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COMPARATIVE STUDY ON THE MORPHOLOGICAL CHARACTERS OF A POLYPHAGOUS APHID SPECIES, *MYZUS PERSICAE* (SLUZER) INFESTING SOME HOST PLANTS IN EGYPT.

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ABSTRACT: ***Two distinct morphological forms (apterous viviparous adult female and alate viviparous adult female) of the peach or potato aphid, Myzus persicae (Sluzer) (Homoptera, Aphidoidea, Aphididae) were studied and described. The green peach aphid as a polyphagous species was collected from 15 different host plants (fruit trees, weeds, vegetables, crop plants and ornamental plants) in five Governorates in Egypt.***

Morphometeric measurements of ten individuals from each morph (apterae and alatae adult females) of M. persicae infesting 15 host plant species in different localities were accomplished and the mean ± Standard Error in mm were studied and discussed.

The present study indicated that although there were variations in colour and length of measurement of the green peach aphid on different host plants and different localities, the modern European ratios of most diagnosis characters of aphid species are approximately settled. These variations were observed between each morph, the apterous and alate viviparae adult females, also from one host plant to another and from a locality to another on the same host plant species in different localities.

Key words: ***Apterous, alate, ratios of diagnosis characters and localities.***

INTRODUCTION

Aphids are usually considered a difficult group taxonomically and ecologically. One reason is their polymorphism, the occurrence of several morphs of adult individuals within the same species. The apterous viviparous adult females are a morph specialized for large reproduction parthenogentic females, while the alate viviparous females are specialized for dispersal as migrants and/or spread the infestations within the same field (Heie, 1980; Darwish, 1983a; Blackman and Eastop 1984).

Aphid can be divided into two different groups with respect to their life cycle. The first one is the non-host-alternating (monoecious or monophagous) species such as *Brachycaudus schwartzi* CB. in Hungary, which feed on the same perennial i.e., peach trees all year round (Darwish, 1983b). The second is the host-alternating (heteroecious or polyphagous) species, which migrate between the primary, mostly woody winter host and

one or more species of secondary herbaceous plants during summer such as *M. persicae* (Hille Res Lambers, 1966; Lees, 1966; Darwish, 1989; Darwish *et al*., 1994 and Tawfeek, 2001).

The green peach aphid is considered among the most major agricultural pests in the world because of its worldwide distribution and the type of damage inflicted on so many crops.

On the other hand, from the agricultural standpoint, the polymorphism of aphids is very troublesome because their winged forms widely disseminate various plant virus diseases. They cause immense damage either directly by sucking plant sap or indirectly as vectors of serious virus diseases (Bioshop, 1965; Eskanderi *et al.*, 1979; Minks and Harrewijn, 1987; Verma *et al*., 1998 and El-Komy *et al.*, 2004).

The present study aimed to through the light on the morphology and redescription of two distinct morphs of the polyphagous species *M. persicae*, which were collected from 15 different host plant species (fruit trees, weeds, vegetables, crop plants and ornamental plants) in five Governorates, Egypt. Furthermore, to study if the modern European ratios of most diagnosis characters of aphid species are settled.

MATERIALS AND METHODS

Specimens of the green peach aphid *Myzus persicae* (Sluzer) were found in large numbers in five Governorates (Alexandria, Beheira, Gharbia, Menoufia and Qalubia). Aphids associated with about 72 host plant samples representing fifteen species were collected from January 2008 through August 2009 (Table 1).

The aphids were collected in the field with the host plants from various locations. Collected specimens were taken to the laboratories of Economic Entomology Departments, Faculties of Agriculture, Alexandria University and Menoufia University. The colour of alive specimens was recorded before preservation. A total of 72 host plant samples were collected, where aphid specimens were transferred into 70% ethyl alcohol. For maceration the method presented by Hille Ris Lambers (1951), and explained by Van Emden (1972) and applied with modification corrections by Darwish (1983a) was used. The species were mounted in Hoyar's fluid and labeled.

Measurements of ten individuals from each morph (apterae and alatae) of *M. persicae* infesting 15 host plant species in different localities were conducted using research microscope in laboratory of Economic Entomology, Faculty of Agriculture, University of Alexandria. The means of ten measurements in mm were given with Standard Error.

The terms and ratios used in the description are in accordance with modern European Aphidology given by Heie (1980) and applied by Darwish (1982; 1983a, c; 1989 and 1990).

Table 1: A list *Myzus persicae* host plants, their families, common names, localities and date of collecting from January 2008 through August 2009.

Host plant and Family	Common name	Governorate	Locality	Date of collection
Convolvulas arvensis Fam.: Convolvulaceae	Field bindweed	Alexandria	Abo-Keir	January 2008
		Menoufia	Shebin El-Kom	October 2008
Eruca sativa * Fam.: Brassicaceae	Rocket or Arugula	Qaluobia	Banha	October 2008
		Alexandria	Burg El-Arab	March 2009
Brassica nigra Fam.: Brassicaceae	Black mustard	Menoufia	El-May	March 2008
		Beheira	Abo-Hommos	December 2008
Prunus persicae Fam.: Rosaceae	Peach trees	Gharbia	Berma	April 2008
		Beheira	Abo-Hommos	April 2009
Rumex dentatus Fam.: Polygonaceae	Toothed dock	Gharbia	Kafr El-Zayat	April 2008
		Menoufia	Menof f	June 2008
Lycopersicon esculentum Fam.: Solanaceae	Tomato	Alexandria	Abbiss	January 2008
Vicia fabae Fam.: Leguminosae	Faba bean	Menoufia	Shebin El-Kom	February 2008
Malva parviflora Fam.: Malvaceae	Cheese weed	Alexandria	Burg El-Arab	November 2008
Solanum tubersum Fam.: Solanaceae	Potato	Beheira	Abo-Hommos	May 2009
Mangifera indica Fam.: Anacardiaceae	Mango trees	Qaluobia	Banha	May 2009
Citrus sinensis Fam.: Rutaceae	Navel orange trees	Beheira	Abo-Hommos	May 2009
Sonchus oleracea Fam.: Asteraceae	Common sowthistle	Menoufia	Meet Khalaff	April 2008
Rosa sp. Fam.: Rosaceae	Rose trees	Alexandria	Sedy Keraer	August 2009
Uritica pilulifera Fam.: Urticaeae	Roman nettle	Menoufia	Talla	July 2008
Raphanus sativus Fam.: Brassicaceae	Radish	Alexandria	Khorshed	April 2009

*** Where, Family Brassicaceae = Family Cruciferae**

RESULTS AND DISCUSSION

1- The systematic position of *Myzus persicae* (Sluzer):

Order: Homoptera
Suborder: Sternorrhyncha
Infraorder: Aphidiformes
Section: Aphidomorpha
Superfamily: Aphidoidea
Family: Aphididae
Subfamily: Aphidinae
Tribe: Macrosiphini
Subtribe: Macrosiphina
Genus: *Myzus* Passerini, 1860
***Myzus persicae* (Sulzer, 1776)**

***The systematic position (after Szelegiewicz, 1978; Blackman and Eastop, 1984)**

The exhibited data in Table 1 showed the host plants, which represented 15 host plant species belonging to 11 plant families. The infestation by the green peach aphid as a polyphagous species occurred all year round through out the four seasons of year on different host plants in Egypt.

The investigations and observations in the field indicated that the alate form (Fig. 1A) of green peach aphid occurred all year round as migrants to spread infestations to the new foliages of young shoots of the same primary host plant and/or secondary host plants as well as weeds. However, the aphid individuals suck the sap from the leaves of different host plants, which afterward become flecked with spots and begin to curl or roll. Infestations cause younger leaves to crinkle, cup, or curl downward and cause older leaves to wilt, become yellow and die. The terminal growth is stunted and loping of new growth appears. Indeed, high numbers of green peach aphid were found infested tomato, common potato, rocket and black mustard plants.

2- The morphological characters of two morphs of *Myzus persicae*:

Morphometeric measurements of ten individuals from each host plant under consideration and each morph (apterae and alatae) of *M. persicae* infesting 15 host plants in different localities were accomplished and the mean ± S.E. in mm were given in Table 2. Also, numbers of secondary rhinaria on third antennal joints of alatae were also counted and scored.

Table 2

Table 2 -1

Table 2-2

Table 2 -3

The treatment of any aphid species usually consisted of a description of the apterous viviparous adult female and additional description of alate viviparous adult female. In Egypt, this aphid species do not produce sexuales so called anholocyclic species and individuals of all generations on all host plants are considered as parthenogenetic females.

2-1- The apterous viviparous adult female:

In life is dark green, whitish green, green, or reddish or pink in colour; not shiny; front of head emarginated and the frontal distinctly convergent tubercles. Immature stage, i.e. larvae and alatoid nymphs are pale yellow or yellow in colour.

As indicated in Table 2, in mounted specimens, body elongate oval, with averages ranged between 2.094 and 2.674 mm long on *Vicia fabae* and *Prunus persica*, respectively. Compound eyes consisting of about 62 – 76 ommatidia, about 3.3 – 5.3 times longer than triommatidium. Frons convergent tubercles (Fig. 1B), antennal tubercles well developed, their inner faces convergent in dorsal view, median frontal tubercle a lower than lateral frontal tubercles. Antennae usually 6-jointed (Fig. 1C), about 0.70 – 0.73 times as long as the body; pale; processus terminalis gradually slightly paler towards apex. Length of antennal joints from the third to the sixth as: 0.338, 0.259, 0.220 and 0.104 mm for the basal part of sixth and 0.387 mm for the unguis on faba bean plants, and 0.500, 0.266, 0.347 and 0.130 mm for the basal part of sixth and 0.420 mm for the unguis on peach plants, respectively. Processus terminalis 3.7 and 3.2 times as long as base of joint VI and 1.14 and 0.84 times the length of joint III on faba bean and peach plants, consecutively. The third antennal joint without secondary rhinaria and with 6 – 9 hairs. Tip of rostrum generally reaching to the top of middle coxae; ultimate rostral joint about 0.104 mm long, 1.0 times as long as hind tarsal joint II.

Head and thorax sclerotized; pale yellowish. Compound eyes, legs pale brownish, siphunculi, cauda genital plate paler yellowish in colour (Fig. 1D). Transverse rows of indistinct imbrications on abdominal tergites anterior to the siphunculi. Metanotum fused with abdominal tergites I to VI forming a pale patch. Dorsum pale, tergites VII and VIII free; dorsal shield quite smooth. Marginal tubercles absent on metathorax and abdominal tergites, and spinal tubercles absent on abdominal tergites VII, VIII. Tergite VIII with 7 – 11 hairs, mostly with filamentary apex, placed in a row on posterior margin of this segment; the longest one of these hairs ranged between 0.030 – 0.040 mm long, 0.8 – 1.0 times as long as basal diameter of antennal joint III. Longest hairs on antennal joint III 0.010 mm long, 0.3 – 0.4 times as long as the basal diameter of this joint. Siphunculi (Fig. 1D$_1$) slightly clavate pale yellowish in colour (light tapering with swollen end and distinctly flanged) ranged between 0.426 and 0.488 mm long, about 0.2 times as long as the body

length, about 4.1 – 4.7 times the length of hind tarsal joint II. Cauda (Fig. 1D$_2$) finger-shaped pale in colour with a slight basal constriction, and 0.104 – 0.109 mm long, about 1.7 – 1.9 times as wide at base as its length bearing from 9 – 13 hairs. Legs bearing numerous fine hairs. Hind tarsal joint II 0.104 – 0.109 mm long. Number of hairs on the first tarsal joint of each leg (Chaetotaxy) 2, 2, 2 (Measurements and ratio see Tables 2 and 3).

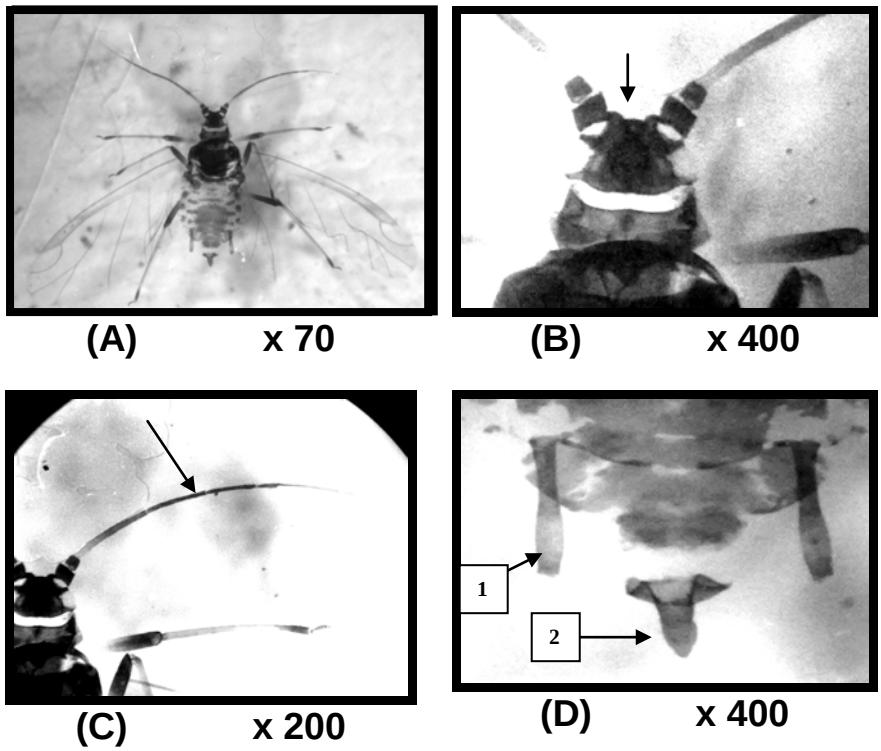

Fig. 1: (A) Alate viviparous adult female of *M. persicae.*
(B) Frontal convergent tubercles of *M. persicae*.
(C) Antenna of adult female of *M. persicae*.
(D) 1- Siphunculus and (D)2- Cauda of *M. persicae.*

Table 3: Ratios of certain diagnostic characters of the green peach aphid in accordance with Modern European Aphidology.

Host plant	Locality	Morph	The ratios of modern European Aphidology *				
			A	B	C	D	E
Convolvulas arvensis	Abo-Keir	Apterous	0.70	3.50	1.00	0.20	2, 2, 2
		Alate	0.85	3.76	1.00	0.19	2, 2, 2
	Shebin El-Kom	Apterous	0.70	3.53	1.00	0.20	2, 2, 2
		Alate	0.84	3.73	1.00	0.20	2, 2, 2
Eruca sativa	Banha	Apterous	0.70	3.50	1.00	0.19	2, 2, 2
		Alate	0.85	3.72	1.00	0.19	2, 2, 2
	Burg El-Arab	Apterous	0.70	3.50	1.00	0.20	2, 2, 2
		Alate	0.85	3.73	1.00	0.20	2, 2, 2
Brassica nigra	El-May	Apterous	0.70	3.53	1.00	0.20	2, 2, 2
		Alate	0.86	3.74	1.00	0.19	2, 3, 2
	Abo-Hommos	Apterous	0.70	3.58	1.00	0.20	2, 2, 2
		Alate	0.84	3.75	1.00	0.21	2, 2, 2
Prunus persica	Berma	Apterous	0.70	3.54	1.00	0.20	2, 2, 2
		Alate	0.84	3.70	1.00	0.19	2, 2, 2
	Abo-Hommos	Apterous	0.71	3.50	1.00	0.20	2, 2, 2
		Alate	0.85	3.71	1.00	0.20	2, 2, 2
Lycopersicon esculentum	Abbiss	Apterous	0.70	3.50	1.00	0.21	2, 2, 2
		Alate	0.86	3.72	1.00	0.19	2, 2, 2
Vicia fabae	Shebin El-Kom	Apterous	0.70	3.48	1.00	0.20	2, 2, 2
		Alate	0.86	3.74	1.00	0.19	2, 2, 2
Solanum tubersum	Abo-Hommos	Apterous	0.70	3.48	1.00	0.21	2, 2, 2
		Alate	0.85	3.72	1.00	0.20	2, 2, 3
Malva parviflora	Burg El-Arab	Alate	0.85	3.71	1.00	0.20	2, 2, 2
Mangifera indica	Banha	Alate	0.85	3.71	1.00	0.20	2, 2, 2
Citrus sinensis	Abo-Hommos	Alate	0.84	3.75	1.00	0.20	2, 2, 2
Sonchus oleracea	Meet Khalaff	Alate	0.86	3.75	1.00	0.20	2, 2, 2
Rosa sp.	Sedy Keraer	Alate	0.86	3.76	1.00	0.19	2, 2, 2
Uritica pilulifera	Talla	Alate	0.85	3.75	1.00	0.20	2, 2, 2
Rumex dentatus	Menoff	Alate	0.85	3.70	1.00	0.20	2, 2, 2
	Kafr El-Zayat	Alate	0.85	3.73	1.00	0.20	2, 2, 2
Raphanus sativus	Khorshed	Alate	0.85	3.77	1.00	0.20	2, 2, 2

*** Where:**
A = Length of antenna in proportion to length of body.
B = Length of processes terminals (unguis) in proportion to length of basal part of ultimate antennal joint.
C = Length of apical joint of rostrum in proportion to length of second joint of hind tarsus.
D = Length of siphunculus in proportion to length of body.
F = Number of hairs on first tarsal joint of each leg (Chaetotaxy).

2-2- The alate viviparous adult female:

In mounted specimens head and thorax dark brown, abdomen with a brown well developed dorsal patch sclerites extending from abdominal tergites III – VII; this blotch fused with the marginal sclerites of segments from IV to VII and more or less with the marginal sclerites of segment III (Fig. 1A). Antennae dark brown, about 0.66 - 73 times as long as the length of body. Antennal joint III with 0 – 15 secondary rhinaria. Compound eyes brown, consisting of about 65 – 88 ommatidia. Legs brown in colour, except tibiae pale brownish. Chaetotaxy of the first tarsal joints 2, 2, 2 except, on *Solanum tubersm* 2, 2, 3. Siphunculi pale brownish in colour, about 0.351 – 0.540 mm long. Also, cauda about the same length of apterous adult female; pale brownish in colour (Measurements see Tables 2).

Number of antennal jointed is six for both morphs apterous and alate. The antennae are shorter than body length. They are relatively longer in alate form than that in apterous females of *M. persicae*. Secondary rhinaria found on third antennal joint of alatae viviparous adult females.

3- Ratios and diagnostic characters in accordance to Modern European Aphidology:

Data in Table 3 elucidated the ratios and diagnostic characters of the green peach aphid. For both apterous and alate viviparous adult females, the ratios are approximately equal to each other in the same morph on the 15 host plants under this study. In this respect, however, the ratio of length of antenna in proportion to length of body ranged between 0.70 and 0.71 in apterae, while in alatae viviparous adult females ranged between 0.84 and 0.86.

The present study indicated that although there were variations in colour and length of measurement of the green peach aphid on different host plants, the modern European ratios of most diagnosis characters of aphid species are approximately settled for each morph. These variations were observed between each morph, the apterous and alate viviparae adult females, also from one host plant to another and from a local to another on the same host plant species in different localities.

Habib and El-Kady (1961) added nine plant species among them *Eruca sativa* (Crucifera), *Malva rotundifolia* (Malvaceae) as hosts to alatae of *M. persicae* in Egypt. They stated that antennal formula: 6-3-4-5; unguis more than three time as long as the basal part; number of rhinaria on 3rd antennal segment ranged from 9 – 14. First tarsal segment with two hairs.

Rajagopal and Kareem (1983) reported that photoperiods have no significant effect on the production of winged forms of *M. persicae*, but crowding and low temperatures favoured the production of alatae.

Infested peach leaves are severely curled and shoot growth is stunted or even halted. Attacks are often sufficiently serious to affect fruit quality and

quantity; they may also have a detrimental effect on tree vigour and reduce the following year's crop (Alford, 1984).

Simple keys for apterous and alate viviparae of certain aphid species among them the green peach aphid infesting some fruit trees in Egypt were given by Darwish *et al.* (1985) and Tawfeek (2001) .

Weber (1985) stated that *M. persicae* is polyphagous on over 400 plant species in more than 50 families. Darwish *et al.* (1989) recorded eleven aphid species on various vegetable plants. Amongst, *M. persicae* have a wide range numbers of host species. It was the most dominant species and occurred on 23 species of vegetable plants as well as common potatoes. Tawfeek (2001) reported that the green peach aphid has a wide spread on many host plant species representing ten species of fruit trees, but in a few numbers.

Liu and Wu (1994) reported that the low temperature promoted, while high temperature tended to suppress the development of wings. The promotive effect of low temperature was much stronger in *M. persicae* on development stages. Sensitive to temperature showed that temperature experienced by both the mothers and the young nymphs influenced wing development.

El-Gamal (2006) and Mesbah *et al*. (2009) mentioned that *M. persicae* was moderatly distributed on three species of ornamental plants e.g., on *myoporum pictum* and *Rosa* sp. in spring, and on *Vinca minor* in summer.

The differentiations among the measurements of apterous and alate individuals of the same aphid species may be due to the variations of growing plantation season, air temperature, relative humidity, soil moisture, and host plant species and their morphological characters.

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دراسة مقارنة على الصفات المورفولوجية لأنواع من حشرة الخوخ الأخضر المتعدد العوائل الذى يصيب بعض العوائل النباتية فى مصر

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الملخص العربى

تم دراسة ووصف شكلان مميزين من الاشكال المورفولوجية (أنثى غير مجنحة ولودة بالغة وأنثى مجنحة ولودة بالغة) لحشرة من الخوخ أو البطاطس الأخضر(متشابهة الأجنحة ، فوق عائلة المن وعائلة المن). لقد جمعت حشرات من الخوخ الأخضر المتعددة العوائل من خمسة عشرنوع من العوائل النباتية المختلفة (أشجار الفاكهة ، الحشائش ، الخضر والمحاصيل النباتية ونباتات الزينة) فى خمس محافظات فى مصر.

تم عمل قياسات مورفولوجية لعشرة أفراد من حشرة من الخوخ الأخضر لكل شكل (إناث بالغة غير مجنحة ومجنحة) والتى تصيب الخمسة عشر من الأنواع النباتية فى بيئتها المختلفة مع دراسة ومناقشة المتوسطات ± الخطأ القياسى بالملى متر.

أوضحت الدراسة وأثبتت إنه بالرغم من وجود اختلاف فى اللون والأطوال القياسية لحشرة من الخوخ الأخضر المجموعة من مختلف العوائل وأماكن تواجدها كانت النسب الأوربية التشخيصية للصفات المورفولوجية لحشرات المن تقريبا ثابتة لكل شكل مورفولوجى والتى تختلف أيضا من عائل نباتى إلى آخر ومن مكان إلى آخر.

Table 2: Mean ± S.E. of measurements in mm of apterous and alate viviparous adult females of *Myzus persicae* on some host plants collecting from five Governorates in Egypt from January 2008 through August 2009.

Date and Locality	Host plant	Morph	Body	Ant.	Siph.	Cauda	U.r.j.	H.t.II	Antenna joints III	Antenna joints IV	Antenna joints V	Antenna joints VI	Sec. Rhin on III
January 2008 Alexandria (Abo-Keir)	*Convolvulas arvensis*	Apt.	2.538 ± 0.090	1.785 ± 0.030	0.501 ± 0.012	0.198 ± 0.005	0.104 ± 0.000	0.104 ± 0.000	0.399 ± 0.010	0.339 ± 0.010	0.230 ± 0.006	0.130 + 0.455 ± ± 0.000 0.010	0
		Alate	2.586 ± 0.040	2.194 ± 0.020	0.480 ± 0.014	0.196 ± 0.004	0.104 ± 0.006	104 ± 0.006	0.531 ± 0.020	0.480 ± 0.010	0.307 ± 0.006	0.130 + 0.485 ± ± 0.000 0.012	10
October 2008 Menoufia (Shebin El-Kom)	*Convolvulas arvensis*	Apt.	2.392 ± 0.042	1.672 ± 0.013	0.487 ± 0.008	0.198 ± 0.003	0.109 ± 0.000	0.109 ± 0.000	0.366 ± 0.010	0.306 ± 0.010	0.230 ± 0.006	0.130 + 0.459 ± ± 0.000 0.010	0
		Alate	2.408 ± 0.017	2.028 ± 0.012	0.477 ± 0.010	0.198 ± 0.000	0.104 ± 0.000	104 ± 0.003	0.492 ± 0.020	0.388 ± 0.010	0.276 ± 0.004	0.130 + 0.485 ± ± 0.000 0.009	13
October 2008 Qaluobia (Banha)	*Eruca sativa*	Apt.	2.230 ± 0.021	1.557 ± 0.016	0.419 ± 0.012	0.204 ± 0.000	0.104 ± 0.000	0.104 ± 0.000	0.372 ± 0.010	0.289 ± 0.010	0.230 ± 0.002	0.130 + 0.455 ± ± 0.000 0.010	0
		Alate	2.204 ± 0.040	1.884 ± 0.012	0.412 ± 0.011	0.196 ± 0.003	0.104 ± 0.000	104 ± 0.000	0.411 ± 0.020	0.330 ± 0.010	0.296 ± 0.002	0.130 + 0.484 ± ± 0.000 0.016	10
March 2009 Alexandria (Burg El-Arab)	*Eruca sativa*	Apt.	2.337 ± 0.024	1.633 ± 0.024	0.458 ± 0.023	0.204 ± 0.001	0.109 ± 0.000	0.109 ± 0.000	0.398 ± 0.010	0.299 ± 0.008	0.236 ± 0.008	0.122 + 0.427 ± ± 0.000 0.010	0
		Alate	2.166 ± 0.020	1.846 ± 0.018	0.428 ± 0.033	0.186 ± 0.002	0.109 ± 0.000	0.109 ± 0.003	0.453 ± 0.028	0.394 ± 0.015	0.269 ± 0.009	0.132 + 0.492 ± ± 0.004 0.022	14

Abbreviations: Ant. = Antenna, Siph. = Siphunculus, U.r.j. = Ultimate rostal joint, H.t.II = Hind tarsal joint, Sec. Rhin on III = Secondary rhinaria on third antennal joint, Apt. = Apterous viviparous adult female and III, IV, V, VI = Antennal joints 3rd, 4th, 5th, 6th (Basal part + Unguis) and ± S.E. = ± The value of Standard Error.

Table 2: Continued 1.

Date and Locality	Host plant	Morph	Body	Ant.	Siph.	Cauda	U.r.j.	H.t.II	Antenna joints				Sec. Rhin on III
									III	IV	V	VI	
March 2008 Menoufia (El-May)	*Brassica nigra*	Apt.	2.324 ± 0.020	1.621 ± 0.020	0.472 ± 0.009	0.176 ± 0.007	0.104 ± 0.000	0.104 ± 0.000	0.378 ± 0.009	0.282 ± 0.010	0.236 ± 0.005	0.117 + 0.413 ± ± 0.000 0.010	0
		Alate	2.369 ± 0.030	2.049 ± 0.030	0.447 ± 0.006	0.182 ± 0.000	0.104 ± 0.000	0.104 ± 0.000	0.494 ± 0.010	0.397 ± 0.009	0.302 ± 0.008	0.130 + 0.486 ± ± 0.000 0.020	0
December 2008 Beheira (Abo-Hommos)	*Brassica nigra*	Apt.	2.469 ± 0.52	1.729 ± 0.074	0.488 ± 0.12	0.211 ± 0.010	0.104 ± 0.002	0.104 ± 0.000	0.398 ± 0.008	0.268 ± 0.005	0.254 ± 0.006	0.122 + 0.427 ± ± 0.004 0.022	0
		Alate	2.161 ± 0.036	1.809 ± 0.040	0.462 ± 0.017	0.253 ± 0.009	0.109 ± 0.004	0.109 ± 0.006	0.463 ± 0.007	0.315 ± 0.008	0.261 ± 0.009	0.117 + 0.443 ± ± 0.006 0.018	0
April 2008 Gharbiya (Berma)	*Prunus persica*	Apt.	2.674 ± 0.029	1.868 ± 0.026	0.528 ± 0.021	226 ± 0.004	0.104 ± 0.000	0.104 ± 0.000	0.500 ± 0.019	0.266 ± 0.012	0.347 ± 0.019	0.130 + 0.460 ± ± 0.000 0.008	0
		Alate	2.509 ± 0.042	2.115 ± 0.026	0.487 ± 0.020	0.234 ± 0.008	0.104 ± 0.000	0.104 ± 0.002	0.520 ± 0.018	0.364 ± 0.008	0.312 ± 0.011	0.130 + 0.481 ± ± 0.003 0.015	13
April 2009 Beheira (Abo-Hommos)	*Prunus persica*	Apt.	2.650 ± 0.035	1.865 ± 0.030	0.519 ± 0.006	0.242 ± 0.006	0.104 ± 0.000	0.104 ± 0.003	0.488 ± 0.007	0.373 ± 0.006	0.284 ± 0.004	0.130 + 0.455 ± ± 0.004 0.012	0
		Alate	2.373 ± 0.030	2.023 ± 0.030	0.470 ± 0.007	0.199 ± 0.004	0.104 ± 0.000	0.104 ± 0.000	0.481 ± 0.010	0.390 ± 0.007	0.282 ± 0.007	0.130 + 0.482 ± ± 0.000 0.020	14

Abbreviations: see Table 2.

Table 2: Continued 2.

Date and Locality	Host plant	Morph	Body	Ant.	Siph.	Cauda	U.r.j.	H.t.II	Antenna joints III	Antenna joints IV	Antenna joints V	Antenna joints VI	Sec. Rhin on III
January 2008 Alexandria (Abbiss)	*ersicon esculentum*	Apt.	2.353 ± 0.020	1.651 ± 0.018	0.494 ± 0.008	0.182 ± 0.006	0.104 ± 0.000	0.104 ± 0.000	0.377 ± 0.007	0.286 ± 0.006	0.234 ± 0.004	0.117 + 0.409 ± 0.000 ± 0.010	0
		Alate	1.980 ± 0.017	1.712 ± 0.015	0.370 ± 0.007	0.208 ± 0.005	0.104 ± 0.000	0.104 ± 0.000	0.413 ± 0.006	0.317 ± 0.006	0.275 ± 0.000	0.130 + 0.484 ± 0.000 ± 0.008	9
February 2008 Menoufia (Shebin El-Kom)	*Vicia fabae*	Apt.	2.094 ± 0.020	1.470 ± 0.020	0.426 ± 0.020	0.203 ± 0.006	0.104 ± 0.000	0.104 ± 0.000	0.338 ± 0.008	0.259 ± 0.004	0.220 ± 0.004	0.117 + 0.407 ± 0.000 ± 0.015	0
		Alate	1.965 ± 0.019	1.698 ± 0.020	0.368 ± 0.007	0.205 ± 0.005	0.104 ± 0.000	0.100 ± 0.006	0.367 ± 0.013	0.323 ± 0.006	0.265 ± 0.000	0.125 + 0.467 ± 0.007 ± 0.009	13
May 2009 Beheira (Abo-Hommos)	*Solanum tubersum*	Apt.	2.392 ± 0.034	1.638 ± 0.030	0.494 ± 0.013	0.206 ± 0.003	0.104 ± 0.000	0.104 ± 0.000	0.364 ± 0.015	0.300 ± 0.010	0.230 ± 0.006	0.130 + 0.452 ± 0.000 ± 0.012	0
		Alate	2.503 ± 0.060	2.124 ± 0.020	0.489 ± 0.001	0.229 ± 0.006	0.104 ± 0.000	0.104 ± 0.000	0.530 ± 0.019	0.376 ± 0.010	0.317 ± 0.006	0.130 + 0.484 ± 0.000 ± 0.010	13
November 2008 Alexandria (Burg El-Arab)	*Malva parviflora*	Alate	2.254 ± 0.015	1.927 ± 0.011	0.437 ± 0.015	0.181 ± 0.008	0.104 ± 0.000	0.104 ± 0.000	0.480 ± 0.019	0.415 ± 0.034	0.318 ± 0.012	0.130 + 0.482 ± 0.009 ± 0.046	10
May 2008 Qalubiya (Banha)	*Mangifera indica*	Alate	2.418 ± 0.078	2.062 ± 0.017	0.486 ± 0.016	0.208 ± 0.014	0.104 ± 0.000	0.104 ± 0.000	0.438 ± 0.012	0.347 ± 0.023	0.268 ± 0.020	0.130 + 0.482 ± 0.009 ± 0.040	12

Abbreviations: see Table 2.

Table 2: Continued 3.

Date and Locality	Host plant	Morph	Body	Ant.	Siph.	Cauda	U.r.t.	H.T.II	Antenna joints				Sec. Rhin on III
									III	IV	V	VI	
May 2009 Beheira (Abo-Hommos)	*Citrus sinensis*	Alate	2.167 ± 0.022	1.826 ± 0.025	0.424 ± 0.009	0.182 ± 0.004	0.104 ± 0.000	0.104 ± 0.000	0.481 ± 0.014	0.314 ± 0.006	0.279 ± 0.004	0.130 + 0.487 ± ± 0.000 0.015	
April 2008 Menoufia (Meet Khalaff)	*Sonchus oleraceus*	Alate	2.297 ± 0.057	1.977 ± 0.022	0.455 ± 0.011	0.186 ± 0.006	0104 ± 0.000	0.104 ± 0.000	0.490 ± 0.012	0.371 ± 0.007	0.304 ± 0.007	0.134 + 0.503 ± ± 0.006 0.012	13
August 2009 Alexandria (Sedy Kerair)	*Rosa* sp.	Alate	2.232 ± 0.051	1.917 ± 0.034	0.421 ± 0.014	0.182 ± 0.008	0.104 ± 0.000	0.104 ± 0.000	0.470 ± 0.032	0.403 ± 0.027	0.299 ± 0.008	0.130 + 0.489 ± ± 0.000 0.034	
July 2008 Menoufia (Talla)	*Uritica pilulifera*	Alate	2.345 ± 0.100	2.003 ± 0.070	0.460 ± 0.015	0.202 ± 0.006	0.104 ± 0.000	0.104 ± 0.000	0.494 ± 0.020	0.411 ± 0.006	0.326 ± 0.010	0.126 + 0.472 ± ± 0.006 0.040	15
June 2008 Menoufia (Menof)	*Rumex dentatus*	Alate	2.415 ± 0.031	2.057 ± 0.040	0.477 ± 0.009	0.216 ± 0.006	0.117 ± 0.000	0.117 ± 0.000	0.491 ± 0.020	0.383 ± 0.007	0.328 ± 0.009	0.117 + 0.433 ± ± 0.000 0.017	12
April 2008 Gharbia (Kafr El-Zayat)	*Rumex dentatus*	Alate	2.317 ± 0.043	1.960 ± 0.028	0.468 ± 0.008	0.208 ± 0.004	0.117 ± 0.000	0.117 ± 0.000	0.455 ± 0.018	0.338 ± 0.006	0.312 ± 0.008	0.117 + 0.436 ± ± 0.000 0.015	13
April 2009 Alexandria (Khorshed)	*Raphanus sativus*	Alate	2.194 ± 0.020	1.860 ± 0.020	0.437 ± 0.006	0.197 ± 0.005	0.104 ± 0.000	0.104 ± 0.000	0.454 ± 0.010	0.347 ± 0.009	0.249 ± 0.005	0.117 + 0.441 ± ± 0.000 0.007	14

Abbreviations: see Table 2.