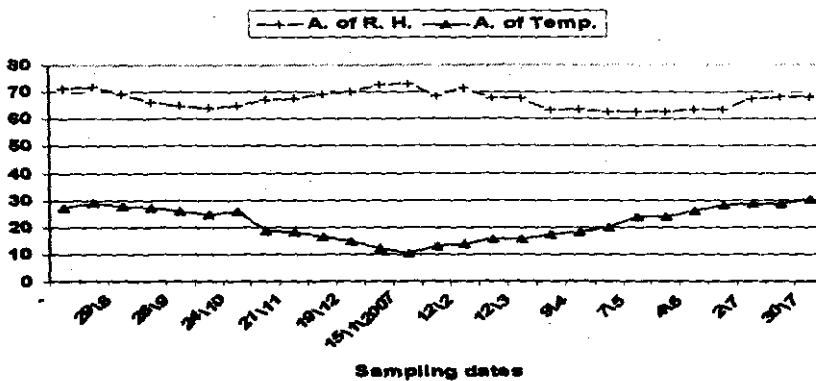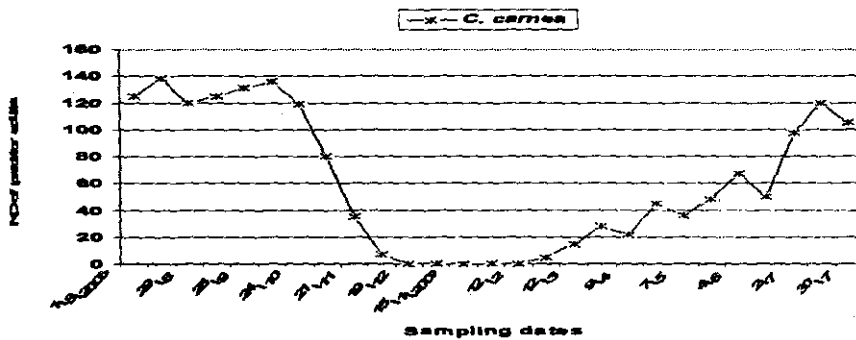

Figure (1) Biweekly catch of *C. carnea* trapped by a light trap during the first year 2006 /2007 at Mansoura district.

Figure (2) illustrated the population density of *C. carnea* adults in the second year of investigation. The adults of this predator started to appear in a light trap in the second week of February during the second year of study, then the number of biweekly catch increased gradually and reached its first peak in the first week of April . It can be noted that *C. carnea* adult disappeared during the period from the first week of January till the third week of the same month. The biweekly catch showed that *C. carnea* had five peaks in the second year of study. These peaks were found in the first week of April , first week of June ,first week of July, first week of August and fourth week of September . The highest peak was found in the fourth week of September. The highest peak was found in the fourth week of September. It can be seen from Figure (2) that the optimum degree of temperature and relative humidity for *C. carnea* ranged between 25.43-28.86°C and 67.97-71.72% R.H..

These findings generally are in agreement with the findings of Hassanein (1956) who found that the first appearance of the lacewing fly in the traps was in 16th March and the peaks of the predator population was during May, June and July . In addition, Nielsen (1977), in Denmark stated that the peaks of *C. carnea* adults activity trapped by light traps were recorded in July and October and most of the individuals were collected in October, but Kharizanov and Dimitrov (1972) in Bulgaria, found that adults of *C. carnea* were occurred in the field at the end of March and the beginning of April , when the average temperature reaches 12°C. Abd El-Aziz(1991) in Egypt, recorded five generations for *C. carnea* and the peaks of these generations were found in the third week of May, third week of June, second week of July, second week of August and first week of October. Oresek *et al.* (2004) in Slovenia surveyed lacewings from 21th April to October 1994 using light traps. They found that , the highest numbers were collected in July (153 adults) and the most frequently caught species were *C. carnea* and *Chrysopa perla* .

2. Effect of certain weather factors (temperature and relative humidity)on the population density of *C. carnea*:

The summarized data in Table (2) presented that the simple correlation coefficient between the population density of *C. carnea* (biweekly catch) and max. temp., min. temp., average temp., max. R.H., min. R.H., and average R.H. during the two years of study. The statistical analysis showed that there was a highly significant positive correlations between the biweekly catch of *C. carnea* and the temperature parameters (min.; max. and average tem.) during the two years of study (Table 2).While the relative humidity parameters had insignificant effect on the population density of this predator during the two years of investigations. These findings are in agreement with the findings of Honek and Kraus (1981) in Czechoslovkia who studied a regression analysis of some weather factors affecting a light trap catches of *C. carnea* in Prague. They stated that from July to September, significant correlations were found between catches and temperature parameters.
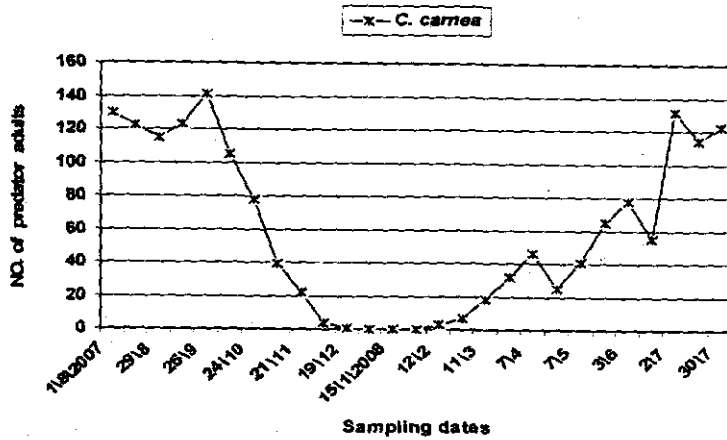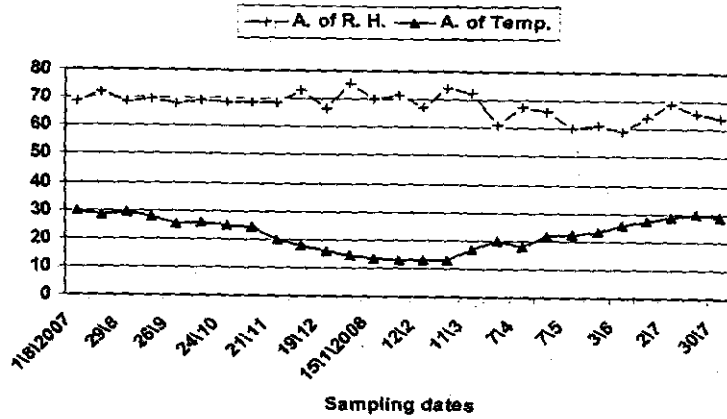
Sampling dates

Sampling dates

Figure (2) Biweekly catch of *C. carnea* trapped by a light trap during the second year 2007 /2008 at Mansoura district.

Table (2): Simple correlation coefficient between the population density of *C. carnea* and the temperature and relative humidity components in a light trap during The two successive years 2006 /2007 and 2007 /2008 at Mansoura district.

Weather variables	2006 /2007			2007 /2008		
	r	p	s	r	p	s
Maximum Temp.	0.8482	0.3098	***	0.8717	0.2055	***
Minimum Temp.	0.8813	0.2805	***	0.9209	0.9505	***
Average Temp	0.8718	0.1937	***	0.9051	0.9609	***
Maximum R. H.	- 0.0175	0.9307	ns	0.0380	0.8507	ns
Minimum R. H.	- 0.1475	0.4627	ns	- 0.2182	0.2741	ns
Average R. H.	- 0.1462	0.4666	ns	- 0.1868	0.3507	ns

ns = in significant * = significant with varied degree where r =correlation coefficient p = probability s = significant sign.

B. *Chrysopa septempunctata* :
1. Relative abundance and flight activity of *C. septempunctata* adults:
      Figure (3) shows the relative abundance of *C. septempunctata* during the first year of study. The adults of this predator started to appear in a light trap in the fourth week of April in the first year of study, then the population density of this predator increased gradually and reached the first peak in the first week of June. The biweekly catch showed that the predator *C. septempunctata* adults had four peaks in the first year of the investigation. These peaks were recorded in the first week of June, third week of July, fourth week of August and second week of October, respectively in 2006 /2007. The highest peak was found in the four week of August
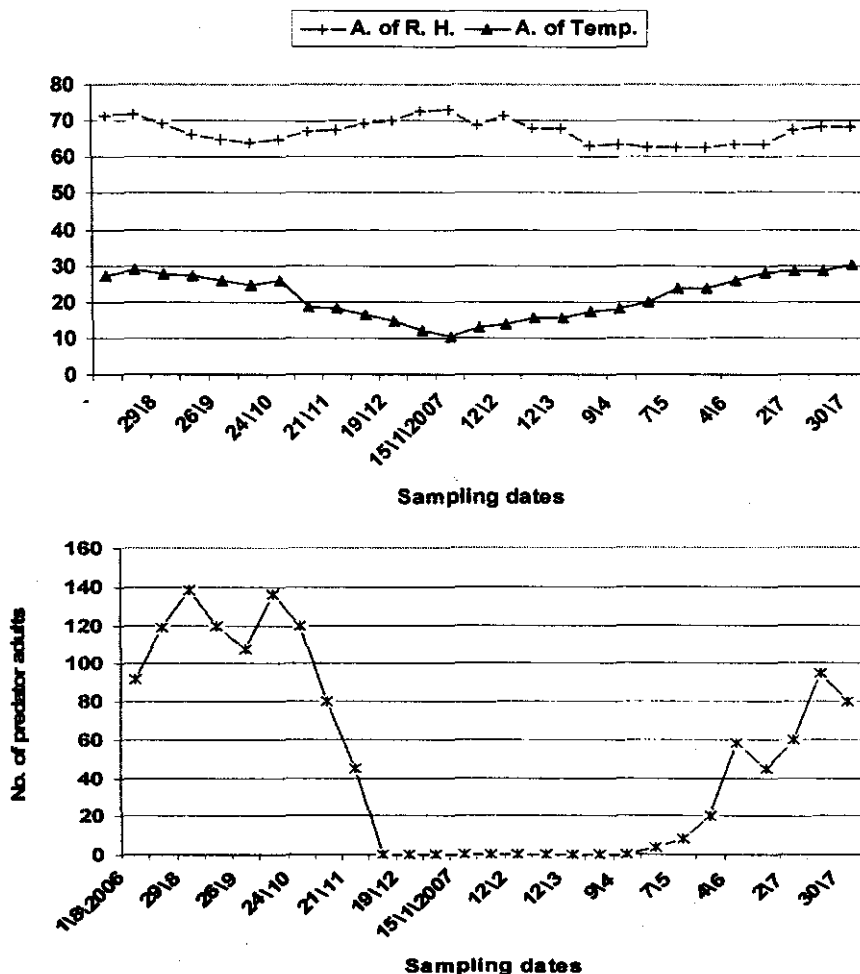
Figure(3) Biweekly catch of *C. septempunctata* trapped by a light trap during the first year 2006 /2007 at Mansoura district.

It can be concluded from Figure (3)that adults of *C. septempunctata* disappeared completely from the first week of December till the second week of April. The size of third and fourth peaks in the first year of study was the highest. That may be referred to the temperature and relative humidity prevailing at this time of the year (July and October) which the average degrees of temperature and relative humidity were between 24.65°C-27.89°C and 63.86-69.11% during the first year of study.

Figure (4) shows the population density of *C. septempunctata* adults in the second year of investigation. It can be noted that *C. septempunctata* adults started to appear in a light trap in the fourth week of April in the second year, then the number of biweekly catch increased gradually and reached its first peak in the first week of June in 2007/2008.The adults of this predator disappeared during the period from the third week of December till the fourth week of April.
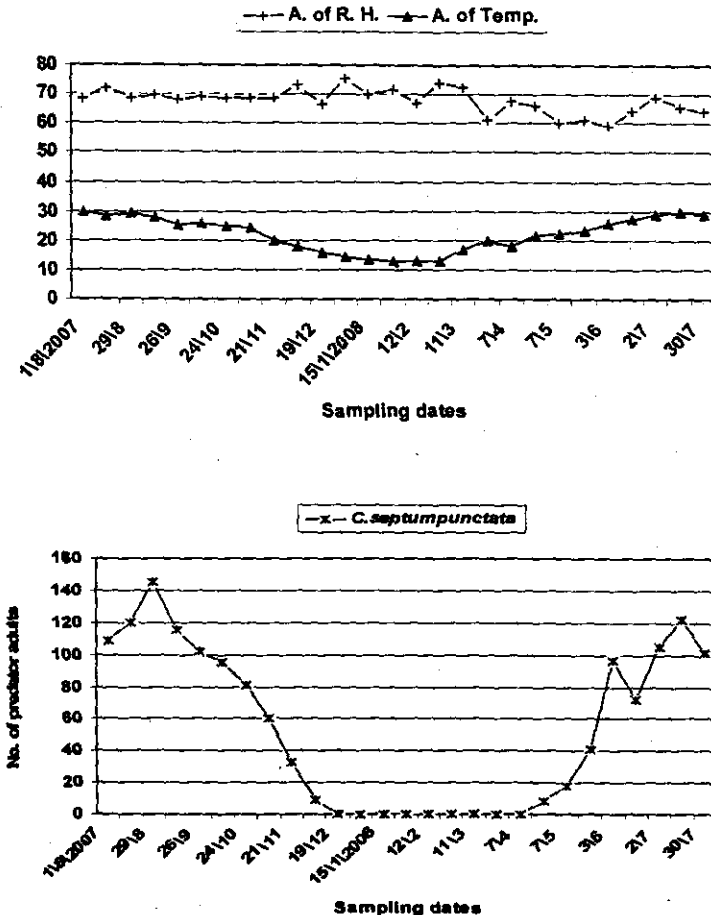

Figure (4) Biweekly catch of *C. septempunctata* trapped by a light trap during the second 2007 / 2008 at Mansoura district.

The biweekly catch showed that *C. septempunctata* had three peaks in the second year of study .These peaks were found in the first week June, first week of July and fourth week of August. The highest peak was found in the fourth week of August. It can be seen from Figure (4) that the optimum degree of temperature and relative humidity for *C. septempunctata* were 29.32°C and 68.64% R.H.. El-Haidari and Aziz (1978) in Iraq , found that *C. septempunctata* had two generations yearly. In addition, Khalil *et al.* (1980) in Iraq , studied the seasonal abundance of some neuropterous predators during 1976-1977. They mentioned that *C. septempunctata* was the most abundant , but *C. carnea* was less frequently observed. Abd El-Aziz (1991) in Egypt, recorded three generations yearly . The peaks of these generations occurred in the second week of June ,second of July and fourth week of August in 1986. Our results showed there were four peaks in the first year and three peaks in the second year of study.

2.Effect of certain weather factors (temperature and relative humidity)on the population density of *C. septempunctata*:

The summarized data in Table (3) showed that the simple correlation coefficient between the population density of *C. septempunctata* (biweekly catch) and max. temp., min. temp., average temp., max. R.H., min. R.H., and average R.H. during the two years of study. The statistical analysis showed that there was highly significant positive correlation between the biweekly catch of *C. septempunctata* and the temperature parameters (min.; max. and average tem.) during the two years of study (Table 3).While the relative humidity parameters had insignificant effect on the population density of this predator during the two years of investigations.

Table (3): Simple correlation coefficient between the population density of *C. septempunctata* and the temperature and relative humidity components during the two successive years (2006/2007 and 2007 / 2008)at Mansoura district.

Weather variables	2006 / 2007			2007 / 2008		
	r	p	s	r	P	s
Maximum Temp.	0.7542	0.5175	***	0.8700	0.7586	***
Minimum Temp.	0.7933	0.9628	***	0.9488	0.0769	***
Average Temp	0.7797	0.6319	***	0.9178	0.5843	***
Maximum R. H.	0.0238	0.9061	ns	0.0475	0.8139	ns
Minimum R. H.	- 0.0479	0.8123	ns	- 0.1621	0.4191	ns
Average R. H.	- 0.0440	0.8273	ns	- 0.1345	0.5034	ns

ns = in significant * = significant with varied degree where r= Correlation coefficient p = Probability s = significant sign.

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حصر المفترسات معرقة الأجنحة و السوفرة الموسـمية لأسـد المـن الأخـضر Chrysoperla carnea (Steph.) و أسـد المـن البنـي Wesm. Chrysopa septempunctata باستخدام المصيدة الضوئية فـي منطقـة المنصورة

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لدراسة حصر المفترسات من رتبة معرقة الأجنحة و الوفرة الموسمية للمفترسات الهامة منها استخدمت المصيدة الضوئية خلال عامين متتالين ٢٠٠٧/٢٠٠٦، ٢٠٠٨/٢٠٠٧ في منطقة المنصورة . النتائج المتحصل عليها سجلت أربعة أنواع من مفترسات معرقة الأجنحة تم اصطيادها بالمصيدة الضوئية تتبع لعائلتين هما فصيلة أسد المن Chrysopidae و فصيلة أسد النمل Myrmeleonidae و هذه الأنواع هي أسد المن الأخضر Chrysoperla carnea(Steph.) و أسد المن البني Chrysopa septempunctata Wesm. و أسد النمل الصغير Cueta varigata Klug. و أسد النمل الكبير Palpares cephalotes Klug. . و أوضحت النتائج أن أكثر الأنواع شيوعا أسد المن الأخضر خلال سنتي الدراسة . و لقد أوضحت النتائج أن أسد المن الأخضر له ستة ذورات للتواجد في السنة الأولى بينما كانت له خمسة ذروات في السنة الثانية . و سجلت هذه الذروات في العام الأول في الأسبوع الرابع من مارس ، و الأسبوع الرابع من أبريل ،و الأسبوع الأول من يونيو، و الأسبوع الثالث من يوليو ، و الأسبوع الثالث من أغسطس و الأسبوع الثاني من أكتوبر علي التوالي بينما في العام الثاني كانت هذه الذروات في الأسبوع الأول من أبريل ، و في الأسبوع الأول من يونيو، و الأسبوع الأول من يوليو، و الأسبوع الأول من أغسطس، و الأسبوع الرابع من سبتمبر علي التوالي.

و أوضحت النتائج أن أسد المن البني له أربعة ذروات للتواجد في العام الأول بينما كانت له ثلاث ذروات في العام الثاني.هذه الذروات سجلت في الأسبوع الأول من يونيو ، و في الأسبوع الثالث من يوليو ، و في الأسبوع الرابع من أغسطس ، في الأسبوع الثاني من أكتوبر علي التوالي في السنة الأولى بينما كانت هذه الذروات في الأسبوع الأول من يونيو ، في الأسبوع الأول من يوليو و الأسبوع الرابع من أغسطس في العام الثاني من الدراسة.

و أوضحت النتائج المتحصل عليها للتحليل الإحصائي أن هناك علاقة ارتباط عالي معنوي موجب بين تعداد الحشرات الكاملة المصطادة من أسد المن الأخضر و أسد المن البني و درجة الحرارة القصوى والصغرى و متوسط درجة الحرارة خلال عامي الدراسة بينما درجة الرطوبة النسبية لم يكن لها تأثير معنوي علي الكثافة العددية لهذين المفترسين خلال سنتي الدراسة.