

دراسة الشكل الظاهري لحشرة المنّ *Uroleucon (Uroleucon) sonchi* المصاحب لحشيشة الجعضيض *Sonchus oleraceus* L. محافظة المنوفية - مصر.

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المخلص العربي

تم دراسة ووصف شكلين مميزين لحشرة المن المصاحبة لحشيشة الجعضيض (مورفولوجياً) وهما الحشرة الولودة الغير مجنحة، الحشرة الولودة المجنحة و كذلك الأطوار الغير بالغة (الأربع أعمار اليرقية - الحورية الثالثة والرابعة) التي تم جمعها من علي حشيشة الجعضيض المنتشرة و المصاحبة للنباتات الإقتصادية المزروعة في محافظة المنوفية بمصر.

MORPHOLOGY OF *UROLEUCON (UROLEUCOM) SONCHI* ASSOCIATED WITH ANNUAL SOWTHISTLE WEED, *SONCHUS* *OLERACEUS* IN MENOUFIA, EGYPT

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(Received: Jan. 31, 2012)

ABSTRACT: Two distinct morphological morphs (apterous and alate viviparous adult females) and immature stages (four larval instars and two alatoid nymphal instars) of *Uroleucon (Uroleucon) sonchi* (L.) associated with the annual sowthistle weed, *Sonchus oleraceus*, were morphologically studied and described. This weed plant was found associated with some economic plants cultivated in Menoufia Governorate, Egypt.

Key words: Apterous, alate and larvae and alatoid nymphs of aphid.

INTRODUCTION

The lack of information in morphological characters of *Uroleucon (Uroleucon) sonchi* (L.) in Egypt kindly attracted our attentions to such study. However, the present work was carried out in the Economic Entomology and Agricultural Zoology Department, Faculty of Agriculture, Menoufia University, Shebin El-Kom, Egypt to add new contribution to the available knowledge about the aphid associated with annual sowthistle. Habib and El-Kady (1961) described only the alate viviparous adult female of *Uroleucon sonchi* under the synonym name *Dactynotus sonchi* (L.).

Aphids are usually considered, taxonomically and ecologically a difficult group. One reason is their polymorphism. Aphid life cycles can be rather complicated and involve a succession of morphologically different forms of the same species. The transitions from one morph to another have been triggered by change in the environment. The complexity – and the terminology created to describe it – can be daunting to the non-specialist (Hille Ris Lambers, 1966; Lees, 1966; Hiei, 1980, 1991; Darwish, 1983a, b, 1992, 1998; Dixon, 1985; Blackman and Eastop, 1984 and 1994).

Weed plants are considered as secondary host plants for numerous aphid species from which the alatae viviparae adult females of aphids (migrants) migrate and infest the primary host plant trees

(and/or) economic crops. However, such these aphid species, which characterized by host-alternation, are known as polyphagous species (heteroecious or dioecious), while other aphid species without host-alternation are the monophagous ones (monoecious or autoecious).

MATERIALS AND METHODS

The individual of collected aphid specimens were observed aggregating in large numbers on the stems of the annual sowthistle weeds, *Sonchus oleraceus* in El-Batanoon and Kafr Tanbedy in Menoufia Governorate. Through survey of aphids associated with weed plants that was carried out during 2009 to 2011. The infested plants with aphids were collected in the field; then taken to the laboratory, where 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 personal modification by Darwish (1982, 1983c and d) was used. The specimens (more than 300 individuals of both morphs and immature stages of *U. sonchi* were mounted in Berlese's fluid.

Measurements of 10 individuals from each morph (apterae and alatae viviparous adult females) and immature stages (four larval instars and two alatoid nymphal instars) of this aphid species were performed and recoded using research microscope. The means of 10

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measurements \pm Standard Error were deduced.

The terms used in the descriptions were in accordance with modern European Aphidology given by Hille Ris Lambers (1960), Stroyan (1977), Szelegiewicz (1977), Heie (1980) and applied by Darwish (1984, 1989, 1990) and Darwish and Tawfeek (2009).

RESULTS AND DISCUSSION

The systematic position of *Uroleucon (Uroleucon) sonchi* (L.) (Szelegiewicz, 1978):

Order: Homoptera

Suborder: Sternorrhyncha

Infraorder: Aphidiforms

Section: Aaphidomorpha

Superfamily: Aphidoidea

Family: Aphididae

Subfamily: Aphidinae

Tribe: Macrosiphini

Subtribe: Macrosiphina

Genus: *Uroleucon* Mordvilko, 1914

Subgenus: *Uroleucon* Szelegiewicz, 1978

Uroleucon (Uroleucon) sonchi (Linnaeus, 1767)

Description of Different Stages:

1. Apterous viviparous adult female:

In life brownish black in colour. In mounted specimens body broadly spindle-shaped aphid (Fig. 1a) about 4.556 to 5.399 mm in length. Compound eyes about 5 times longer than triommatidion, consisting of about 180 ocelli. Frons diverging with inner side little rounded and smooth (Fig. 1b), median frontal tubercle posterior than lateral frontal tubercles. Antenna usually 0.78 to 0.89 times as long as the body, with joints I and II brown. Flagellum from the pale joint III and IV gradually darkens towards the base of joint VI; processus terminalis gradually slightly darkens towards apex. Length of antennal joints from the third to the sixth as follow: 1.373 – 1.142, 0.666 – 0.952, 0.639 – 0.843 and 0.204 – 0.231 mm for basal part and 0.843 – 1.238 mm for the unguis, respectively. Processus terminalis from 4.1 to 5.5 times as long as base of joint VI, and 0.7 to 0.9 of length of joint III. The third antennal joint with 11 to 19 secondary

rhinaria and with 16 hairs. Tip of rostrum generally reaching half the middle coxae; ultimate rostral joint about 0.204 to 0.231 mm long, 0.8 to 0.9 times as long as second joint of hind tarsi (Measurements see Table 1).

Head and thorax sclerotized and pigmented brown in colour. Legs, compound eyes, siphunculi brown in colour, cauda, and genital plate pale brown. Marginal tubercles absent on mesothorax; mesosternal process conspicuous, branched unite shaped. Marginal tubercles absent on mesothorax and abdominal tergites; and spinal tubercles absent on abdominal tergites VII and VIII. Tergite VIII with 8 hairs, mostly with filamentary apices, placed in a row on posterior margin of sclerotic part of this segment; longest of these hairs 0.068 mm long, as long as basal diameter of antennal joint III. Longest hairs on antennal joint III 0.054 mm long, 1.25 times as long as the basal diameter of this joint. Siphunculi elongate conical shaped (Fig. 1c) with subapical zone of polygonal reticulation, with a circular incision below the well developed flange, 1.102 - 1.455 mm long, about 0.242 - 0.276 of the body length, about 4.765 - 5.095 times the length of second joint of hind tarsi. Cauda elongate tongue-like (Fig. 1d), about 1.034 to 1.537 mm long, about 3.3 - 4.9 times as wide at base as its length bearing 22 hairs. Legs long and spinose; coxae and tarsi dark brown in colour; tibiae pale brown with dark brown apices, bearing numerous fine hairs. Hind tarsal joint II about 0.231 to 0.286 mm long (Fig. 1e). Chaetotaxy of first tarsal joints 4,5,5 hairs.

2. The larval instars

2.1. The first instar larva:

In life red in colour. In mounted specimens body oval (Fig. 2a), about 1.496 – 2.230 mm long. Frons slightly sinuated, median frontal tubercle a little lower than lateral frontal tubercles. Head and pronotum sclerotized; meso- and metanotum membranous. Transverse rows of imbrication on abdominal tergites absent, membranous. Antenna usually 5 jointed, about 0.8 times as long as the body length.

Length of antennal joint from the third to the fifth as 0.286 – 0.462, 0.286 – 0.394, 0.122 – 0.149 mm for basal part and 0.435 – 0.816 mm for unguis and 0.517 – 0.748 mm for unguis, without secondary rhinaria on the third joint. Processus terminalis 4.6 - 5.4 times as long as base of joint V, and 1.6 - 2.4 times of the length of joint III. Tip of rostrum generally reaching to the beyond hind coxae; ultimate rostral joint about 0.150 - 0.177 mm long, 0.9 – 1.0 times as long as

second joint of hind tarsi. Siphunculi cylindrical, about 0.122 – 0.367 mm long, about 0.1 – 0.2 times of the body length. Cauda semi-circular, very small, about 0.054 – 0.163 mm long, about 0.3 – 1 times as wide at base as its length bearing 2 hairs. The larva in this instar has six well developed legs, bearing numerous fine hairs. Hind tarsal joint II about 0.150 – 0.190 mm long. First tarsal joint with 1, 2, 2 hairs (Measurements see Table 1).

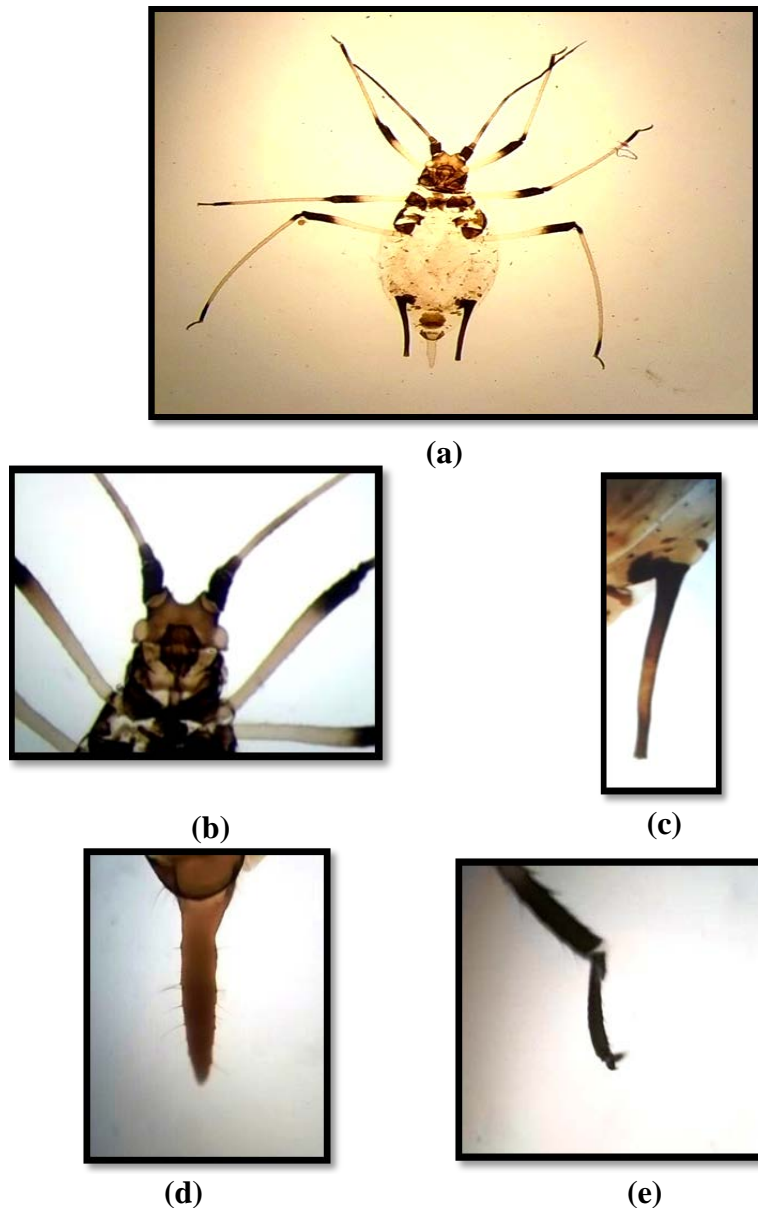


Fig. 1: (a) Apterous viviparous adult female *U. sonchi*, (b) Front diverging with inner side, (c) Siphunculus (d) Cauda, and (e) Second joint of hind tarsus.

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Table 1

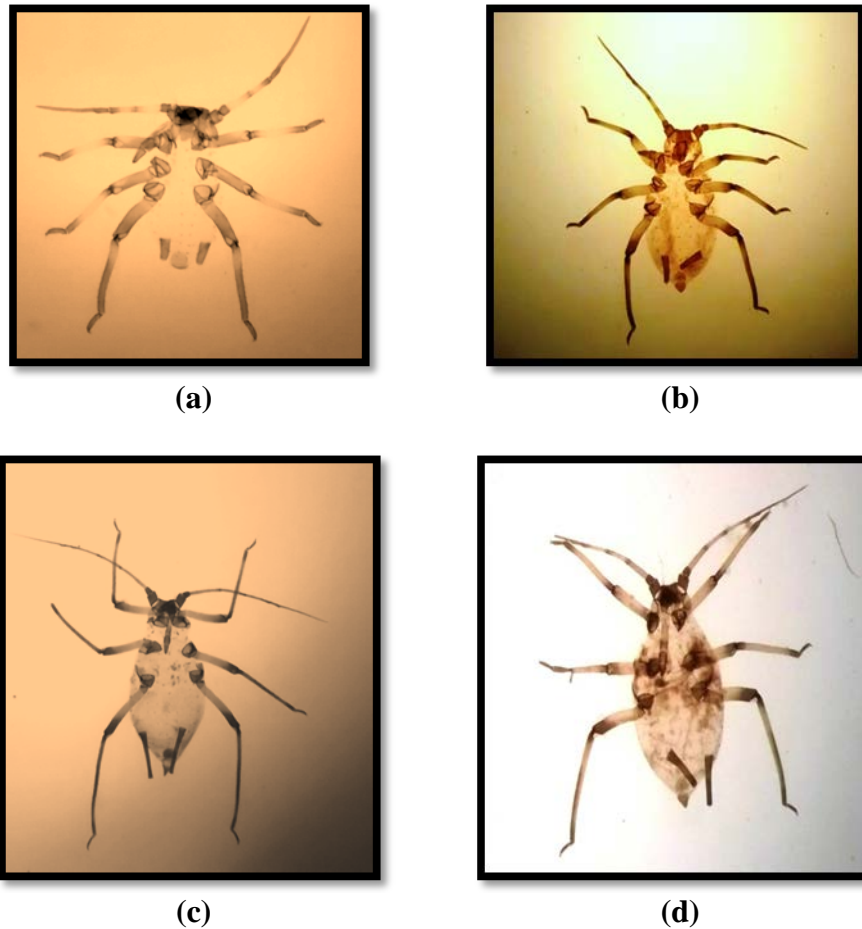


Fig. 2: The larval instars of *U. sonchi* (a) First instar, (b) Second instar, (c) Third instar (d) Fourth instar

2.2. The second instar larva:

In life red in colour. In mounted specimens body oval (Fig. 2b), about 2.040 – 2.557 mm long. Frons slightly diverging with inner side little rounded and smooth (median frontal tubercle lower than lateral frontal tubercles). Head, pronotum, antennae, legs sclerotized; other thoracic tergites, abdominal and cauda ones pale brown. Siphunculi brown in colour. Transverse rows of imbrication on abdominal tergites absent. Antenna usually 5 segments, about 0.8 – 1.0 time as long as the body length. Length of antennal joint from the third to the fifth as 0.286 – 0.462, 0.286 – 0.394, 0.122 – 149 mm for basal part and 0.435 – 0.816 mm for unguis,

without secondary rhinaria on the third joint. Processus terminalis 5.5 – 5.7 times as long as base of joint V, and 1.9 – 2.4 of the length of joint III. Tip of rostrum generally reaching the middle of hind coxae; ultimate rostral joint about 0.163 - 0.190 mm long, 0.9 – 1 times as long as second joint of hind tarsi. Siphunculi conical, about 0.312 – 0.544 mm long, about 0.15 to 0.21 times as long as the body length. Cauda short triangular about 0.095 – 0.313 mm long, about 0.5 - 1.5 times as long as its basal width, bearing 6 hairs. Legs bearing numerous fine hairs. Hind tarsal joint II about 0.163 – 0.218 mm long. Chaetotaxy of first tarsal joint with 2,2,3 hairs.

2.3. The third instar larva:

In life reddish brown in colour. In mounted specimens body broadly oval (Fig. 2c), about 2.666 – 3.536 mm long. Frons diverging with inner side little rounded and smooth (median frontal tubercle lower than lateral frontal tubercles). Head, pronotum, antenna, legs sclerotized; brown, other thoracic tergites and abdominal ones colourless. Transverse rows of imbrication on abdominal tergites absent. Marginal tubercles absent in mesothorax; mesosternal processes absent. Tergites VIII bearing 4 hairs with filamentary apics, placed in arrow on posterior margin part; about 0.068 mm long, as long as basal diameter of antennal joint III. Antenna usually 6 jointed, about 0.939 – 0.958 times as long as the body. Length of antennal joint from the third to the sixth as 0.394 – 0.694, 0.354 – 0.558, 0.435 – 0.598, 0.136 – 0.204 mm for basal part and 0.802 – 1.034 mm for unguis, usually without secondary rhinaria on the third joint. Processus terminalis 5.1 – 5.9 times as long as base of joint VI, and 1.5 – 2.0 of the length of joint III. Third antennal joint divides during moulting, giving the third and the fourth joint. Tip of rostrum generally reaching beyond the middle coxae; ultimate rostral joint about 0.16 – 0.19 mm long and about 0.8 times as long as second joint of hind tarsi. Siphunuli conical brown in colour, with a circular incision below the flange, about 0.558 – 0.762 mm long, about 0.2 times as long as the body length, and 2.7 – 3.3 times of second joint of hind tarsi. Cauda triangular, about 0.272 – 0.544 mm long, about 1.3 – 2.5 times as long as its basal width; bearing 9 hairs. Legs bearing numerous fine hairs. Hind tarsal joint II about 0.204- 0.2312mm long. Chaetotaxy of first tarsal joint 4,3,3 hairs.

2.4. The fourth instar larva:

In life reddish brown in colour. In mounted specimens body spindle-shaped aphid (Fig. 2d), about 2.788 – 3.985 mm long. Dorsal sclerotization as in the third instar larvae. Marginal tubercles and mesosternal processes absent on mesothorax. Tergite VIII bearing 12 hairs about 0.0816 mm long 0.9 times as long as

basal diameter of antennal joint III. Antenna usually 6 jointed, about 0.9 times as long as the body length. Length of antennal joint from the third to the sixth as 0.449 – 0.748, 0.381 – 0.598, 0.476 – 0.639, 0.163 – 0.204 mm for basal part and 0.884 1.115 mm for unguis, usually without secondary rhinaria on the third joint. Processus terminalis 5.5 times as long as base of joint VI, and 1.5 – 2.0 of the length of joint III. Tip of rostrum generally reaching to end of middle coxae; ultimate rostral joint about 0.177 – 0.204 mm long, 0.8 times as long as second joint of hind tarsi. Siphunuli elongate conical brown in colour, with a circular incision below the well developed flange, about 0.544 – 1.047 mm long, about 0.19 – 0.26 times as long as the body length, and 2.5 – 4.1 times of second joint of hind tarsi. Cauda triangular, about 0.435 – 0.680 mm long, about 1.5 – 2.3 times as long as its basal width, bearing 15 hairs. Hind tarsal joint II about 0.218 – 0.258 mm long. Chaetotaxy of first tarsal joint 4,5,4 hairs.

3. Alate viviparous adult female:

In life dark brownish black in colour. In mounted specimens body spindle-shaped aphid (Fig. 3), about 3.264 – 5.617 mm in length. Compound eyes about 6.8 times longer than triommatidion, consisting of about 180 ocelli. Frons diverging with inner side little rounded and smooth, median frontal tubercle a little posterior than lateral frontal tubercles. Antenna usually 1.0 to 1.2 times as long as the body length, with joints I and II brown. Flagellum from the pale joint III and IV gradually darkens towards the base of joint VI; processus terminalis gradually slightly paler towards apex. Length of antennal joints from the third to the sixth as: 0.993 – 1.047, 0.598 – 1.047, 0.503 – 0.938, 0.177 – 0.258 mm for basal part and 1.170 – 1.387 mm for unguis, respectively. Processus terminalis to 5.4 – 6.6 times as long as base of joint VI, and 0.9 to 1.2 times of length of joint III. The third antennal joint with 40 to 54 secondary rhinaria and with 17 hairs. Tip of rostrum generally reaching the middle coxae; ultimate rostral joint about 0.163 to 0.218 mm long, 0.762 to 0.857 times as long as second joint of hind tarsi.



Fig. 3: The alate viviparous adult female of *U. sonch*

Head and thorax sclerotized and pigmented brown in colour. Legs, compound eyes, siphunculi brown in colour, cauda, and genital plate pale brown. Transverse rows of indistinct imbrications on abdominal tergites anterior to the siphunculi absent. Marginal tubercles absent on mesothorax. Marginal tubercles present on mesothorax and lateral sclerites present on abdominal tergites; spinal tubercles absent on abdominal tergites VII and VIII. Tergite VIII with 20 hairs, mostly with filamentary apices, placed in a row on posterior margin of sclerotic part of this segment; longest of these hairs 0.068 mm long, as long as basal diameter of antennal joint III. Longest hairs on antennal joint III 0.041 mm long, 0.6 times as long as the basal diameter of this joint. Siphunculi elongate conical and smooth with faint traces of several imbrications brown in colour, with a circular incision below the well developed flange, 0.598 – 1.550 mm long, about 0.2 – 0.3 of the body length, about 3 – 5 times the length of second joint of hind tarsi. Cauda elongate tongue shaped, about 0.585 to 1.088 mm long, about 2.4 – 4.4 times as wide at base as its length; bearing 22 hairs. Legs bearing numerous fine hairs. Hind tarsal joint II about 0.190 – 0.286 mm long. Chaetotaxy of first tarsal joints with 4,5,5 hairs.

4. The nymphal stages:

4.1. The third instar nymph:

In life alatoid individuals reddish brown in colour. In mounted specimens body spindle-shaped (Fig. 4a), about 2.788 – 3.917 mm long. Frons diverging with inner side little rounded. Head, pronotum, antennae, legs sclerotized; brown in colour, other thoracic tergite and abdominal ones colourless. Transverse rows of imbrication on abdominal tergites absent. Marginal tubercles absent in mesothorax; mesosternal processes absent. Tergites VIII bearing 13 hairs with filamentary apices, placed in a row on posterior margin part; the longest one about 0.095 mm long, 1.2 times as long as basal diameter of antennal joint III. Antenna usually 6 jointed, about 0.9 – 1.0 times as long as the body. Length of antennal joints from the third to the sixth as 0.408 – 0.857, 0.394 – 0.653, 0.394 – 0.653, 0.476 – 0.680, 0.163 – 0.204 mm for basal part and 0.789 – 1.197 mm for unguis, usually without secondary rhinaria on the third joint. Processus terminalis 4.8 – 5.9 times as long as base of joint VI, and 1.4 – 1.9 of the length of joint III. Tip of rostrum generally reaching beyond the middle coxae; ultimate rostral joint about 0.177 – 0.204 mm long, 0.8 – 0.9 times as long as second joint of hind tarsus. Siphunuli

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conical, with a circular incision below the flange, about 0.558 – 0.952 mm long, about 0.2 times as long as the body length, and 2.7 – 3.684 times of second joint of hind tarsus. Cauda triangular, about 0.462 – 0.653 mm long, about 1.4 – 2.0 times as long as its basal width; bearing 16 hairs. Legs bearing numerous fine hairs. Hind tarsal joint II about 0.204- 0.2584 mm long. First tarsal chaetotaxy joints: 3,3,3.

4.2. The fourth nymph:

In life alatoid individuals reddish brown in colour. In mounted specimens body spindle-shaped (Fig. 4b), about 3.604- 3.985 mm long. Dorsal sclerotization as in the third nymphal instar. Marginal tubercles and mesosternal processes absent on mesothorax. Tergite VIII bearing 14 hairs about 0.095 mm long 1.2 times as long as basal diameter of antennal joint III. Antenna usually 6 jointed, about 0.698 – 0.983 times as long as the body. Length of antennal joint from the third to the sixth as 0.707 – 0.870, 0.558 – 0.707, 0.585 – 0.734, 0.177 – 0.218 mm for basal part and 0.952 – 1.197 mm for unguis, usually without secondary rhinaria on the third joint. Processus terminalis about 5.5 times as long as base of joint VI, and 1.3 of the length of joint III. Tip of rostrum

generally reaching to the half of middle coxae; ultimate rostral joint about 0.190 to 0.204 mm long, 0.8 times as long as second joint of hind tarsi. Siphunuli elongate conical, with a circular incision below the well developed flange, about 0.843 – 1.061 mm long, about 0.26 times as long as the body length, and 3.4 to 3.9 times of second joint of hind tarsi. Cauda triangular, about 0.503 – 0.802 mm long, about 1.6 – 2.6 times as long as its basal width, bearing 22 hairs. Hind tarsal joint II about 0.245 – 0.272 mm long. First tarsal chaetotaxy joints: 3,4,5.

As shown in Table 1 there are remarkable variations in the measurements of the various organs between the two morphs and immature stages. Third antennal joint divides during the second moulting, giving the third and the fourth antennal joint to reach six jointed.

The present results are well agree with Habib and El-Kady (1961) who found that antennal formula was 6:3:4:5; unguis 5.9 times as long as basal part and number of rhinaria on 3rd antennal joint ranging 38 – 55, scattered over the whole length of the segment. Cauda white to yellow, bearing more than 20 long setae.

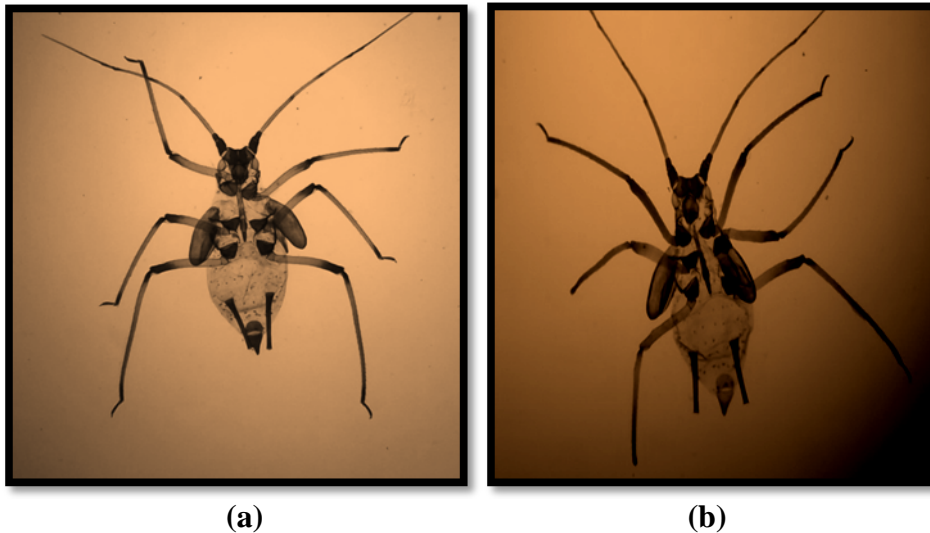


Fig. 4: The nymphal instars of *U. sonchi* (a) Third nymphal instar and (b) Fourth nymphal instar .

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المصاحب لحشيشة الجعضيض *Sonchus oleraceus* L. محافظة المنوفية - مصر.

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المُلخَص العربي

تم دراسة ووصف شكلين مميزين لحشرة المن المصاحبة لحشيشة الجعضيض (مورفولوجياً) وهما الحشرة الولودة الغير مجنحة، الحشرة الولودة المجنحة و كذلك الأطوار الغير بالغة (الأربع أعمار اليرقية - الحورية الثالثة والرابعة) التي تم جمعها من علي حشيشة الجعضيض المنتشرة و المصاحبة للنباتات الإقتصادية المزروعة في محافظة المنوفية بمصر.

Table 1: Mean \pm S.E. of performed measurements (in mm) of collected apterous and alate viviparous adult females and immature stages of *Uroleucon sonchi* on annual sowthistle weed in Menoufia region.

Aphid stage	Body	Ant.	Siph.	Cauda	U.r.j.	H.t.II	Antennal joints				Sec. Rhin. on III *
							III	IV	V	VI	
Apterous viviparous adult female	4.948 \pm 0.091	4.485 \pm 0.105	1.310 \pm 0.040	1.250 \pm 0.044	0.215 \pm 0.003	0.261 \pm 0.005	1.265 \pm 0.021	0.796 \pm 0.024	0.744 \pm 0.022	0.219 + 1.136 \pm 0.003 + 0.044	14.7 \pm 1.03
Alate viviparous adult female	4.466 \pm 0.194	4.946 \pm 0.137	1.296 \pm 0.083	0.885 \pm 0.046	0.200 \pm 0.006	0.254 \pm 0.008	1.330 \pm 0.054	0.919 \pm 0.041	0.827 \pm 0.039	0.229 + 1.285 \pm 0.008 + 0.022	46.9 \pm 1.42
First instar larva	1.778 \pm 0.094	1.421 \pm 0.073	0.224 \pm 0.023	0.092 \pm 0.011	0.165 \pm 0.002	0.169 \pm 0.004	0.277 \pm 0.030	0.249 \pm 0.026	0.121 + 0.580 \pm 0.007 + 0.024	-	-
Second instar larva	2.281 \pm 0.045	1.873 \pm 0.098	0.377 \pm 0.028	0.185 \pm 0.020	0.169 \pm 0.003	0.186 \pm 0.006	0.412 \pm 0.015	0.322 \pm 0.010	0.160 + 0.632 \pm 0.014 + 0.044	-	-
Third instar larva	2.912 \pm 0.083	2.689 \pm 0.082	0.623 \pm 0.022	0.363 \pm 0.024	0.177 \pm 0.002	0.219 \pm 0.004	0.442 \pm 0.028	0.409 \pm 0.017	0.471 \pm 0.015	0.167 + 0.917 \pm 0.006 + 0.023	-
Fourth instar larva	3.479 \pm 0.118	3.302 \pm 0.084	0.884 \pm 0.045	0.582 \pm 0.0266	0.188 \pm 0.003	0.239 \pm 0.004	0.690 \pm 0.028	0.525 \pm 0.022	0.567 \pm 0.018	0.186 + 1.006 \pm 0.005 + 0.024	-
Third instar nymph	3.244 \pm 0.098	3.532 \pm 0.131	0.830 \pm 0.042	0.566 \pm 0.016	0.194 \pm 0.003	0.237 \pm 0.006	0.749 \pm 0.042	0.573 \pm 0.042	0.619 \pm 0.020	0.196 + 1.054 \pm 0.005 + 0.036	-
Fourth instar nymph	3.798 \pm 0.049	3.728 \pm 0.064	0.937 \pm 0.021	0.679 \pm 0.028	0.197 \pm 0.002	0.260 \pm 0.003	0.817 \pm 0.017	0.641 \pm 0.018	0.657 \pm 0.014	0.196 + 1.078 \pm 0.004 + 0.022	-

*Abbreviations: Ant. = Antenna, Siph. = Siphunculus, U.R.J = Ultimate Rostral Joint, H.t.II = Second Joint of Hind tarsus, III, IV, V, VI = 3rd, 4th, 5th, 6th antennal joints and Sec. Rhin. on III = Secondary rhinaria on 3rd antennal joint.

