

SEASONAL ABUNDANCE OF *APHIS GOSSYPHII* (GLOV.) ON COTTON PLANTS AND THE PREDATORY EFFICIENCY OF *CHRYSOPERLLA CARNEA* (STEPH.)

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ABSTRACT

This investigation was carried out on cotton crop for four seasons through 2005, 2006, 2007 and 2008 years at Kafr El-Sheikh (Sakha Agriculture Research Station Farm) to follow up the seasonal abundance of *Aphis gossypii* (Glov.) on cotton cultivars and the predatory efficiency of *Chrysoperla carnea* (Steph.) on this insect was also detected.

Results showed that, during 2005, 2006 and 2007 seasons; the highest number of aphid was recorded in 2006 season (10040 individual/60 leaves) while in season 2005 it was 9959 individuals and 9158 in 2007 season/ 60 leaves. On the other hand, study of predation efficiency of chrysopid, *Chrysoperla carnea* during the first and second seasons indicated that the average durations of the three larval instars during the first season were 2.6, 3.2 and 4.0 days, respectively. The third larval instar consumed an average of 182.2 nymphs/47.6 % which represents of the total aphids consumptions. While during the second season, the three larval instars lasted 2.8, 3.2 and 4.5 days and the third larval instar consumed 278.64 nymphs which represents 53.49 % out of the total aphids consumed.

INTRODUCTION

Cotton exports are one of the major source of foreign currency to the Egyptian national income. The Egyptian cotton crop is always subjected to attack by different insects pests. *Aphis gossypii* considered to be the most important insect pests which reduce quality and quantity of cotton annually yields. Also, aphids cause serious injury to the cotton plants by sucking the plant juices and secrete abundance honey dew on which grows a sooty molder by acting as vectors of several virus diseases (Hafez *et al.* 1996 and Arif *et al.* 2006). Therefore, the present investigation aimed to study the

seasonal abundance of *Aphis gossypii* on cotton plants in addition to the predatory efficiency of *Chrysoperla carnea* on *A. gossypii* under laboratory conditions.

MATERIALS AND METHODS

1. Seasonal abundance of *Aphis gossypii* on cotton plants:

This study was carried out at Kafr El-Sheikh (Sakha Agriculture Research Farm) during three cotton successive seasons 2005, 2006 and 2007. The experimental area was about half feddan (2100 m²), cultivated with Giza 89 cotton variety during the first week of April during the three tested seasons. The normal agricultural practices were adopted throughout every growing season.

Weekly samples considered 60 leaves, starting from 1st of May were collected at random from the lower, middle and upper parts of the plant (Ramadan et al. 1999).

2. Predation efficiency of *Chrysoperla carnea*:

Biological study was carried out in the laboratory of the Economic Entomology Department, Faculty of Agriculture, Kafr El-Sheikh University. Eggs were obtained from cotton fields and placed in Petri dishes, which incubated until hatching. Twenty newly hatched larvae of the predator *C. Carnea* was confined in divided way to avoid cannibalism. *Aphis gossypii* was used as a prey and was provided in excess and was renewed and changed every 24 hrs, until the onset cocoon production.

The predator larvae were maintained under a controlled conditions, of 16:8 (L:D), 27±°C and 75±5 % RH. according the same procedure followed by Rakha, 2008. Predator larval instar period was recorded every day and number of consumed aphids during predator longevity.

RESULTS AND DISCUSSION

1. Seasonal abundance of *Aphis gossypii* on cotton plants:

Results in Table (1) showed, that during three successive cotton seasons, 2005, 2006 and 2007, the total number of collected aphids in the first cotton season 2005 was 9959 individuals with three peaks of 1320, 1630 and 1130 individuals, respectively, at 25th July, 16th August and 1st September of 2005, 2006 and 2007 seasons, respectively

Table (1): Population density of *Aphis gossypii*/60 leaves seedlings during three tested cotton seasons; 2005, 2006 and 2007 at Kafr El-Sheikh region.

Sampling date	No./60 leaves/7 days		
	2005	2006	2007
May 3	0	0	0
10	0	0	0
17	0	0	0
24	0	0	0
30	0	0	0
June 6	10	15	8
13	30	23	0
20	44	40	15
27	80	120	36
July 4	128	180	56
11	185	310	90
18	350	850	125
25	1320	1150	450
Aug. 2	1240	1365	898
9	1410	1290	1480
16	1630	1430	1310
23	890	1620	1550
Sept. 1	1130	875	1105
8	412	390	950
15	400	280	395
22	410	260	410
30	290	242	280
Total	9959	10440	9158
Mean	4527±545.6	474.5±558.7	416.3±537.2

The highest number of aphids was recorded in 2006 cotton season (10440 individuals) with two peaks (1365 and 1620 individuals, respectively) at (2nd May with 9365 individuals)

While through 2007 season, the total number of aphids was 9158 individuals and two peaks occurred on 9th August and 23rd August with 1480 and 1550 individuals, respectively.

Generally, the population of aphids was high during 2006 cotton season than 2005 and 2007 cotton season.

The obtained results agreed fully with the previous findings of El-Zahi (2005) who mentioned that, aphid population had nearly two equal peaks on August 8th and August 23rd.

2. Predation efficiency of *Chrysoperla carnea*:

Data in Table (2) indicated that the duration of the three larval instar of *Ch. Carnea* were 2.6, 3.2 and 4.0 days, respectively. The total larval period lasted for an average of 9.8 days.

Table (2): Larval duration and predation efficiency of *Chrysoperla carnea* larvae reared on *Aphis gossypii* under laboratory conditions at 2007 and 2008 season.

Larval instar	Instar duration (day±SD)	Consumed aphids		Av. daily consumption
		Av. number	% consumption	
2007 season				
1 st	2.6±1.22	52.2±4.59	13.7	20.08±1.47
2 nd	3.2±0.67	148.5±6.04	38.9	46.41±4.54
3 rd	4.0±1.08	182.2±8.65	47.6	45.55±3.16
Total	9.8	382.2		112.04
2008 season				
1st	2.9±0.69	79.5±6.75	9.7	27.4±2.05
2nd	3.2±0.67	162.8±6.14	19.8	50.9±5.57
3rd	4.5±0.71	278.6±21.05	53.5	61.9±5.26
Total	10.5	520.9		140.1

The daily consumed aphids were 20.08, 46.41 and 45.55 nymphs for the three instars, respectively. To count total consumed aphids, nymphs as previously mentioned, each duration of larval instar was multiplied by number of daily consumed aphids. Thus the first larval instar consumed 52.2 aphid nymphs, represented by 13.6 % of the total consumed aphid throughout the whole larval period. The second instar consumed a total of 148.5 aphids, representing

38.9 %, while the third instar devoured 182.2 nymphs which represents 47.6 % in 2007 season.

In 2008 season, the durations of three larval instars were 2.8, 3.2 and 4.5 days, respectively. In the same time, the total larval period lasted average of 10.6 days. The daily consumed aphids were 27.4, 50.8 and 61.9 nymphs, respectively. The first larval instar consumed 79.5 aphid nymphs, representing 15.3 % of total consumed aphid throughout the larval duration. The second instar consumed a total of 162.8 aphids, representing 31.3 %, while the third instar devoured 278.6 nymphs representing 53.5 %.

This results are in agreement with those obtained by **Megahed et al, 1982 and El-Shafei, 2003.**

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المؤلفين الغربي

الوفرة الموسمية لحشرة من القطن على نبات القطن ودراسة الكفاءة الإثرائسية لأسد المن على من القطن

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أجرى هذا البحث في انمزرعة البحثية بمحطة البحوث الزراعية بسخا - كفر الشيخ، خلال أربعة مواسم متتالية ٢٠٠٥، ٢٠٠٦، ٢٠٠٧ و ٢٠٠٨ بهدف دراسة الوفرة الموسمية لحشرة من القطن على نبات القطن ودراسة الكفاءة الإثرائسية لأسد لمن على نفس الأفة.

وكانت أهم النتائج المتحصل عليها كالآتي:

١. الوفرة الموسمية لحشرة من القطن:

في الموسم الأول ٢٠٠٥ كان التعداد الكلي لهذه الحشرة حوالي ٩٩٥٩ فرد، وقد تم تسجيل ثلاث قمم وهي ١٣٢٠ فرد/٢٠ نبات في ٢٥ يوليو و ١٦٣٠ فرد في ١٦ أغسطس و ١١٣٠ في أول سبتمبر.

في الموسم الثاني ٢٠٠٦ كان أعلى تعداد للمن بالمقارنة بعامى ٢٠٠٥ و ٢٠٠٧ حيث وصل التعداد الكلي لحوالى ١٠٤٤٠ فرد وسجل قمتين للمن (١٣٦٥ فرد/٢٠ نبات في ٢ أغسطس و ١٦٢٠ فرد في ٢٣ أغسطس).

في الموسم الثالث ٢٠٠٧ وصل التعداد الكلي حوالى ٩١٥٨ فرد وجدت قمتين في ٩ أغسطس بتعداد ١٤٨٠ فرد/٢٠ نبات وفي ٢٣ أغسطس بتعداد ١٥٥٠ فرد/٢٠ نبات.

٢- دراسة الكفاءة الإثرائسية لأسد المن:

كما أظهرت النتائج أنه في الموسم الأول ٢٠٠٧ قد أكتمل انطور اليرقى في فترة ٩,٨ يوم أستهلك فيها العمر اليرقى الأول حوالى ٥٢,٢ فرد من حوريات المن والعمر اليرقى الثانى استهلك ١٤٨,٥ حورية والعمر اليرقى الثالث استهلك ١٨٢,٢ حورية.

في موسم ٢٠٠٨ استغرق العمر اليرقى الثانى حوالى ١٠,٥ يوم استهلك فيها العمر اليرقى الأول حوالى ٧٩,٥ فرد من حوريات من القطن والعمر اليرقى الثانى استهلك حوالى ١٦٢,٨ فرد والعمر اليرقى الثالث استهلك حوالى ٢٧٨,٤ فرد من حوريات المن.