

## New Records of Gall Midges (Diptera: Cecidomyiidae) from Iran

Younes KARIMPOUR<sup>1\*</sup>

Marcela SKUHRAVA<sup>2</sup>  
Mehdi RAZMI<sup>4</sup>

Hossein LOTFALIZADEH<sup>3</sup>

<sup>1,4</sup>Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia - IRAN.

<sup>2</sup>Bitovská 1227/9, CZ-140 00 Praha 4, CZECH REPUBLIC

<sup>3</sup>Department of Plant Protection, East-Azerbaijan Agricultural and Natural Resources Research and Education Center, Agricultural Research, Education and Extension Organization (AREEO), Tabriz, IRAN

e-mails: <sup>1\*</sup>y.karimpour@urmia.ac.ir, <sup>2</sup>marcela.skuhrava@gmail.com, <sup>3</sup>hlotfalizadeh@gmail.com, <sup>4</sup>m.razmi@urmia.ac.ir

ORCID IDs: <sup>1</sup>0000-0003-2468-8367, <sup>2</sup>0000-0002-8640-4879, <sup>3</sup>0000-0002-7927-819X, <sup>4</sup>0000-0002-1781-1569

### ABSTRACT

Based on the materials which recently collected from west Azerbaijan province/Iran, two genus of gall midges including *Giraudiella* Rübsaamen, 1915 and *Stenodiplosis* Reuter, 1895 and seven species of them namely, *Baldratia salicorniae* Kieffer, 1897; *Cystiphora taraxaci* (Kieffer, 1888); *Dasineura plicatrix* (Loew, 1850); *D. teucarii* (Tavares, 1903); *G. inclusa* (Frauenfeld, 1862); *Lasioptera flexuosa* (Winnertz, 1853) and *S. bromicola* (Marikovskii & Agafonova, 1961) are reported for the first time for Iranian fauna. In addition, the species *Halodiplosis araratica* Mirumian, 1991 is a new record for west Azerbaijan province' fauna. Some photos of galls on their host plants and its distribution data are given.

**Key words:** New records, Cecidomyiidae, Iran.

## INTRODUCTION

Gall midges are small and fragile flies belonging to the order Diptera, the suborder Nematocera, and the family Cecidomyiidae. The family Cecidomyiidae is one of the largest families of the Diptera in the world (Skuhrová, Skuhrový, & Brewer, 1984). Many phytophagous species of gall midges are known for the typical galls they produce on host plants during the larval development. The shape of galls is used to identify different species of the family. Although commonly known as gall midges, but only two - thirds of the known species are phytophagous gall-maker. Other species are phytophagous without making gall, mycophagous, predator and parasitoids (Gagné, 1981).

In west Azerbaijan (Azerbaijan-e Gharbi) province, north western Iran, a total of 18 species of the family Cecidomyiidae were reported during last ten years (Karimpour & Skuhrová, 2012; Hashemi Khabir, Sadeghi, Harris, & Hanifeh, 2012; Skuhrová, Karimpour, Sadeghi, Gol, & Joghataie, 2014; Skuhrava & Karimpour, 2017; Karimpour & Skuhrová, 2022). From which four species are associated with various species of *Salix* spp. (Salicaceae) and the larvae of one species namely, *Dasineura rosae* (Bremi, 1847) live in the folded leaflets of *Rosa canina* L. (Rosaceae). The larvae of other species grow in flower, leaf buds and leaves of herbaceous plants. More recently a new genus and species of gall midges namely, *Cephalaromyia* Skuhrová, 2017 and *Cephalaromyia capituli* Skuhrová, 2017 were described from Urmia environs. The larvae of *C. capituli* develops in flower heads of *Cephalaria microcephala* Boiss. (Caprifoliaceae) and forming a small gall in it (Skuhrava & Karimpour, 2017). The aim of this survey is to search and identify more species of gall midges' fauna of west Azerbaijan province.

## MATERIAL AND METHOD

Galled host plant samples were collected and put in the polyethylene bag and transferred to the laboratory during the years 2019-2020 from six districts of west Azerbaijan province - Iran:

KHOY, Pirkandī village: 38° 43' 30" N, 45° 06' 36" E, 1000 m asl.

KHOY, (in front of Mahlazan village, next to Khoy-Tabriz Road: 38° 39' 03" N, 45° 05' 27" E, 1019 m asl.

KHOY, (in front of Khoy airport, next to Khoy-Salmas road: 38° 24' 17" N, 44° 54' 01" E, 1192 m asl.

URMIA, Urmia University Campus: 37°39'14" N, 44°58'35" E, 1360 m asl.

URMIA, Kelīsā Kandī village (Sir Mountain): 37°29'08" N, 45°01'31" E, 1638 m asl.

URMIA, Shīrū Kandī village (Qasemlū valley): 37°18'02" N, 45°07'10"E, 1433 m asl. (Fig. 1).

After transferring to laboratory, plant materials were kept separately in glass boxes (50 × 40 × 80 cm) covered with muslin, fixed with a rubber band, until the emergence of adults. Soft sand was poured on the bottom of the box to a height of 2 cm so that

*New Records of Gall Midges (Diptera: Cecidomyiidae) from Iran*

the species that pupate in the soil have a place for pupation. Boxes were checked daily for collection of emerging gall midge adults for a 25-30 days. Obtained adults were put in vials with 75% ethanol and kept for identification. Emergence dates of adults were recorded. The specimens were identified using the keys written by Skuhravá (1997).

Specimens are deposited in the collection of the Department of Plant Protection, Faculty of Agriculture, Urmia University, Iran. Voucher specimens, both on slides and in ethanol, are deposited in the second author's collection at the Bítovská 1227/9, CZ-140 00 Praha 4, Czech Republic. The species are listed in alphabetical order by the genus.

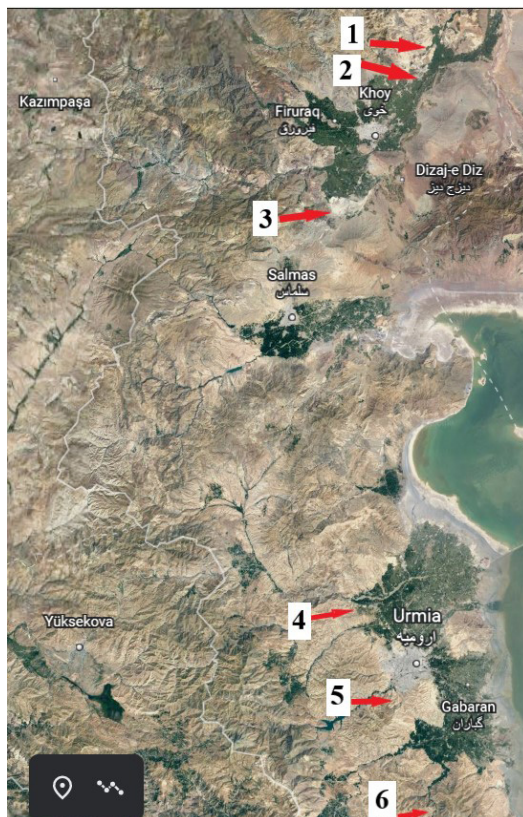


Fig. 1. Sampled area and the distribution map of identified gall midge's species. 1-KHOY, Pirkandi village, *Stenodiplosis bromicola*, 2-KHOY, Mahlazan village, *Lasioptera flexuosa*, *Baldratia salicorniae* and *Halodiplosis araratica*, 3-KHOY, in front of Khoi airport, *Baldratia salicorniae* and *Halodiplosis araratica*, 4-URMIA, Urmia University Campus, *Cystiphora taraxaci*, 5-URMIA, Kel'sa Kand'i village, *Dasineura teucii* and *Giraudiella inclusa*, 6-URMIA, Shiru Kand'i village, *Dasineura plicatrix*.

## RESULTS AND DISCUSSION

Collecting galled plant materials and keeping them under appropriate laboratory conditions led to the gradual emergence of adult gall midges that were responsible

for causing galls in collected plant species. These gall midges belonged to seven genera and eight species as follow.

### ***Baldratia salicorniae* Kieffer, 1897**

**Distribution:** Along the coasts of Black Sea, Mediterranean Sea, several islands in these seas, southern France, Spain, Portugal, southern parts of England, Italy, former Yugoslavia, Morocco, Algeria, Tunisia, Libya, Egypt, Eritrea and Israel (Skuhravá & Skuhravý, 2021; Dorchin & Freidberg, 2008).

**Material examined:** 2♀, 1♂, host plant: *Salsola dendroides* Pall. (Chenopodiaceae) 3-9.09.2020. Galls on stems were collected in 29<sup>th</sup> August 2020 from Khoy (in front of Khoy airport, next to Khoy-Salmas road. We also obtained 2♀ and 2♂ during 15-21 April 2021 from overwintering galls. Overwintering galls were collected in 15<sup>th</sup> March 2021 from the same area.

**Host plants:** the species induce galls on leaves of *Salicornia fruticosa* (L.), *Salicornia europaea* L. and *Sarcocornia perennis* (Mill.) (Dorchin & Friedbberg, 2008; Gagné & Jaschhof, 2021).

**Remark:** So far, five species of this genus have been reported from Iran (Skuhravá et al, 2014). Of which, the host plant of *Baldratia aelleni* Möhn, 1969 belong to *Suaeda* Forssk. ex J.F. Gmel. genus namely, *S. microphylla* Pall.. *Baldratia aelleni* known only from Iran and described by (Möhn, 1969) based on materials that collected from Tehran province, Central Alborz, vicinity of Simin Dasht village by Manoutcheri & P. Aellen in 4 September 1948.

The *B. salicorniae* and *S. dendroides* association is new.

### ***Cystiphora taraxaci* (Kieffer, 1888)**

**Distribution:** widespread in Europe, Pakistan and introduced to Canada for target weed biological control (Gagné & Jaschhof, 2021).

**Material examined:** 7♀, 5♂; host plant: *Taraxacum officinale* L. (Asteraceae). 18-26. 09. 2021. Galls on lamina were collected in 14<sup>th</sup> September 2021 from Urmia, Urmia University campus.

**Host plants:** All species of *Cystiphora* cause galls on the leaves of tribe Cichorieae (Asteraceae) plants. The orange larvae of *C. taraxaci* cause several flat circular pustule galls on lamina with dark red or purple margin in old blisters on *T. officinale*. Larva are active under a translucent epidermis of blister.

**Remark:** This is second species of *Cystiphora* which recorded from Iran. *Cystiphora sonchi* (Vallot, 1827) has already been reported from Iran/west Azerbaijan province (Karimpour & Skuhravá, 2012).

### ***Dasineura plicatrix* (Loew, 1850)**

**Distribution:** widespread in Europe and North Africa, Türkiye (Gagné & Jaschhof, 2021). North America (Sinclair et al, 2009).

**Material examined:** 3♀, 2♂; host plant: *Rubus caesius* L. (Rosaceae) during the days from 20-26.07.2020 (Fig. 2a,b). The plant materials were collected from vicinity of Shirü Kandī village, (Qasemlū valley) in 17<sup>th</sup> July 2020.

*New Records of Gall Midges (Diptera: Cecidomyiidae) from Iran*

**Host plants:** *Dasineura plicatrix* is an oligophagous gall midge species which recorded from *R. caesius* and other species of *Rubus* L. (Barnes, 1926; Alford, 1984; Darvas, Skuhravá & Andersen, 2000). It has been reported as a minor pest of blackberry (*R. laciniatus* Willd.), loganberry (*R. loganobaccus* L.H. Bailey), and raspberry (*R. idaeus* L.) in northern Europe (Darvas, Skuhravá & Andersen, 2000).



Fig. 2. a) Folded and distorted leaves of European dewberry caused by larvae of *Dasineura plicatrix* and b) larvae of *D. plicatrix* inside the folded leaf of *R. caesius* (scale bar: 1mm, infested stem around 20 cm).

***Dasineura teucrii* (Tavares, 1903)**

**Distribution:** former Czechoslovakia, Belgium, Switzerland, England, France, Germany, Portugal, Italy, Greece, Romania, Spain and former Yugoslavia (Skuhravá & Skuhravý, 2021).

**Material examined:** 3♀, 3♂; host plant: *Teucrium polium* L. (Lamiaceae) during 11-17.07.2020 (Fig. 3a,b). The plant materials were collected from Sir Mountain, near the Sir church, vicinity of Kelisä Kandī village in 8<sup>th</sup> July 2020.

**Host plants:** Gregarious orange larvae (Fig. 3b) cause leaf bud galls on *Teucrium scorodonia* L., *T. lusitanicum* Lam., *T. salviastrum* Schreber, *T. lusitanicum* Schreber, *T. scorodonia* L., and *T. chamaedrys* L. (Lamiaceae)

**Remark:** Eight species of the genus *Dasineura* Rondani, 1840 were reported from Iran (Skuhravá et al, 2014a). By introducing of these two species, their number reaches ten species.

The association between *D. teucrii* - *T. polium* is new.

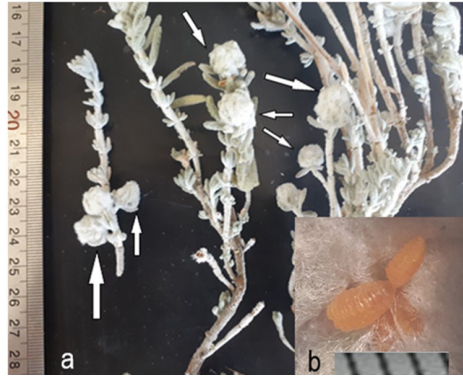


Fig. 3. a) leaf bud galls of *D. teucriti* on *Teucrium pollium* and b) larvae of *D. teucriti* (scale bar: 1mm)

### ***Giraudiella inclusa* (Frauenfeld, 1862)**

**Distribution:** widespread in the Palaearctic region and immigrant in north America, Eastern USA (Skuhrová & Skuhrový, 2021).

**Material examined:** 11♀, 9♂; host plant: grain-like galls in the stems of *Phragmites australis* (Cav.) (Poaceae) (Fig. 4a,b) during the days from 8-19.05.2020. The plant materials were collected from Sir Mountain, near the Sir church, vicinity of Kel'sā Kand' village in 26<sup>th</sup> March 2020.

**Host plant:** *Phragmites australis*.

**Remark:** This is the first record of genus *Giraudiella* from Iran.



Fig. 4. a) The common reed stem infested by *Giraudiella inclusa* and b) the same stem after dissection and grain-like galls in it.

### ***Halodiplosis araratica* Mirumian, 1991**

**Distribution:** Iran/Mazandaran Province, Amol (Delarostagh) (Skuhrová et al, 2014) and Armenia (Mirumian, 2011).

**Material examined:** 5♀, 3♂; host plant: *Salsola dendroides* Pall. (Chenopodiaceae) (Fig. 5a,b). Galls on stems were collected in 10<sup>th</sup> September 2021 from Khoy (in front of Khoy airport, next to Khoy-Salmas road and next to Khoy-Tabriz Road (16<sup>th</sup> km), vicinity of Mahlazan village in 18<sup>th</sup> September 2021.

*New Records of Gall Midges (Diptera: Cecidomyiidae) from Iran*

**Remark:** Two species of gall midges namely *B. salicorniae* and *H. araratica* were associated with *S. dendroides* in west Azerbaijan province.



Fig. 5. a) furlled galls of *H. araratica* on the leaves of *S. dendroides*, b) the larva of *H. araratica* inside the gall (scale bar: 1mm).

### ***Lasioptera flexuosa* (Winnertz, 1853)**

**Distribution:** former Czechoslovakia, Austria, Hungary and Czech Republic (Gagné & Jaschhof, 2021).

**Material examined:** 4♀, 5♂; host plant: stems of *Phragmites australis* (Cav.) (Poaceae) during the days from 23-29.09.2020. The plant materials were collected from Khoy, next to Khoy-Tabriz Road (16<sup>th</sup> km), vicinity of Mahlazan village in 18<sup>th</sup> September 2020.

**Remark:** With report of *G. inclusa* and *L. flexuosa*, in this paper the number of gall midge species that are associated with common reed in Iran (west Azerbaijan province) reaches three species. Because, the species *Asynapta phragmitis* (Giraud, 1863) has already been reported from Iran, west Azerbaijan province, Urmia (Skuhravá et al, 2014).

Till now, two species of *Lasioptera* namely, *L. carophila* Löw, 1874 and *L. umbelliferarum* Kieffer, 1909 were reported from Iran (Skuhravá et al, 2014). By introducing of *L. flexuosa*, their number reaches three species.

### ***Stenodiplosis bromicola* (Marikovskii & Agafonova, 1961)**

**Distribution:** Germany, Poland, Ukraine, Russia (Europe), W Asia; immigrant to Canada (Saskatchewan, Alberta), USA (Oklahoma, Missouri, Wisconsin, Maryland). (Gagné & Jaschhof, 2021).

**Material examined:** 1♀ was obtained from inflorescences of *Setaria glauca* (L.) (Poaceae) in 28.09.2020. The plant materials were collected from Khoy, vicinity of Pirkandi village in 18<sup>th</sup> September 2020, sugar beet field.

**Host plants:** *Bromus inermis* (Poaceae).

**Remark:** This is the first record of genus *Stenodiplosis* from Iran. The *S. bromicola*-*S. glauca* association is new.

## CONCLUSION

Till now, 38 genera and 67 species of gall midges were known from Iran (Skuhrová et al., 2014; Moeinadini, Madjdzadeh, & Skuhrová, 2017; Hadi, Lotfalizadeh, Kazemi, & Skuhrová, 2018). In this study, 2 genera and 7 species of gall midges are reported for the first time from Iran. By introducing these 2 genera and 7 species, the number of known gall midge fauna of Iran reaches 40 genera and 74 species. Of which the highest number - 26 species of gall midges - was recorded in the north-western part of Iran, in West Azerbaijan Province, 12 species in Khorasan Province and 11 species in the northern parts of Iran near the Caspian Sea (in Golestan Province) and the remaining 25 species have been reported from other provinces of Iran. Therefore, more than 38% of the known species of gall midges in Iran are from West Azerbaijan province. Also, the number of known genera of gall midges in West Azerbaijan province reaches 14 genera.

Among the species reported from Iran in this research, only two species namely, *C. taraxaci* and *G. inclusa* have been reported from Pakistan and Iraq (Gagné & Jaschhof, 2021), respectively, but there is no report on the distribution of the remaining species in neighboring countries of Iran.

The finding of gall midges, *B. salicorniae*, *D. plicatrix*, *D. teucrii* and *L. flexuosa* in west Azerbaijan province extends our knowledge on the geographical distribution of these species into the border of Eastern Palaearctic region in Western Asia. With these findings it may be presupposed that researchers will discover in future studies of gall midge fauna will be able to find the species in adjacent countries of Iran.

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*New Records of Gall Midges (Diptera: Cecidomyiidae) from Iran*

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