

**Relative Abundance of Insect Predators  
Associated with Citricola Scale *Coccus  
Pseudomagnoliarum* (Kuwana) (Hemiptera:  
Coccidae) within Citrus Orchards  
in Lattakia Governorate**

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**Abstract**

The study was conducted in two citrus orchards at Al-Sanobar and Daba orchard in Lattakia governorate, (Syrian coast), during 2016-2017. This study aimed to determine predatory insects associated with Citricola scale *Coccus pseudomagnoliarum* (Kuwana) (Hemiptera: Coccidae). The predators belong to order Coleoptera which were considered with special importance because they were the most abundant (58.86%) of the total collected specimens: 506 individuals belonging to Coccinelidae family (54.35%), and 42 individuals of *Cybocephalus fodori* (Endrody-Younga), and Cybocephalidae family (4.51%). Two species of order Hemiptera were recorded, *Geocoris ochropterus* (Fieber) which belongs to family Geocoridae (11.60%), and *Cardiastethus nazarenus* (Reuter) which belongs to family Anthocoridae (16.76%). The abundance of Neuropteran predatory insects was 8.81%, two species belonged to Coniopterygidae: *Conwentzia pineticola* (Enderlein), *Coniopteryx borealis* (Tjeder), and *Chrysoperla carnea* (Stephens) that belongs to family Chrysopidae.

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One species of thrips, *Karnyothrips flavipes* (Jones), (Thysanoptera: Phlaeothripidae) was recorded with abundance of 3.65%. *Eublemma scitula* (Rambur) (Lepidoptera: Noctuidae) was recorded only at Daba orchard with abundance of 0.32%. The high biodiversity of predatory insects in the two studied areas suggested the importance of predatory insects as biological control agents against the Citricola scale insect *C. pseudomagnoliarum*.

**Key words:** Survey, Citricola scale, Predator, Citrus orchard, Syria.

**الوفرة النسبية للمفترسات الحشرية المترافقة مع القشرية الرمادية  
*Coccus pseudomagnoliarum* (Hemiptera:  
Coccidae) (Kuwana) ضمن بساتين الحمضيات  
في محافظة اللاذقية.**

علاء تركي صالح\*

**الملخص**

أجريت الدراسة في بستاني حمضيات في محافظة اللاذقية (الساحل السوري)، خلال الفترة من عامي 2016-2017. هدفت الدراسة إلى تحديد الحشرات المفترسة المترافقة مع الحشرة القشرية الرمادية (*Coccus pseudomagnoliarum* (Kuwana) (Hemiptera: Coccidae)، ضمن بساتين الحمضيات في منطقتي الصنوبر ودبا في محافظة اللاذقية، وتعد المفترسات من فصيلة غمدية الأجنحة Coleoptera ذات أهمية خاصة لكونها الأكثر وفرة فقد بلغت (548) فرداً بنسبة (58.86%) من مجموع المفترسات. منها ما ينتمي إلى فصيلة أبي العيد Coccinellidae وقد بلغ أعدادها (506)، و (42) فرداً من المفترس Cybocephalidae من فصيلة *Cybocephalus fodori* (Endrody-Younga). وسُجل نوعين من رتبة نصفية الأجنحة Hemiptera *Geocoris ochropterus*

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(Fieber) يتبع لفصيلة Geocoridae، و *Cardiastethus nazarens* (Reuter) من فصيلة Anthocoridae بنسبة (28.36%). وبلغت وفرة الحشرات المفترسة التابعة لرتبة شبكيات الأجنحة Neuroptera (8.81%)، نوعان منها يتبع لفصيلة Coniopterygidae، *Conwentzia pineticola* (Enderlein)، و *Coniopteryx borealis* (Tjeder)، وأسد المن *Chrysoperla carnea* (Stephens) التابع لفصيلة Chrysopidae. ونوعاً واحداً من التريس *Karnyothrips flavipes* (Jones) (Thysanoptera: Phlaeothripidae) بنسبة (3.65%)، وسُجلت فقط في بساتين دبا الفراشة المفترسة *Eublemma scitula* (Rambur) (Lepidoptera: Noctuidae) بنسبة (0.32%). أشارت نتائج البحث في منطقتي الدراسة إلى وجود درجة عالية من التنوع الحيوي للحشرات المفترسة وهذا يقترح أن تلعب دوراً هاماً كعناصر مكافحة حيوية للحشرة القشرية الرمادية *C. pseudomagnoliarum*.

**الكلمات المفتاحية:** حصر، القشرية الرمادية، مفترس، بساتين الحمضيات، سورية.

## **Introduction:**

The citricola scale insect, *Coccus pseudomagnoliarum* (Kuwana) (Hemiptera: Coccidae), is an important pest on citrus in Australia (Smith *et al.*, 1997), Azerbaijan (Ben-Dov, 1993), Croatia Cyprus (Şişman and Ülgentürk, 2010), France (Foldi and Germain 2018), Georgia (Ben-Dov, 1993), Greece (Argyriou and Ioanides, 1975), Iran (Moghaddam, 2013), Italy (Barbagallo, 1974), South Korea (Ben-Dov, 1993), Syria (Basheer *et al.*, 2014), Sicily (Barbagallo and Patti, 1997), Slovenia (Seljak, 2010) Spain (Tena and García-Marí, 2008), Turkey (Kaydan *et al.*, 2007), Turkmenistan (Potaeva, 1993) and United States in Arizona, California and Maryland (Ben-Dov, 1993). Some studies showed that *C.pseudomagnoliarum* was a dangerous pest in 1900's, in some citrus area in USA. The use of insecticides against *C.pseudomagnoliarum* made this insect less injurious in the 1940's. *C.pseudomagnoliarum* problem increased when natural enemies are destroyed by applications of broad spectrum insecticides against this insect and other pests (Trumble *et al.*, 1995). So, the preservation of natural enemies is important (Ashley, 2003). Predation is an important component of ecological aspects because through predators the flow of energy continues throughout a community (Salahi *et al.*, 2012). Several species of naturally occurring insects that prey on *C.pseudomagnoliarum*, such as; the Coccinellidae, Chrysopidae, Syrphidae, Thripidae, Anthocoridae and Geocoridae. They act as natural nuisance controlling items (Mohamed *et al.*, 2012). Predators: *Campyloneura virgule* (Herrich-Schafer), *Chilocorus renipustulatus* (Scriba), *Cryptolaemus montrouzieri* (Mulsant), *Exochomus quadripustulatus* (Linnaeus) and *Rhyzobius lophanthae* (Blaisdell) are important groups and they act as natural nuisance controlling items of *C.pseudomagnoliarum* (Bernal *et al.*, 1998, 2001).

Literature on predatory insects associated with *C.pseudomagnoliarum* is very rare in Syria. This study is devoted to determine of predatory insects associated with *C.pseudomagnoliarum* and their abundance in two citrus orchards in Al-Sanobar and Daba regions in Lattakia governorate.

## Materials and Methods

Periodic field visits were conducted to collect insect predators that attack citricola scale insect, *C. pseudomagnoliarum* in untreated citrus orchards in two districts (Al-Sanobar, 35°28'45"N, 35°53'07"E; and Dabba, 35°31'59"N, 35°54'20"E) in Lattakia governorate, Syria. Surveys were conducted during 2016-2017. The samples were collected from each orchard with the interval of two weeks. A comprehensive survey of the two study areas was conducted to determine the predator species and their density on the citricola scale insect. The collection was made from selected fields during 6:00-8:00 am.

The predatory insects were collected by using aspirator insect collection, sweep net or hand netting by forceps and brush. Collected specimens were stored in jars containing 70-30% alcohol and glycerin solution. The collected specimens were then brought to the Biological Control Studies and Research Center, Faculty of Agriculture, Damascus University, Syria and placed in separated glass vials. Larvae of predators were taken to the laboratory to rear them on their prey until adulthood. The emerged specimens were identified up to species level with the dissecting binocular microscope, identification keys, description available in literature (Kóbor, 2018; Wang *et al.*, 2013; Yamada *et al.*, 2008; Hacker and Fibiger, 2006; Lupi, 2002; McEwen *et al.*, 2001; Hodek, 1973; Hampson, 1910). Glass vials were labeled containing date of collection, locality name, common name, scientific name specimens, temperature, and humidity to diversify

their ecology. Number and seasonal abundance of collected predator species/location were recorded.

Relative abundance: Is the number of members of species divided by the number of individuals of all species contained in the same sample.

The relative abundance was calculated as follow:

$$A = (N1/N1+N2+N3..) \times 100$$

Where: A=relative abundance

N1= number of individuals of first species

N2= number of individuals of second species

The species become abundant (exuberant) when relative abundance is higher than or equal to the value (2) (Solaiman- Khaled *et al*, 2012).

### **Results and discussion:**

Survey of common predatory insects in Al-Sanobar and Dabba regions, revealed the presence of a total 931 individual, 516 individuals from the Al-Sanobar orchard, and 415 individuals from the Daba orchard (Table1). These collected specimens belong to five orders, Coleoptera, Hemiptera, Neuroptera, Thysanoptera and Lepidoptera. The most dominant order was Coleoptera with 548 individuals, which was (58.86%) of all collected predators. Hemiptera was the second most numerous with 264 individuals (28.36%). Neuroptera was the third most numerous with 82 individuals (8.81%). After that, Thysanoptera with 34 individuals (3.65%). Lepidoptera was recorded only from Daba orchard with 3 individuals (0.32%).

The specimens belonged to Coleoptera, collected from both locations were defined to six species. Five of them belong to five genera belonging to Coccinellidae, and one belonging to Cybocephalidae. The Hemiptera predatory in Al-Sanobar and Daba regions revealed the presence of a total 2 species, one of each family Anthocoridae and Geocoridae. While those of Neuroptera belong to two family, Coniopterygidae belonged to two genera, and one genera of family

Chrysopidae. In this study we recorded one predator of order Lepidoptera, belonged to family Noctuidae, and one predator of order Thysanoptera.

### **Abundance of predatory species at studied locations during 2016-2017.**

#### **Coleoptera**

Number and seasonal abundance of collected Coccinellidae insects were recorded in relation to species, location and time and showed in (Figs. 1, 2). The total number of predatory beetles was 548 individuals (279 and 269 in Al-Sanobar and Daba, respectively) (Table 1). They belonged to Coccinellidae and Cybocephalidae. The second one was rare and less abundant while 42 individuals *Cybocephalus fodori* (Endrody-Younga) was recorded at Daba orchard. The most abundant species from Coccinellidae were; *Chilocorus bipustulatus* (Linnaeus), with density 239 individual (25.67%) and *Serangium parcesetosum* (Sicard) that reached 201 individuals (21.59%) in both locations (Table 1).

*Chilocorus bipustulatus* (Linnaeus) species: The most abundant species in total sample Coccinellidae from both locations. The relative abundance reaches 25.67%. It was the dominant species in Al-Sanobar with relative abundance 35.27%, whereas in Daba reaches 13.74%. In both regions the predator of the most abundant with relative abundance of (25.67%; N=239) (Table 1).

*Serangium parcesetosum* (Sicard): this species with second degree relative abundance in total 21.59%. It was a dominant species in samples collected from Daba with 37.83%. Whereas reaches in Al-Sanobar 8.53% only (Table 1). In both regions the predator was one of the most abundant that reached 201 individuals (21.59%).

*Oenopia conglobate* (Linnaeus): that was one of the most abundant at Al-Sanobar orchard only with relative abundance (7.95% N=41). The



predator was one of the most abundant in two orchards together with relative abundance (4.73%, N=44) (Table 1). But the results showed that *O. conglobate* is relatively prolific species with a relative 7.95% in Al-Sanobar orchard only, and the predator was a very rare species at Daba orchard with relative abundance (0.72%; N=3).

*Propylea quatuordecimpunctata* (Linnaeus): Recorded only at Al-Sanobar with a little percentage of abundance reaches 1.74%.

*Exochomus nigromaculata* (Goeze): Recorded only at Al-Sanobar with the most little abundance in samples reaches 0.58%. (Table 1).

*Exochomus quadripustulatus* (Linnaeus): Recorded only at Daba, and the predator was a medium- relative abundance (2.41%; N=10) (Table1).

Abundance of Coccinellid decreased during winter, while the highest abundance was recorded during May (54 individual) in Al-Sanobar, and at Jun. (38 individual) in Daba orchard.

The occurrence of Ladybird beetles is depended on the occurrence and abundance of preferred stage of prey (eggs, crawlers and 1st-instar). These results agree with the findings of Khalil (2006), Basheer and Abo-Alshamat (2004), Basheer (1999) and Almatni (1997).

Abd-Rabou *et al* (2012) recorded that *C. bipustulatus* feeds on some soft scale insects in Egypt. Basheer (1999) recorded that *C. bipustulatus* feeds on eggs, crawlers and 1st-instar of *Aonidiella aurantii* Mask (Hemiptera: Diaspididae) at citrus fields in Lattakia governorate, Syria. Basheer and Mahmalji (2004) found that *C. bipustulatus* feeds on different stages of *Parlatoria oleae* (Colvée, 1880) (Hemiptera: Diaspididae) at apple orchard in Abo-Jarach (Damascus Countryside). The study conducted in Jordan by Allawi (1989) showed that *P. oleae*, *Aspidiotus hederae* (Leonardi, 1898), *Saisetia oleae* and *Ceroplastes rusci* L. (Hemiptera: Coccidae) are the most preys of predator. The predators recorded in northern Syria as predators of pistachio psyllid *Agonosceana targionii* (Lichtenstein,

1874) (Hemiptera: Aphalaridae). *C. bipustulatus* and *S. parcesetosum* play an important role in the control of *C. pseudomagnoliarum* at citrus orchards in Syria (Deeb *et al.*, 2017).

*Exochomus nigromaculata* and *E. quadripustulatus* were recorded in few numbers at Al-Sanobar and Daba orchard with relative abundance 0.58% and 2.41% respectively. The reason may be that *C. pseudomagnoliarum*, because there were other preferred preys, such as *Planococcus citri*, *Coccus hesperidum*, *Saissetia oleae* and another insect on host plants. These results agree with (Kuzenetsov, 1997; Talhouk, 1961; El-Hariri, 1968). *E. nigromaculata* and *E. quadripustulatus* were recorded as predatory of *C. pseudomagnoliarum* in Turkey (Uygun, 1981). Diab (2015) reported that *E. quadripustulatus* is predator of *C. rusci* (Homoptera: Coccidae) in Syria. *Oenopia conglobata* (Linnaeus) doesn't recorded as predators on *C. pseudomagnoliarum*, but, it has been recorded as predator of many species of aphid (Khalil, 2006; Adriaens and Maes, 2004; Harde, 1999; Allawi, 1989).

It is the first time to mention that *Cybocephalus fodori* (Cybocephalidae) as predator in Syria. The predatory beetle *C. fodori minor* has been reported in Iran as predator of pistachio oyster shell scale *Lepidosaphes pistaciae* (Archangelska) (Homoptera: Diaspididae) (Shahrudi *et al.*, 2006). Uygun (1981), Ülgentürk and Toros (2000) and Erler and Tunç (2001) recorded that predator *Cybocephalus fodori* (Endrody-Younga) is known to be associated with diaspidids, Ülgentürk (2001) and Ülgentürk *et al.*, (2001) reported that *C. fodori minor* was found to be very abundant on some soft scales such as *Sphaerolecanium prunastri* (Fonscolombe) and *Eulecanium ciliatum* (Douglas) in Ankara previously in Turkey.

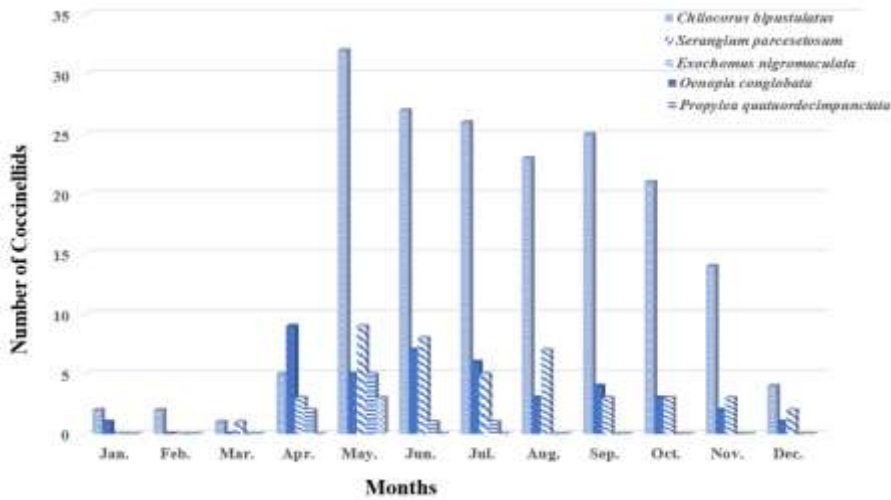


Fig. 1. Monthly Abundance of Coccinellidae species on *C. pseudomagnoliarum* in Al-Sanobar orchard during 2016-2017.

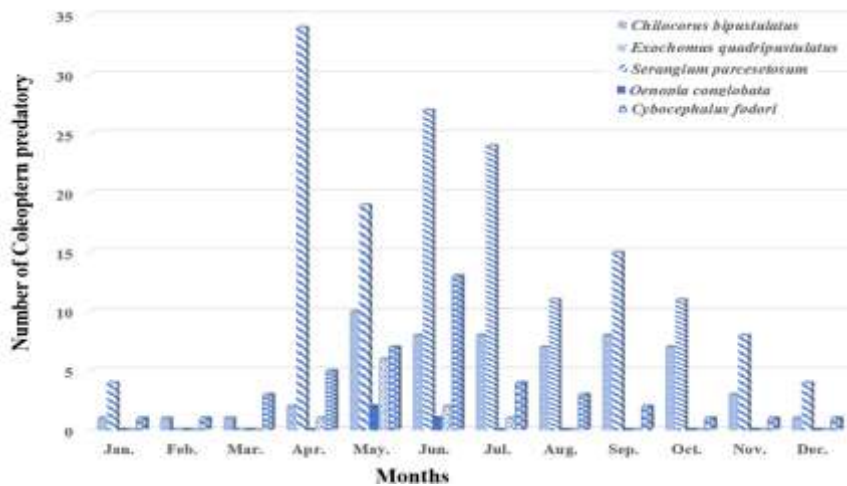


Fig. 2. Monthly Abundance of Coccinellidae species on *C. pseudomagnoliarum* in Daba orchard during 2016-2017.

## Hemiptera

The total number of Hemiptera predaceous collected insects were 264 individuals (175 and 89 individuals at in Al-Sanobar and Daba, respectively). They belonged to Families: (Anthocoridae and Geocoridae) were collected, 175 at Al-Sanobar orchard and 89 at Daba orchard (Table 1). *Cardiastethus nazareus* (Reuter) is belonged to family Anthocoridae. The predator *Geocoris ochropterus* (Fieber) is belonged to family Geocoridae. It is the first time to record these predators in Syria. Abundances of identified Hemipteran species at Al-Sanobar and Daba regions were summarized in Tables (1).

From Al-Sanobar orchard, *Geocoris ochropterus* was recorded as an extraordinary contributing species with relative abundance of (18.80%; N= 97), followed by *Cardiastethus nazareus* with relative abundance (15.12%; N=78). Result showed that the two predators are relatively prolific species at Al-Sanobar orchard.

From Daba orchard, *Cardiastethus nazareus* was the first predator recorded of Hemiptera with relative abundance of (18.79%; N=78), and *Geocoris ochropterus* was the second with relative abundance of (2.65%; N=11). Result showed that the two predators are relatively prolific species at Daba orchard.

Abundance of Hemipteran predators decreased during winter, while the highest abundance was during May- August, and the highest density was in June for *Cardiastethus nazareus* (18 individuals), and was in July for *Geocoris ochropterus* (30 individuals) at Al-Sanobar, (Fig. 3). At Daba orchard was in June for *Cardiastethus nazareus* (21 individual), and was in July for *Geocoris ochropterus* (4 individuals) (Fig. 4).

The anthocorid *C.nazareus* was reported by Tawfik *et al.*, (1976) as a predator of *Lepidosaphes beckii* (Newman) on citrus in Egypt. Bigeyed bugs or *Geocoris* spp. are generalist insect omnivores occur worldwide (Tamaki and Weeks, 1972). They are reported to prey on

different pests, including pries from at least 3 classes, 10 orders, and 30 families of arthropods (Tamaki and Weeks, 1972; Crocker and Whitcomb, 1980). Polyphagous predators are effective bioagents of target pests. Several species of *Geocoris* have been recorded in different crop ecosystems side by side with other natural enemies (Mukhopadhyay and Ghosh, 1982) such as anthocorids and coccinellids. The Geocorid bugs can be effective predators of some Thrips (Kumar and Ananthakrishnan, 1985; Mukhopadhyay, 1988). In India *G. ochropterus* is a common predator occurring in sunflower, cotton (Kapadia and Puri, 1991), Lucerne, Maize and Tea ecosystems (Sannigrahi and Mukhopadhyay, 1992) feeding on several insect pests.

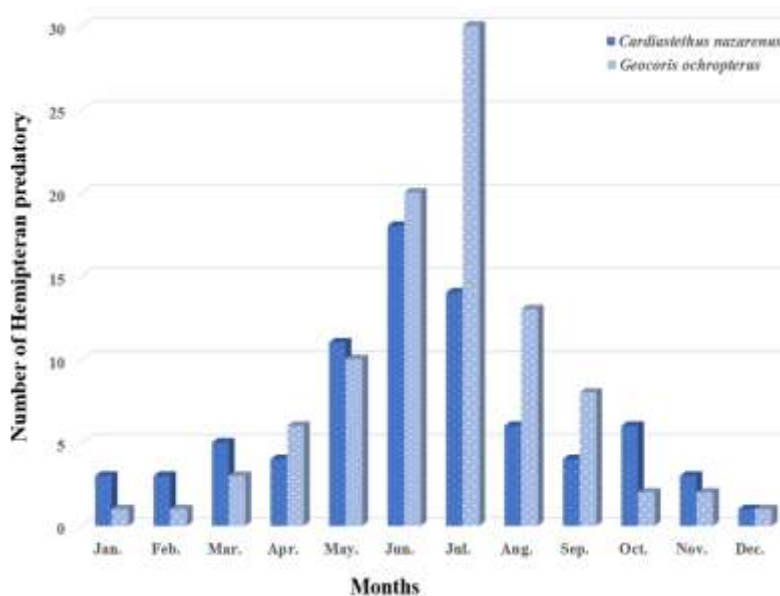


Fig. 3. Monthly Abundance of Hemipteran predatory on *C. pseudomagnoliarum* in Al-Sanobar orchard during 2016-2017.

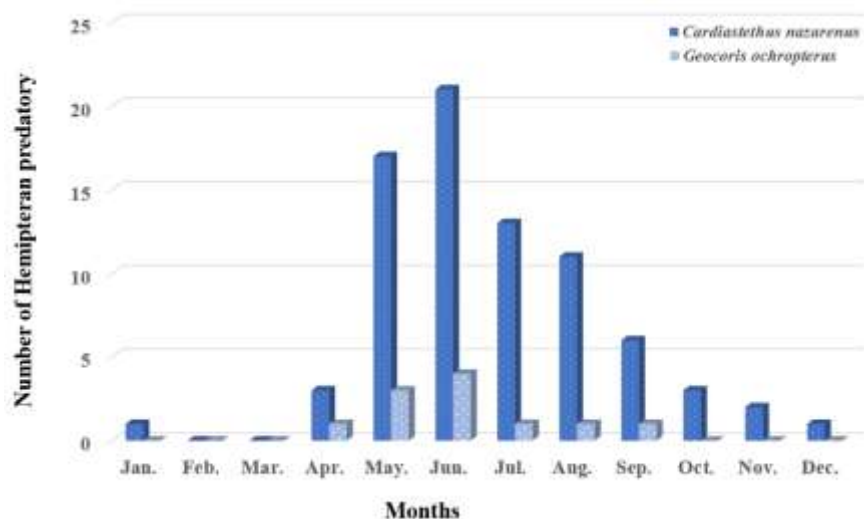


Fig.4. Monthly Abundance of Hemipteran predatory on *C. pseudomagnoliarum* in Daba orchard during 2016-2017.

### Neuroptera

82 individuals were recorded as predators on *C. pseudomagnoliarum*, 34 individuals at Al-Sanobar orchard and 48 at Daba orchard (Table 1). The individuals are belonged to two families Chrysopidae: *Chrysoperla carnea* (Stephens) and Coniopterygidae: *Conwentzia pineticola* (Enderlein) and *Coniopteryx borealis* (Tjeder). The highest abundance of Neuropteran predators were during April-Jun (Fig. 5, 6).

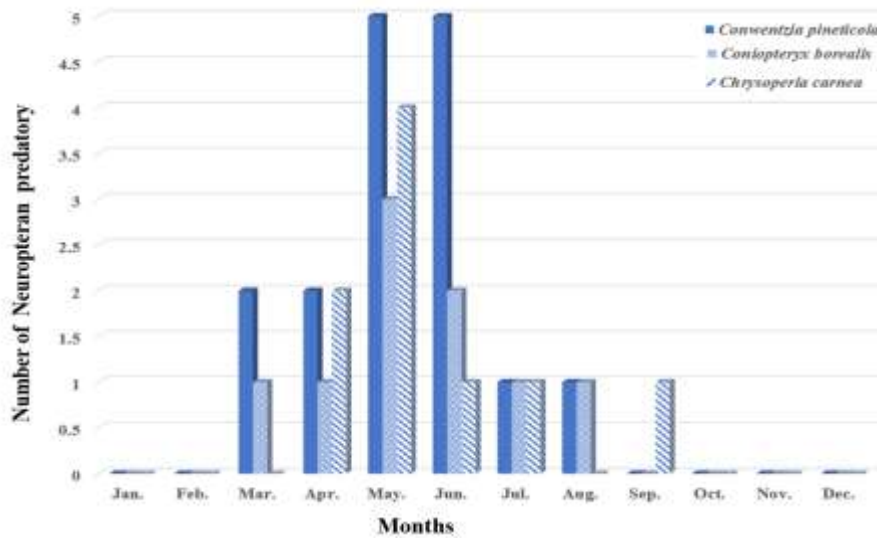


Fig.5. Monthly Abundance of Neuropteran predatory on *C. pseudomagnoliarum* in Al-Sanobar orchard during 2016-2017.

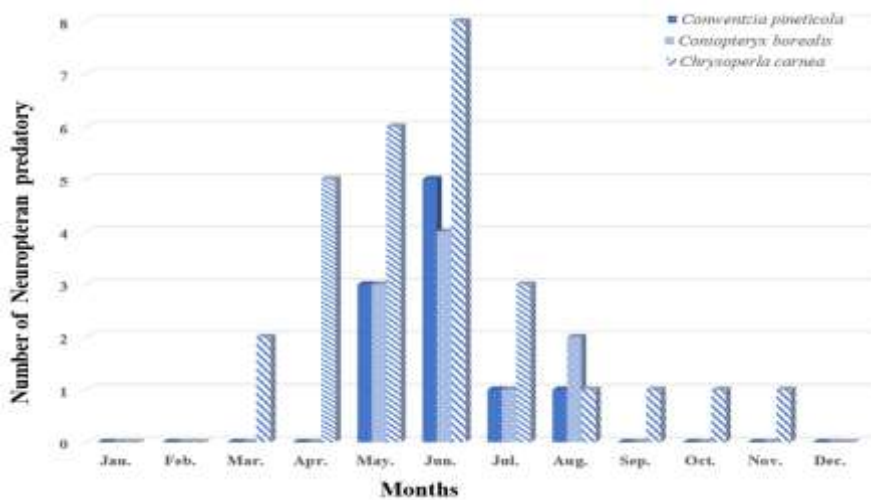


Fig.6. Monthly Abundance of Neuropteran predatory on *C. pseudomagnoliarum* in Daba orchard during 2016-2017.

It is the first time to report that *Conwentzia pineticola* as predators associated with *C. pseudomagnoliarum* in citrus orchards in Syria.

From Al-Sanobar orchard, *Conwentzia pineticola* was recorded with relative abundance of (3.1%; N=16), the predator is considered relatively prolific species, and the two species *Coniopteryx borealis* and *Chrysoperla carnea* were recorded with relative abundance (1.74%; N=9), for each of them, and it is considered that they have relatively medium abundance.

From Daba orchard *Chrysoperla carnea* was recorded with relative abundance of (6.75%; N= 28), *Conwentzia pineticola* and *Coniopteryx borealis* were recorded with relative abundance of (2.41%; N=10) for each, and they are considered relatively prolific species.

The *Chrysoperla carnea* represents 94% of the total of Neuropteran captured adults in citrus orchards in Northern East of Tunisia (Cap Bon), (Sellami and Chermiti, 2015). Villenave (2007) found that *C. carnea* represented round 30% of the total Neuroptera collected in agroecosystems in France. *C. carnea* is important biological control agent of aphids and other soft-bodied phytophagous insects (Pappas *et al.*, 2007).

*C. pineticola* is recorded on coniferous trees in Portugal (Letardi, 2012). Kim *et al.*, (2018) reported that *C. pineticola* feeds on small sized arthropods such as mites, aphids and scale insects in Korea. *C. borealis* had been cited in Algeria in citrus orchards, *C. borealis* has a wide range including Europe, Southwest Asia and North Africa (Morocco, Tunisia), (Monserrat, 2016).

### **Thysanoptera**

*Karnyothrips flavipes* (Jones) of family Phlaeothripidae was recorded at Al-Sanobar orchard with relative abundance of (5.43%, N=28) and at Daba orchard with relative abundance of (1.45% N=6). (Table 1). It is considered relatively prolific species at Al-Sanobar orchard, and



relatively has a medium abundance at Daba orchard. The highest abundance of predator was at May in Al-Sanobar orchard. (Fig. 7).

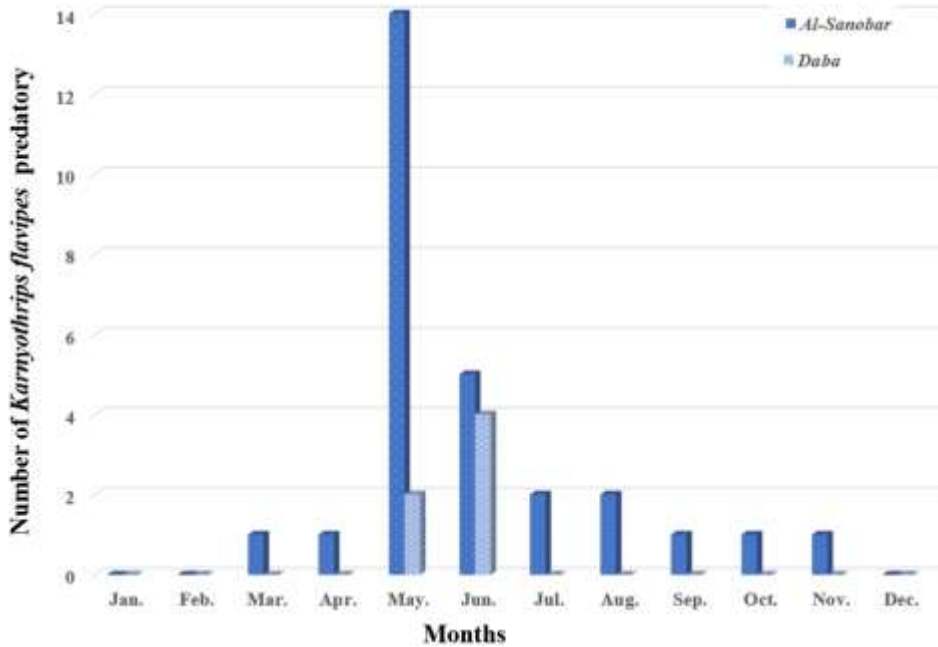


Fig.7. Monthly Abundance of *Karnyothrips flavipes* on *C. pseudomagnoliarum* in Al-Sanobar and Daba orchards during 2016-2017.

It is the First time to report that *Karnyothrips flavipes* as predators associated with *C. pseudomagnoliarum* in citrus orchards in Syria. The predatory thrips, *K. flavipes* was reported in Kenya as a predator of coffee berry borer *Hypothenemus hampei* (Ferrari), (Coleoptera: Curculionidae) (Jaramillo *et al.*, 2010). It is a predator of Green scale, *Coccus viridis* (Hemiptera: Coccidae) in Northern Thailand (Saengyot, 2016).

### **Lepidoptera**

*Eublemma scitula* (Rambur) (= *Coccidiphaga scitula* (Rambur) of family Noctuidae was recorded only at Daba orchard with relative abundance of (0.72%, N=3). The predator is considered relatively a rare species (Table 1).

Lepidoptera has been recorded as a predator of scales from different parts of the world (Clausen, 1940). It feeds on a wider range of scales comprising, *Anomalococcus*, *Lecanium*, *Ceroplastes*, and *Pulvinaria* (Pierce, 1995). It was recorded as a predator on many scale insects such as *Saissetia coffeae* in India (Pathak and Yadav, 2000), *Drepanococcus cajani* (= *Ceroplastodes cajani*) (Coccidae), *Cerococcus indicus* (Maskell) (Cerococcidae) and *Coccidohystrix insolita* (Green) (Pseudococcidae) on pigeon pea (Pierce, 1995).

**Table 1. Relative abundance of collected predatory species from citrus orchards on *Coccus pseudomagnoliarum* at studied locations, Lattakia, 2016-2017.**

Family/Species	Al-Sanobar		Daba		Both location	
	No.	%	No.	%	No.	%
<b>Coleoptera</b>	<b>279</b>	<b>54.07</b>	<b>269</b>	<b>64.82</b>	<b>548</b>	<b>58.86</b>
<b>Coccinellidae</b>	279	54.07	227	54.7	506	54.35
<i>Chilocorus bipustulatus</i>	182	35.27	57	13.74	239	25.67
<i>Oenopia conglobata</i>	41	7.95	3	0.72	44	4.73
<i>Serangium parcesetosum</i>	44	8.53	157	37.83	201	21.59
<i>Propylea quatuordecimpunctata</i>	9	1.74	-	-	9	0.97
<i>Exochomus nigromaculata</i>	3	0.58	-	-	3	0.32
<i>Exochomus quadripustulatus</i>	-	-	10	2.41	10	1.07
<b>Cybocephalidae</b>	-	-	42	10.12	42	4.51
<i>Cybocephalus fodori</i>	-	-	42	10.12	42	4.51
<b>Hemiptera</b>	<b>175</b>	<b>33.92</b>	<b>89</b>	<b>21.44</b>	<b>264</b>	<b>28.36</b>
<b>Anthocoridae</b>	78	15.12	78	18.79	156	16.76
<i>Cardiastethus nazarensis</i>	78	15.12	78	18.79	156	16.76
<b>Geocoridae</b>	97	18.80	11	2.65	108	11.60
<i>Geocoris ochropterus</i>	97	18.80	11	2.65	108	11.60
<b>Neuroptera</b>	<b>34</b>	<b>6.58</b>	<b>48</b>	<b>11.57</b>	<b>82</b>	<b>8.81</b>
<b>Coniopterygidae</b>	25	4.84	20	4.82	45	4.83
<i>Conwentzia pineticola</i>	16	3.1	10	2.41	26	2.79
<i>Coniopteryx borealis</i>	9	1.74	10	2.41	19	2.04
<b>Chrysopidae</b>	9	1.74	28	6.75	37	3.97
<i>Chrysoperla carnea</i>	9	1.74	28	6.75	37	3.97
<b>Thysanoptera</b>	<b>28</b>	<b>5.43</b>	<b>6</b>	<b>1.45</b>	<b>34</b>	<b>3.65</b>
<b>Phlaeothripidae</b>	28	5.43	6	1.45	34	3.65
<i>Karnyothrips flavipes</i>	28	5.43	6	1.45	34	3.65
<b>Lepidoptera</b>	-	-	<b>3</b>	<b>0.72</b>	<b>3</b>	<b>0.32</b>
<b>Noctuidae</b>	-	-	3	0.72	3	0.32
<i>Eublemma scitula</i>	-	-	3	0.72	3	0.32
<b>Total</b>	<b>516</b>	<b>100</b>	<b>415</b>	<b>100</b>	<b>931</b>	<b>100</b>

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