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Short paper

Aphids living on *Stipa* (Poaceae) in Iran: *Chaetosiphella longirostris* Wieczorek, 2008 (Hemiptera: Aphididae: Chaitophorinae) as a new record

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Abstract: During the study of aphid fauna of Kerman province, Iran, an aphid species, *Chaetosiphella longirostris* Wieczorek, 2008 (Hem.: Aphididae: Chaitophorinae), was collected on *Stipa arabica* Trin. & Rupr. (Poaceae), which is reported here for the first time from Iran. This is the second aphid species reported on *Stipa* in Iran. Since there were some morphological differences between the original description of *C. longirostris* and Iranian population, here we made a diagnostic comparison. The biometric data of the Iranian population of *C. longirostris* is given and compared with the original description.

Keywords: Aphid, fauna, taxonomy, Iran, morphological differences, new record

Introduction

The genus *Stipa* L. (Poaceae) is comprised of about 400 species throughout the world with about 90-100 species distributed in the old world (Freitag, 1985; Barkworth and Everett, 1987). Plants belonging to this genus are annual and perennial species usually growing in the arid and dry regions; however, some species, with primitive morphological characteristics, grow in semi-arid regions, too (Freitag, 1985). Many *Stipa* species are among the important forage crops, which occur in grasslands or in savanna habitats (Freitag, 1985). In Iran, they are distributed in various regions of the country and about 20 *Stipa* species have been recorded (Mozaffarian, 1998).

Plants in the genus *Stipa* are infested by a number of aphids. There are about 26 aphid species living on *Stipa* in the world (see Table 1) (Remaudière and Remaudière, 1997; Holman, 2009; Blackman and Eastop, 2018). So far, only one aphid species (i.e. *Chaetosiphella stipae*) has been recorded on *Stipa* in Iran on *Stipa capensis* in Fars and Tehran provinces and on *Stipa hohenakeriana* in Markazi province (Hodjat, 2005; Rezwani, 2010).

The genus *Chaetosiphella* belongs to the tribe Siphini (Aphididae: Chaitophorinae) comprising six species and subspecies viz, *C. berlesei* (Del Guercio 1905), *C. tshernavini* (Mordvilko 1921), *C. massagetica* Kadyrbekov, 2005, *C. longirostris* Wieczorek, 2008, *C. stipae* subsp. *setosa* Wieczorek, 2008 and *C. stipae* subsp. *stipae* Hille Ris Lambers, 1947 (Wieczorek *et al.*, 2017).

Blackman and Estop (2006) mentioned that in the collection of Aphidoidea in the British Museum (Nat. Hist.), London, UK, there are some undescribed species of this genus.

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Moreover, two specimens labelled as "*C. stipae* subsp. *mediteranea*" stored in the collection of BMNH, collected by Ilharco in Portugal (1959), and later determined as *C. stipa* subsp. *mediteranea* by Hille Ris Lambers, is characterized by very long apical rostral segment. Examination of the material collected at the same locality by Wieczorek (2008), stored in the Aphid Collection of Estacao Agronomica Nacional, Oeiras (Portugal) showed that these specimens were new species and were named as *Chaetosiphella longirostris* (Wieczorek, 2008).

Table 1 Aphid species living on *Stipa* in the world (Remaudière and Remaudière, 1997; Wieczorek, 2008; Holman, 2009; Blackman and Eastop, 2018).

Aphid species	Subfamily	Tribe
Anoecia stipae Mamontova 1968	Anoeciinae	
Atheroides karakumi Mordvilko 1948	Chaitophorinae	Siphini
Atheroides serrulatus Haliday 1839	Chaitophorinae	Siphini
Carolinaia rhois (Monell1879)	Aphidinae	Macrosiphini
Chaetosiphella massagetica Kadyrbekov 2005	Chaitophorinae	Siphini
Chaetosiphella stipae HilleRisLambers 1947	Chaitophorinae	Siphini
Chaetosiphella stipae ssp. *setosa* HilleRisLambers 1947	Chaitophorinae	Siphini
Chaetosiphella tshernavini (Mordvilko 1921)	Chaitophorinae	Siphini
Diuraphis tritici (Gillette 1911)	Aphidinae	Macrosiphini
Dysaphis ubsanurensis Ivanoskaya 1973	Aphidinae	Macrosiphini
Forda formicaria von Heyden 1837	Eriosomatinae	Fordini
Forda marginata Koch 1857	Eriosomatinae	Fordini
Forda pawlowae Mordvilko 1901	Eriosomatinae	Fordini
Geoica utricularia (Passerini 1856)	Eriosomatinae	Fordini
Holmania chaetosiphon Szelegiewicz1964	Aphidinae	Macrosiphini
Hysteroneura setariae (Thomas 1878)	Aphidinae	Aphidini
Melanaphis pyraria (Passerini 1861)	Aphidinae	Aphidini
Metopolophium dirhodum (Walker 1849)	Aphidinae	Macrosiphini
Paracletus cimiciformis von Heyden 1837	Eriosomatinae	Fordini
Rhopalosiphum maidis (Fitch 1856)	Aphidinae	Aphidini
Rhopalosiphum padi (Linnaeus 1758)	Aphidinae	Aphidini
Schizaphis graminum (Rondani 1852)	Aphidinae	Aphidini
Sipha (*Rungsia*) *maydis* Passerini 1860	Chaitophorinae	Siphini
Sipha (*Rungsia*) *elegans* Del Guercio 1905	Chaitophorinae	Siphini
Sitobion avenae (Fabricius 1775)	Aphidinae	Macrosiphini
Sitobion fragariae (Walker 1848)	Aphidinae	Macrosiphini
Slavum lentiscoides Mordvilko 1927	Eriosomatinae	Fordini

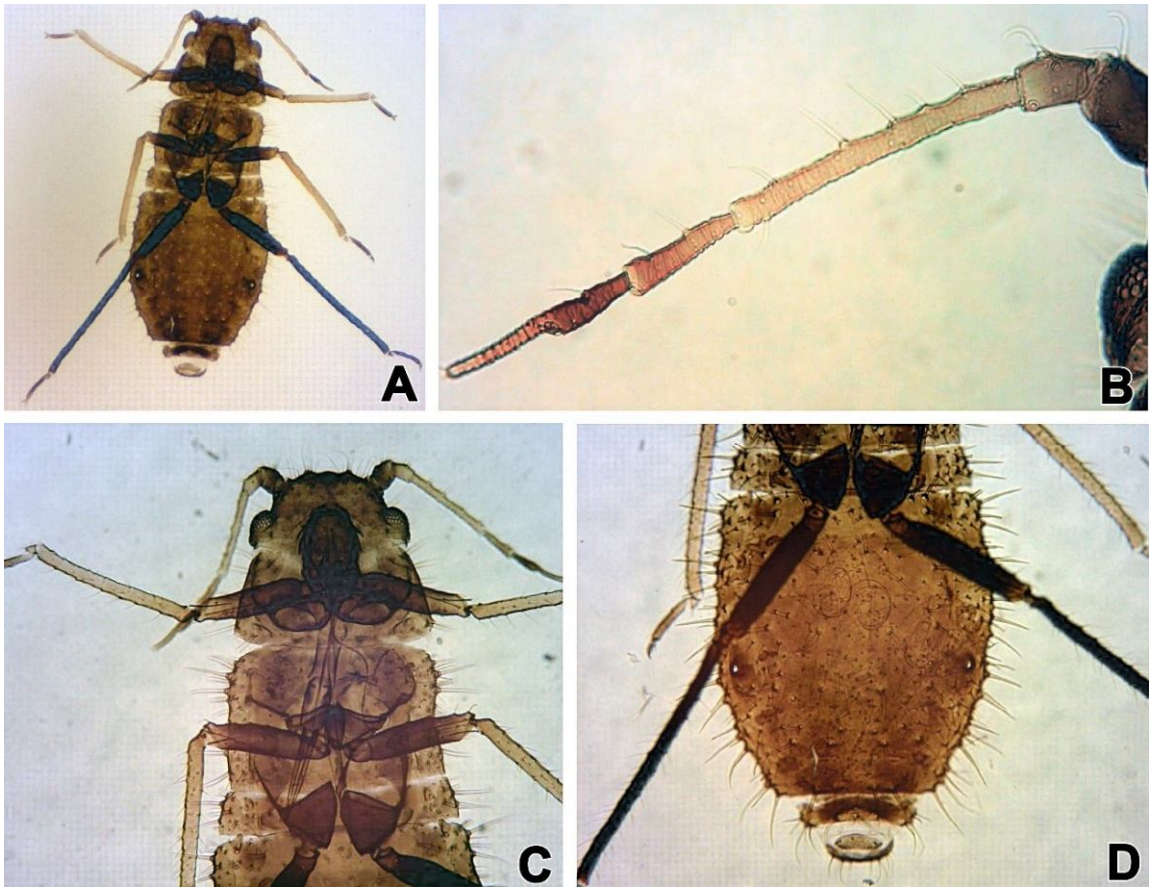

Figure 1 *Chaetosiphella longirostris* (Hemiptera: Aphididae: Chaitophorinae) Wieczorek, 2008, Apterous viviparous female: A, Body; B, Antenna; C, Head, thorax and rostrum; D, Abdominal segments.

The importance of aphid fauna in agriculture, horticulture and forestry is well known, but aphid fauna of rangeland and wild plants have not been studied comprehensively. The aim of this study was to identify the aphid species associated with *Stipa* plants in Kerman province, Iran. Here, we report *Chaetosiphella longirostris* as a new record for aphid fauna of Iran feeding on and collected from *Stipa arabica*.

Materials and Methods

Aphids were collected using different methods. The most satisfactory way of obtaining aphids is by examining plants foliage carefully for colonies. The infested plant parts were cut and placed into plastic bags. Some indicators such as existence of aphid's honeydew, ants' attendance and predators were used to find the aphid colonies/individuals. Later aphids on plants were collected by a paintbrush. When there was no trace of aphids on plants, beating on to a white tray placed underneath the plant was done very carefully. Specimens were either preserved in ethanol 75% or mounted on slides and deposited in the Aphidology Research Group Aphid Collection (ARGAC), Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology (KGUT), Kerman, Iran and in the insect collection of the Zoological Museum of Shahid Bahonar University of Kerman, Kerman, Iran (ZMSBUK).

Abbreviations used in the text are as follows: ANT, antennae length; ANTI, ANTII, ANTIII, ANTIV, ANTV, ANTVb, antennal segments I, II, III, IV, V, and the base of antennal segment V, respectively; ANTIII Base, basal diameter of antennal segment III; PT, processus terminalis; URS, ultimate rostral segment; 2HT, second segment of hind tarsus; SIPH, siphunculus; ABD TERG, abdominal tergites.

Results

***Chaetosiphella longirostris* Wieczorek, 2008 (Chaitophorinae: Siphini)**

Apterous viviparous females: Body color in living specimens is dark brown to black. Color of mounted specimens on slide: antennal segments I, II and V dark brown, III and IV pale brown. Head, thorax and abdominal tergites brown. Coxa and femur dark brown, front and middle tibia pale brown, hind tibia dark brown to black. Rostrum brown (Fig. 1).

Morphological characters: Body elongate, oval-shaped, 2.02-2.29 mm long. Head and prothorax not fused. Abdominal tergites sclerotized, II-VII fused, Hairs numerous, placed on wart-like bases, not arranged in visible rows. Thorax and marginal hairs pointed, thorn-like. Hairs of head are thorn-like. Antenna short, 5-segmented, 0.31-0.35 times the body length. Antennal segment III with 6-10 hairs. The longest hair on ANTIII 1.81-2.55 times as long as basal width of ANTIII. Eyes normal, ocular tubercles distinct. Rostrum long, reaching to hind coxae, the apical segment stiletto-shaped with 5-6 hairs. URS very long 0.26-0.29 mm. First tarsal segments with five hairs, empodial hairs spatulate. Siphunculi pore-shaped, placed at anterior margin of abdominal segment V. Cauda broadly rounded (Fig. 1). Complete biometric data were also compared with the original description, presented in Table 2.

A key to aphid species living on *Stipa* in Iran is provided below:

URS 0.17-0.22mm long, 1.1-1.5 × 2HT, Marginal hairs forked or jagged, hairs with pointed apices only on margin of abdominal tergites VII and VIII, ANTIII with 3-5 hairs……..……..***Chaetosiphella stipae***

URS 0.26-0.29mm long, 1.47-1.71 × 2HT, almost all marginal hairs pointed, thorn-like, ANTIII with 6-10 hairs…….***Chaetosiphella longirostris***

Biology: This aphid lives on *Stipa arabica* (Poaceae) leaves and are visited by ants.

Materials examined: A total of 12 apterous viviparous females were examined; ARG00135, Iran: Kerman province, Sirjan, Hossein-abad, N29°42′E55°55′, 2248m. a.s.l., 13 May 2014, leg. S. Mosapour, 4 apterous viviparous females (ZMSBUK) and 4 apterous viviparous females (ARGAC). ARG00136, Iran: Kerman province, Kuhpayeh, N30°26′E57°12′, 2084m. a.s.l., 19 May 2006, leg. M. Mehrparvar, 4 apterous viviparous females (ARGAC).

Discussion

Chaetosiphella longirostris is the second aphid species reported on *Stipa* in Iran. Following the original description, some morphological differences were found between the specimens of *C. longirostris* collected in Iran and those that were collected in Portugal (see Table 2). It could be supposed that the gap observed is probably derived from different environmental conditions (Madjdzadeh and Mehrparvar, 2009), geographical distribution (Madjdzadeh and Mehrparvar, 2009) and host plants (Madjdzadeh *et al.*, 2009; Mehrparvar *et al.*, 2012). These factors are among the most important aspects that can contribute to the differentiation between aphid populations (Madjdzadeh and Mehrparvar, 2009; Madjdzadeh *et al.*, 2009; Mehrparvar *et al.*, 2012). Besides the different geographical distribution for Portuguese and Iranian populations, it should be mentioned that the Portugal population was collected on *Ammophila arenaria*, while the Iranian ones were on *Stipa arabica*.

Table 2 Biometric data of apterous viviparous females of *Chaetosiphella longirostris* (Hemiptera: Aphididae: Chaitophorinae) Wieczorek, 2008. The data of specimens collected in Iran are compared to Portugal population described by Wieczorek, 2008.

Characters	Original description (Portugal)	Iranian population
Body	2.45-2.62	2.02-2.29
Body width	0.82-0.04	0.70-0.88
ANT	0.64-0.75	0.63-0.76
ANTIII	0.24-0.26	0.24-0.30
ANTIV	0.09-0.10	0.09-0.12
ANTVb	0.075-0.09	0.07-0.10
PT	0.08-0.10	0.08-0.12
Basal Diameter ANTIII		0.02-0.029
Longest hair on ANTIII		0.05-0.067
URS	0.26-0.30	0.26-0.29
2HT	0.17-0.18	0.15-0.19
Hind femur		0.38-0.42
Hind tibia		0.76-0.87
No. URS hair	2	5-6
No. ANTIII hair	5-7	6-10
PT/ANTVb	0.75-1.10	1.00-1.33
URS/2HT	1.40-1.70	1.47-1.71
ANT/Body length	0.24-0.28	0.31-0.35
ANTVb/ANTIII	0.30-0.40	0.30-0.35
ANTV/ANTIII	0.65-0.83	0.60-0.78
ANTV/ANTIV	1.45-2.20	1.63-2.10
URS/ANTIII	1.00-1.38	0.90-1.15
Longest hair on ANTIII/ANTIII Base	2.00-2.40	1.81-2.55

Lengths are in mm. Abbreviations: ANT, antennae length; ANTI, ANTII, ANTIII, ANTIV, ANTV, ANTVb, antennal segments I, II, III, IV, V, and the base of antennal segment V, respectively; ANTIII Base, basal diameter of antennal segment III; PT, processus terminalis; URS, ultimate rostral segment; 2HT, second segment of hind tarsus; SIPH, siphunculus; ABD TERG, abdominal tergites.

The Iranian specimens were smaller, so that they have shorter body length with more accessory hairs on URS and more hairs on ANTIII. The proportions of PT to ANTVb and ANT to body length are greater in Iranian population than in the Portuguese one, while the proportion of URS to ANTIII is relatively smaller in Iranian population (Table 2).

Wieczorek (2008) mentioned that *C. stipae* subsp. *setosa* from France and *C. longirostris* from Portugal may be treated as a variant population of *C. stipae*. Nevertheless, examination of cotypes of *C. stipae* from Switzerland and samples from Mongolia, Iran, Turkey, Hungary, Czech Republic, Austria and Spain (Wieczorek, 2008), showed significant differences in diagnostic characters such as length and shape of the body, antennal ratios and chaetotaxy, length of URS, proportions of URS to ANTIII and URS to 2HT.

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شته‌های گیاهان جنس (Poaceae) *Stipa* در ایران: معرفی *Chaetosiphella longirostris* Wieczorek, 2008 (Hemiptera: Aphididae: Chaitophorinae) به‌عنوان گزارش جدید

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چکیده: در این پژوهش یک گونه شته با نام علمی *Chaetosiphella longirostris* (Hem.: Aphididae: Chaitophorinae) جمع‌آوری شده از روی گیاه *Stipa arabica* Trin. & Rupr. (Poaceae) برای اولین بار در ایران از استان کرمان گزارش می‌شود. با این گزارش تعداد شته‌های فعال روی گیاهان جنس *Stipa* در ایران به دو گونه افزایش می‌یابد. از آنجاکه بین نمونه‌های جمع‌آوری شده از ایران و توصیف اصلی این گونه توسط Wieczorek (2008) اختلافات شکل‌شناسی مشاهده شد، این اختلافات مورد مقایسه و بحث قرار گرفته‌اند. هم‌چنین داده‌های بیومتریک مربوط به نمونه‌های ایران ارائه و با توصیف اصلی مقایسه شده‌اند.

واژگان کلیدی: شته، فون، رده‌بندی، ایران، اختلاف مورفولوژیک، رکورد جدید