

SEASONAL POPULATION ABUNDANCE OF THE
CHRYSANTHEMUM APHIDS (HOMOPTERA, APHIDIDAE) IN THE
MIDDLE OF IRAQ WITH PICTORIAL KEY TO SPECIES

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ABSTRACT

This study was based on the determination of aphid species that infested *Chrysanthemum* sp. (Asterales, Asteraceae) in the middle of Iraq; five aphid species belong to subfamily Aphidinae were recorded: *Aphis fabae* Scopoli, 1763, *Aphis gossypii* Glover, 1877, *Coloradoa rufomaculata* (Wilson, 1908), *Macrosiphoniella sanborni* (Gillette, 1908) and *Myzus persicae* (Sulzer, 1776). *A. gossypii* was the most dominant species throughout the study period while *M. persicae* is the lesser species.

A summary of the main taxonomic characters is presented here and a pictorial key which was designed to separate aphid species colonizing *Chrysanthemum* sp. is also presented.

Key words: Aphididae, Aphid key, *Chrysanthemum*, Hemiptera, Iraq.

INTRODUCTION

Chrysanthemum L. (Asterales, Asteraceae) was one of the first ornamental plants to be domesticated more than 2000 years ago, the common chrysanthemum is native to Asia and it is used for gardens in China and Japan (Kluepfel and Scott, 2005). There are many insects that can attack Chrysanthemums plants, aphids are the most common species that infest them. Aphids affect on these ornamental plants by sucking from the phloem of the vascular bundles of young shoots and leaves (Schread, 1956). Plant parts affected by aphids will wilt, discolour or deform (Blackman and Eastop, 2006). Aphids are usually found in colonies on plant tips, shoots of new growth, or flowers. Aphids multiply so fast on favorable situations that a light infestation may increase to alarming proportions in a week.

They are generally more numerous during cooler months when the most serious damage occurs. The seasonal abundance of aphid is significantly influenced by the environmental factors such as temperature, relative humidity and rainfall. It is not much than other factors, temperature is an important environmental variable that affects the rate of aphid development, reproduction, mortality, survival and subsequently its population increase (Dixon, 1987).

More than 15 species are known to colonize cultivated and wild *chrysanthemum* (Miller and Stoetzel, 1997). Aphid fauna of Iraq are almost poorly known, they are known mainly by surveillance lists such as Bodenheimer and Swirski (1957), Daoud and El-Haidari (1968 and 1969) and Al-Ali, (1977). Ali *et al.* (2012) recorded three aphid species colonized *chrysanthemum* sp., in Iraq; although it is important to have a good understanding about aphid

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population dynamics for the management of these aphid pests.

In Iraq, there is no study has been conducted about aphids population dynamics on *chrysanthemum* sp., where this ornamental plant is widespread. Thus, the present study examined the seasonal abundance of the chrysanthemum aphids under greenhouses and outfield condition in the middle of Iraq, with an identification pictorial key.

MATERIALS AND METHODS

Aphid specimens colonizing cultivated chrysanthemum plants were collected from different regions of the middle provinces of Iraq: Baghdad (Al-Jadiriya, Abu Ghraib, Taji, Al-Mansour, Al- Zuofrania); Babylon (Al Neal village); Kerbala (Aal Jabas, Khan Alroba, Al Hussiania) and Diyala (Khan Bani Saad) over a period of seven months from 2.11.2016 to 29.05.2017.

Aphids were collected from cultivated chrysanthemums plants with a fine brush and preserved in 70% alcohol. The collecting and preserving technique was based mainly on Eastop and Van Emden (1972) method, for slides preparation, maceration and clearing of the specimens with a simple procedure for preparing balsam mounts is as follow Martin (1983).

The aphids were systematically classified based on the catalog of Remandi re and Remandi re (1997); keys from Blackman and Eastop (2006) were principally referred for the identification of collected species. All measurements of the aphid were fixed as millimeter (mm) (Tab. 1), the parameters measured were adopted according to Ilharco and van Harten (1987), except body length (BL) that is always measured to the base of the Cauda and does not include any projecting cauda (Blackman and Eastop, 2006). Aphid specimens were deposited in the collection of Iraq Natural History Research Center and Museum / University of Baghdad / Baghdad, Iraq.

All discriminates used in the key are morphometric characters, key couplets may offer a choice between two ranges of measurements or ratios, these ratios are shown in Table (1), for reliable identifications we examined a series of 10 or more alate and apterous adults.

Table (1): Comparisons between morphometric characters or ratios used in the key.

Comparisons
ANT(I–VI) / Body length
longest hair on ANT III / ANT III(BD)
Processus terminalis / Base antennal VI
Ultimate rostral segment / HT II (length)
SIPH / Body length
SIPH / Cauda (length)
Cauda / Body length

RESULTS AND DUSCUSSION

Abundance of aphid species colonizing about 735 plants samples of Chrysanthemum sp. during period from Nov. 201⁷ to May 201⁸ were studied here, five aphid species were determined in related to subfamily Aphidinae, namely *Aphis fabae* Scopoli, *A. gossypii* Glover, *Coloradoa rufomaculata* (Wilson), *Macrosiphoniella sanborni* (Gillette) and *Myzus*

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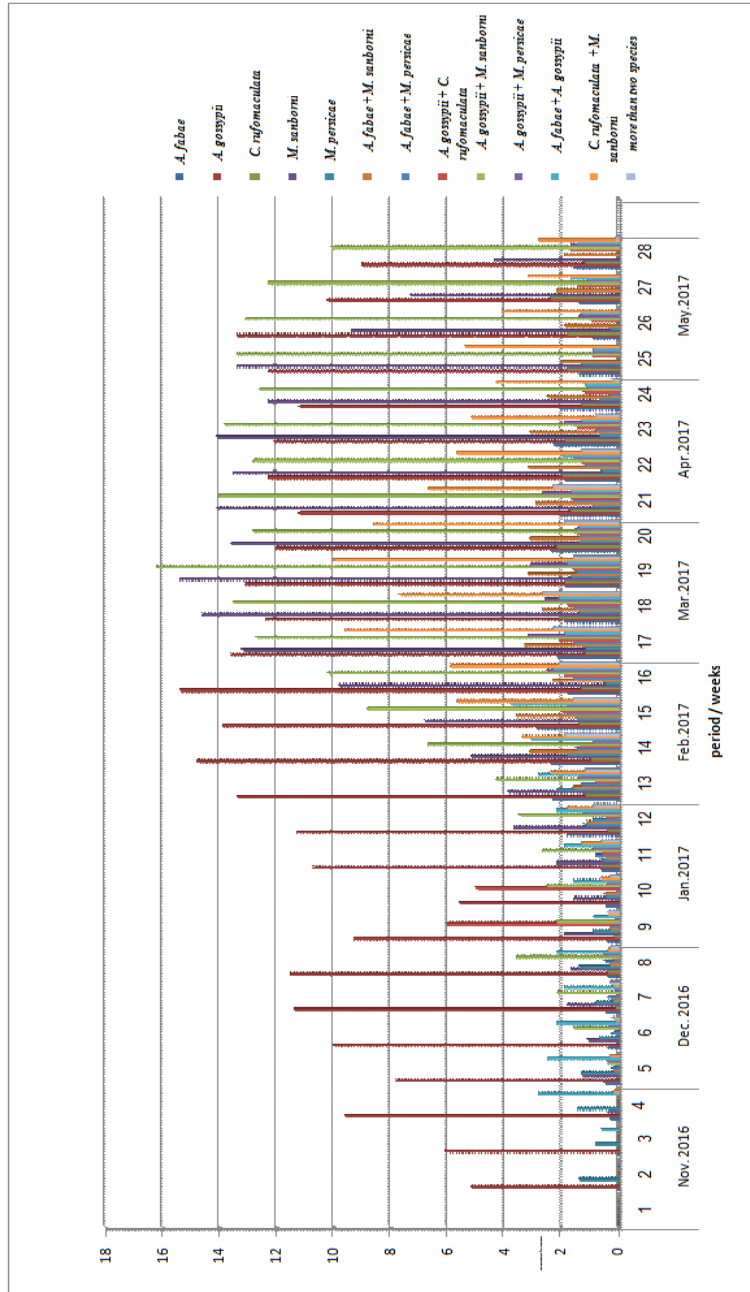
persicae (Sulzer). Whereas there are at least 15 species known to colonize cultivated and wild chrysanthemums in the United State (Miller and Stoetzel, 1997).

The average of Chrysanthemum plants infection by aphid showed in Diagram (1), the maximum abundance of all these species were during spring (first week of March to the second week of April) which the weather in these areas is the most optimizing period of plant growth furthermore aphid occurrence in this period, while minimum abundance was founded in the beginning of summer at Baghdad city shows an extreme climate, with the maximum temperature in summer reaching 52°C and a winter temperature of 2°C. The average mean temperatures and relative humidity for Baghdad province, considering it in the middle of studying regions during the periods of study, are shown in Diagram (2).

A. gossypii was the most dominant species throughout the study periods, while *M. persicae* is the least, these two species are considered perhaps as tentative or important aphid pests in Iraq (Ali *et al.*, 2012). The two species are highly polyphagous being particularly evident during the dry season in hot countries (Blackman and Eastop, 2006).

Diagram (3) shows the percentage of infection, *M. sanborni* , *A. gossypii* and combination infection with these two aphid species was the highest percentage of infection while *Coloradoa rufomaculata* , *Myzus persicae* and combination infection by *A. fabae* and *M. persicae* was the lowest infection.

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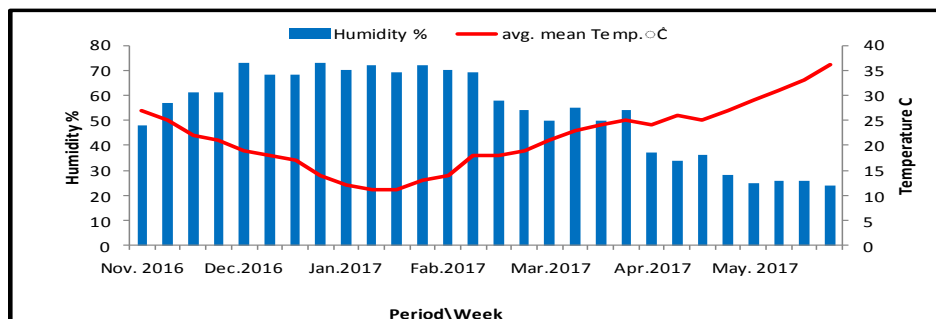


Diagram (2): Average mean temperatures and relative humidity for the duration of Nov. 2016 to May.2017, Baghdad province, Iraq.

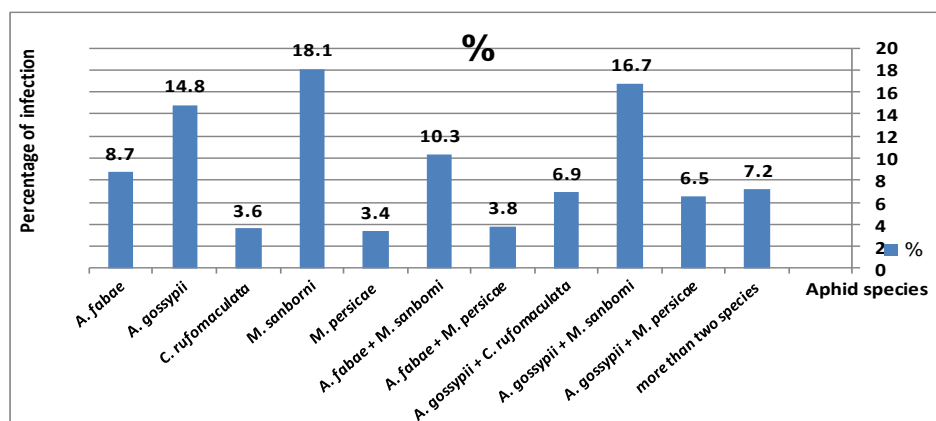


Diagram (3): Percentage of *Chrysanthemum* sp. infection by aphids in Baghdad province from Nov. 2016 to May 2017.

***Aphis gossypii* Glover, 1877**

Small to medium-sized, body length in apterous 1.05-1.90 mm, in alate 1.05-1.77 mm; highly variable in color even within the same colony, ranging from light yellow to dark green, with dark Siphunculi and a pale or dusky. This species is polyphagous and very damaging to many economic importance plants; Ali *et al.* (2012), recorded this species infested *Chrysanthemum* sp. in Baghdad, the infection was associated with *M. sanborni*.

***Aphis fabae* Scopoli, 1763**

Small to medium-sized, body length in apterous 1.60-2.25mm, in alate 1.80-2.6 mm dull greenish black to black; found on young leaves, stems and inflorescences of many plants, mainly Leguminosae, Chenopodiaceae and Compositae (Blackman and Eastop, 2006), so it is not strange that the present study records this aphid species on *Chrysanthemum* sp.

***Coloradoa rufomaculata* (Wilson, 1908)**

Small, body length in apterous 1.0-1.5 mm, in alate 0.9-1.5 mm; green, sometimes with yellow spots at Siphunculi base; found on the stem and underside of leaves of

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Chrysanthemum sp. This aphid species has presented by Ali *et al.* (2012) as a new record for Iraq aphid fauna.

Macrosiphoneilla sanborni (Gillette, 1908)

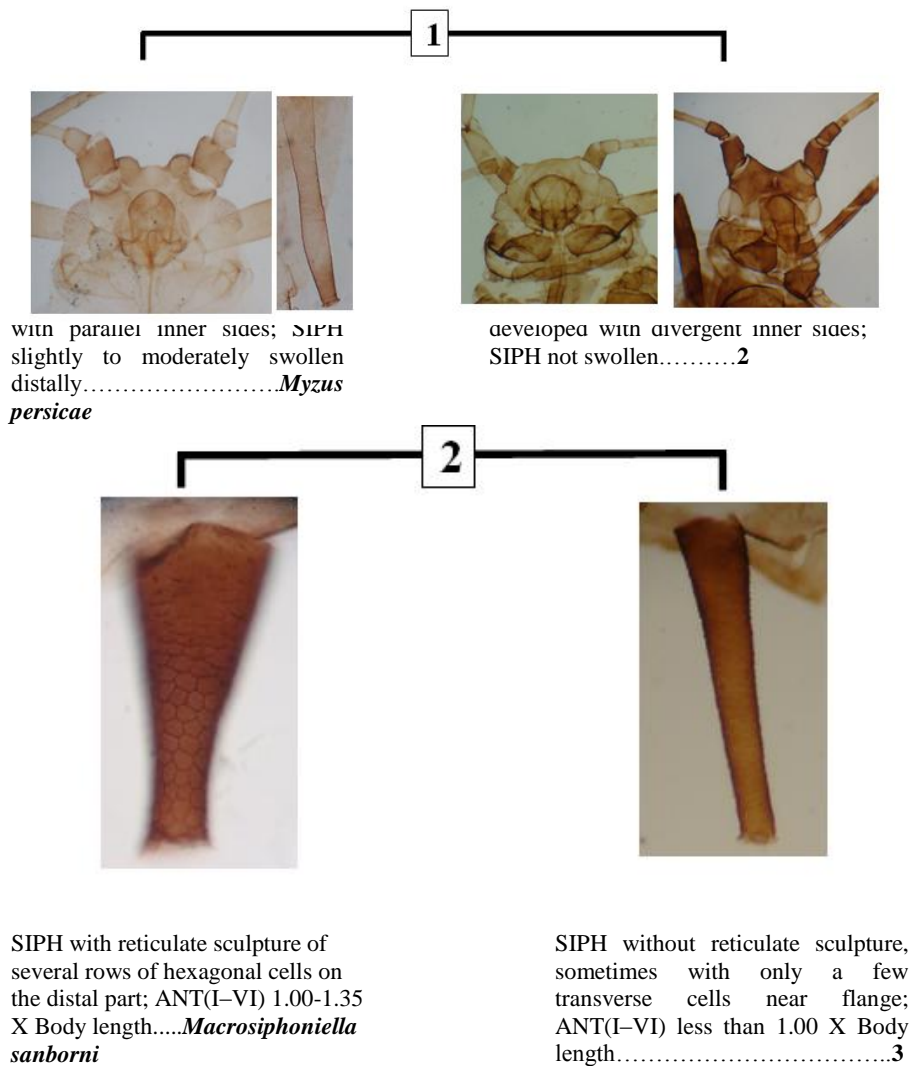
Small to medium-sized, body length in apterous 1.40-2.20 mm, in alate 1.40-2.30 mm; shiny, dark red-brown to blackish brown, broadly spindle-shaped, with black, relatively short and thick Siphunculi. The members of this species are found on young stems and undersides of leaves of *Chrysanthemum* sp.; Bodenheimer and Swirski (1957) are the first authors who record this aphid species in Iraq on *Chrysanthemum* sp.

Myzus persicae (Sulzer, 1776)

Small to medium-sized, body length in apterous 1.65-2.35 mm, alate 1.90-2.45 mm; whitish green, pale yellowish green, greyish green, mid-green or pink, rather uniformly coloured, not shiny, alate have a black central patch on the dorsal surface of the abdominal.

Keys to species of aphids that collected from the *Chrysanthemum* species in current investigations:

A: Key to apterous form aphids



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3



Dorsal body hairs with Fan-shaped apex;
 ABD TERG I and VII
 without MTu.....
Coloradoa rufomaculata

Dorsal body hairs with acuminate, acute or
 blunt apex; ABD TERG I and VII with
 MTu.....4

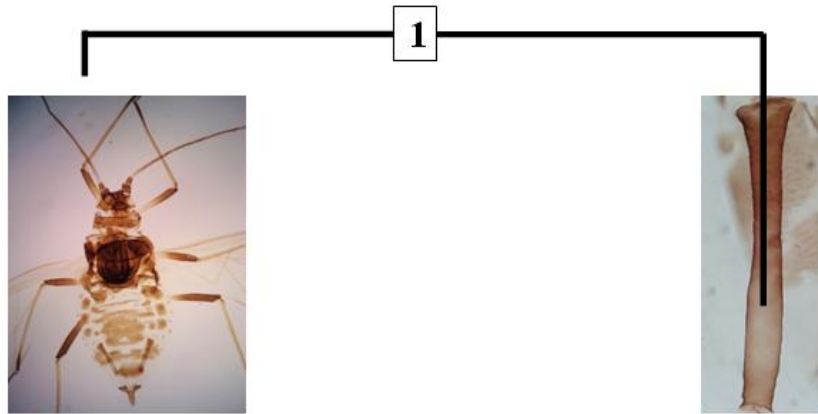
4



Longest hair on ANTIII 0.54-0.65
 X ANTIII BD; SIPH 1.45-1.77 X
 cauda, which bearing 5-7 hairs
 *Aphis gossypii*

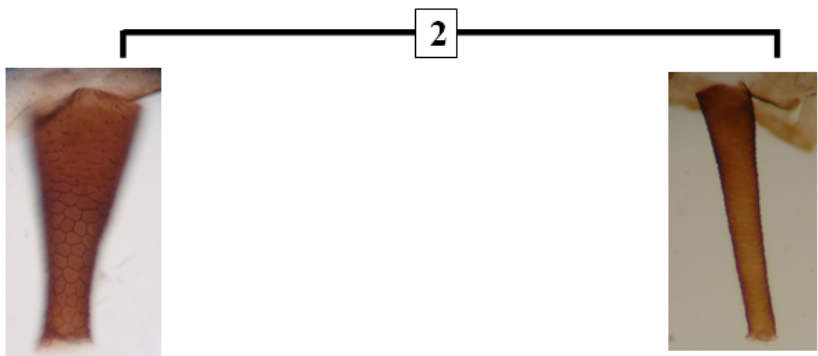
Longest hair on ANTIII more
 than 1.35-1.49 X ANTIII BD;
 SIPH 1.05-1.30 X cauda, which
 bearing 11-14 hairs *Aphis
 fabae*

B: Key to alate form aphids



Abdominal dorsum with large central sclerite on ABD TERG III-VI; SIPH slightly to moderately swollen distally.....*Myzus persicae*

Abdominal dorsum without large central sclerite on ABD TERG III-VI; SIPH not swollen.....2

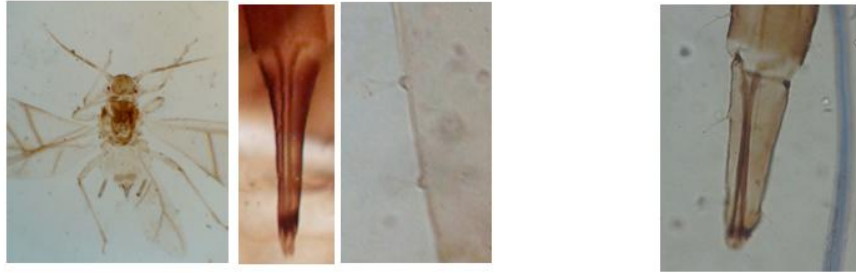


SIPH with reticulate sculpture of several rows of hexagonal cells on the distal part*Macrosiphoniella sanborni*

SIPH without reticulate sculpture, sometimes with only a few transverse cells near flange.....3

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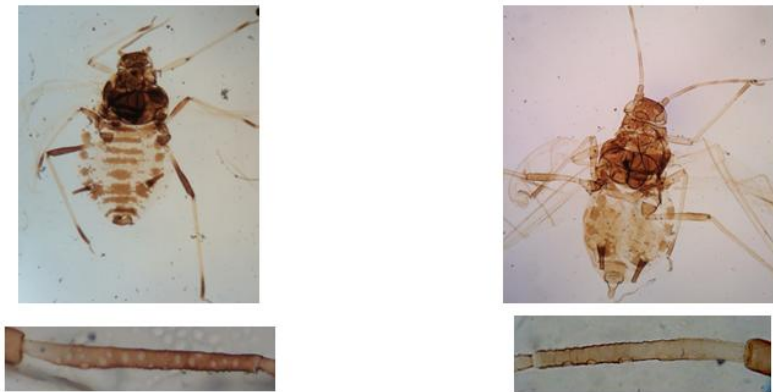
3



Dorsal body hairs with Fan-shaped apex; URS stiletto-shaped with six accessory hairs *Coloradoa rufomaculata*

Dorsal body hairs with acuminate, acute or blunt apex; URS never stiletto-shaped and with only two accessory hairs.....4

4



ANT III with 16-25 secondary rhinaria; SIPH 1.18-1.40 X cauda, which bearing 12-14 hairs.....*Aphis fabae*

ANT III with 5-9 secondary rhinaria; SIPH 1.40-1.63 X cauda, which bearing 6-7 hairs.....*Aphis gossypii*

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Table (2): Morphometric characters (mm) and comparisons of adult morphs of apterous viviparae female of aphids infested *Chrysanthemum* sp.

Characters	<i>A. fabae</i>	<i>A. gossypii</i>	<i>C. rufomaculata</i>	<i>M. sanborni</i>	<i>M. persicae</i>
BL	(1.80-2.6)	(1.05-1.77)	(0.90-1.5)	(1.40-2.30)	(1.90-2.45)
ANT(I-VI) (length)	(1.30-1.65)	(0.90-1.25)	(0.75-1.05)	(2.00-2.40)	(1.9-2.4)
ANT III (length)	(0.34-0.41)	(0.19-0.32)	(0.18-0.25)	(0.55-0.70)	(0.50-0.62)
BD III	(0.0175-0.025)	(0.020-0.025)	(0.017-0.012)	(0.0175-0.028)	(0.020-0.028)
ANT PT (length)	(0.30-0.40)	(0.24-0.36)	(0.19-0.25)	(0.50-0.61)	(0.48-0.60)
ANT VI b	(0.12-0.145)	(0.10-0.13)	(0.11-0.14)	(0.11-0.16)	(0.160-0.195)
ANT III secondary rhinaria	(16-25)	5-9)	(10-14)	(20-33)	(10-14)
Longest hair on ANT III (length)	(0.020-0.035)	(0.010-0.0175)	(0.010-0.013)	(0.030-0.040)	(0.0100-0.0125)
URS (length)	(0.12-0.14)	(0.09-0.11)	(0.080-0.105)	(0.125-0.16)	(0.105-0.12)
URS (accessory hairs)	(2)	(2)	(6)	(6-8)	(2-4)
HT II (length)	(0.110-0.128)	(0.078-0.095)	(0.075-0.095)	(0.11-0.14)	(0.11-0.14)
FTC	3,3,2	3,3,2	3.3.2	3-3-3	3,3,3
SIPH (length)	(0.20-0.28)	(0.16-0.23)	(0.16-0.23)	(0.21-0.33)	(0.35-0.46)
Cauda (length)	(0.165-0.195)	(0.11-0.15)	(0.110-0.155)	(0.22-0.37)	(0.21-0.27)
Caudal hairs	(12-14)	(6-7)	(4-5)	(14-18)	(5-6)
Comparisons					
ANT(I-VI) / BL	(0.62-0.75)	(0.67-0.85)	(0.70-0.82)	(1.00-1.43)	(0.92-1.05)
longest hair on ANT III / BD III	(1.15-1.47)	(0.74-0.88)	(0.75-0.84)	(1.43-1.75)	(0.40-0.52)
ANT PT / ANT VI b	(2.42-2.89)	(2.38-2.88)	(1.70-1.80)	(3.90-4.65)	(2.8-3.2)
URS / HT II	(1.05-1.17)	(1.05-1.20)	(1.00-1.15)	(1.12-1.15)	(0.84-0.96)
SIPH / BL	(0.102-0.115)	(0.11-0.153)	(0.15-0.18)	(0.11-0.14)	(0.16-0.20)
SIPH / Cauda	(1.18-1.40)	(1.40-1.63)	(1.40-1.50)	(0.85-0.95)	(1.67-1.72)
Cauda / BL	(0.073-0.092)	(0.082-0.112)	(0.10-0.13)	(0.15-0.17)	(0.10-0.12)

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HT II (length)	(0.110-0.128)	(0.078-0.095)	(0.075-0.095)	(0.11-0.14)	(0.11-0.14)
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Cauda / BL	(0.073-0.092)	(0.082-0.112)	(0.10-0.13)	(0.15-0.17)	(0.10-0.12)

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الوفرة السكانية الموسمية لحشرات من الداوودي
(Homoptera: Aphididae)
في وسط العراق مع مفتاح مصور للأنواع

حيدر بدري علي
قسم علوم الحياة / كلية العلوم / جامعة بغداد

تاريخ القبول: ٢٠١٧/١٢/٠٢

تاريخ الاستلام: ٢٠١٧/١١/٢٠

الخلاصة

استندت هذه الدراسة على جمع وتحديد أنواع المن التي تصيب نبات الداوودي في وسط العراق، إذ سجلت خمسة أنواع من عويلة Aphidinae وهي *Aphis 1763* و *Coloradoa fabae* Scopoli, 1877 ، *Aphis gossypii* Glover, 1877 ، *Myzus persicae* (Sulzer, 1776) و *rufomaculata* (Wilson, 1908) و *Macrosiphoniella sanborni* (Gillette, 1908) ؛ إذ كان النوع *A. gossypii* أكثر الأنواع سيادةً طوال فترة الدراسة بينما النوع *M. persicae* هو أقل الأنواع سيادةً.

عرض في هذه الدراسة ملخص لأبرز الصفات التشخيصية الرئيسية للأنواع المدروسة وتصميم مفتاح مصور لعزل أنواع المن التي تصيب نبات الداوودي.