



ESI

## Contribution to the knowledge of gall-inducing insects from Biskra province, Algeria

Souad Tahar-Chaouche<sup>1\*</sup>, Hadjer Guesmia<sup>1</sup>, Haroun Fadlaoui<sup>1</sup>  
& Imene Tahar-Chaouche<sup>2</sup>

1 Centre for Arid Areas Scientific and Technical Research (CRSTRA), Biskra, Algeria. [souadhouda@gmail.com](mailto:souadhouda@gmail.com)

2 Laboratory of Natural Hazards and Spatial Planning LRNAT, University of Mustapha Benboulaïd, Batna 2, Algeria. [imentaharchaouche@hotmail.com](mailto:imentaharchaouche@hotmail.com)

**ABSTRACT.** On the basis of the sampling surveys in Biskra province during 2012 and 2019, fourteen distinct types of galls induced by insects were found on various host plants. They were belonging to three insect orders, four families and twelve genera. Most of the galls were induced by eight species of gall midges (Diptera: Cecidomyiidae), recently recorded from Biskra province, of which two species *Houardiella salicornia* Kieffer, 1912 and *Gephyraululus moricandiae* Sylven & Solinas, 1989 are first recorded from Algeria. The only known gall-inducing psyllid species *Rhodochlanis salsolae* (Lethierry, 1874) from Biskra (Algeria) as well as three gall-inducing aphid species associated with *Pistacia atlantica* were detected for the first time in Biskra province. These phytophagous species are associated with ten host plant species of which, the family Chenopodiaceae have the highest number of gall insects. Majority of the gallers are of Mediterranean origin, considered as economically indifferent species.

**Key words:** Gall-inducing, psyllid, Cecidomyiidae, Biskra, Algeria

**Received:**  
10 September, 2020

**Accepted:**  
05 August, 2021

**Published:**  
14 August, 2021

**Subject Editor:**  
Ehsan Rakhshani

**Citation:** Tahar-Chaouche, S., Guesmia, H., Fadlaoui, H. & Tahar-Chaouche, I. (2021) Contribution to the knowledge of gall-inducing insects from Biskra province, Algeria. *Journal of Insect Biodiversity and Systematics*, 7 (3), 337–350.

### Introduction

Galls (Latin *cecidia*) are structure that form as result of deviation in normal plant growth in response to insects and mites (Byers et al., 1976). Various parts of the host plants can be transformed into the gall such as roots, stems, leaves, buds, flowers and fruits (Mapes, 2008). With different characteristic gall structure, high degree of specificity to the site of gall formation (Hodkinson, 1984) and complex morphology; gall inducing insects represent one of the most fascinating entomological topics (Cerasa et al., 2014). Among insects, midge species are the common gallers and represented an important source of information on the interaction between herbivore and plant (Moeinadini et al., 2017). In Algeria, the most important contributions on this subject have been conducted by several researchers (Marchal, 1897; Kieffer, 1898, 1913; Houard, 1908, 1909, 1922, 1923; Bequaert, 1914; Skuhrava, 1986; Skuhrava & Skuhravy, 1994). No survey was done on the galling insects of Algeria, in the recent years. Several Cynipidae and aphid species were mentioned by spiradical papers (Chakali et al., 2002; Benia et al., 2010; Laamari et al., 2010; Pujade-Villar et

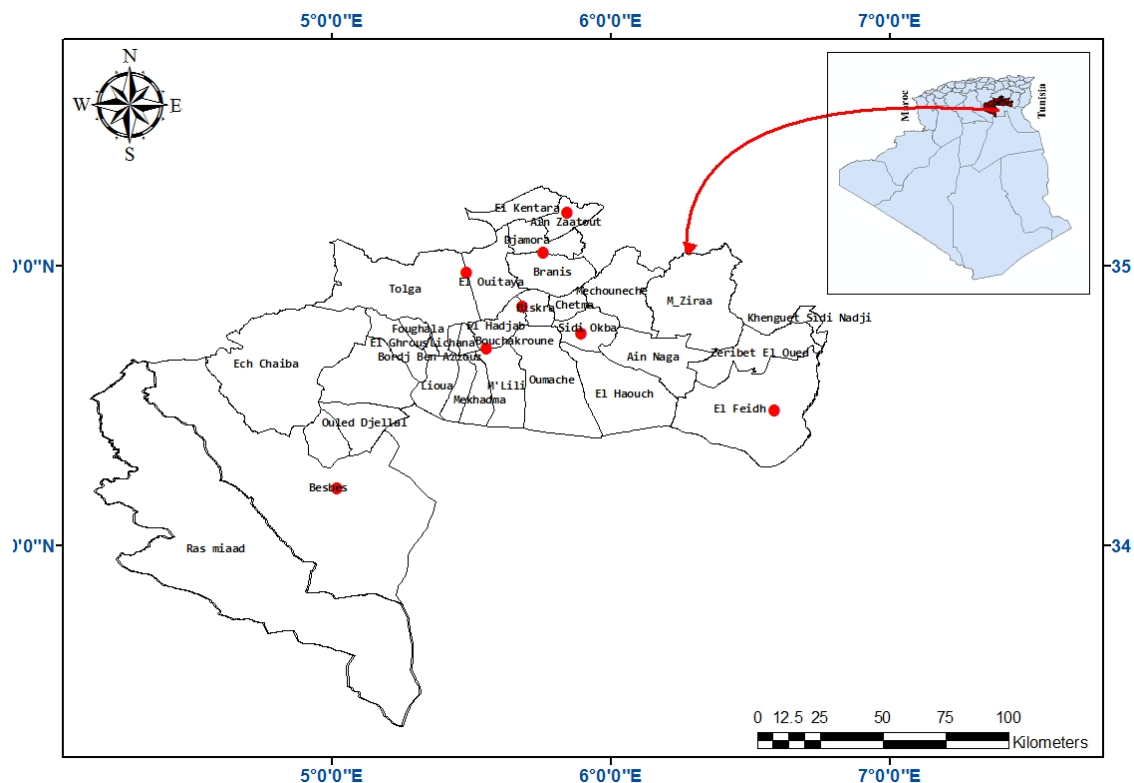
Corresponding author: Souad Tahar-Chaouche, E-mail: [souadhouda@gmail.com](mailto:souadhouda@gmail.com)

**Copyright** © 2021, Tahar-Chaouche et al. This is an open access article distributed under the terms of the Creative Commons NonCommercial Attribution License (CC BY NC 4.0), which permits Share - copy and redistribute the material in any medium or format, and Adapt - remix, transform, and build upon the material, under the Attribution-NonCommercial terms.

al. 2012; Pérez Hidalgo et al., 2012; Cerasa et al., 2014; Boukreris et al., 2015; Tiberi et al., 2016; Ghanema et al., 2016). Despite its specific botanic diversity, no study is devoted on the knowledge of galling-insects in Biskra province. This contribution is an attempt to establish basic information on galling species and their host plants in this province.

### Material and methods

Located in South Eastern part of Algeria, Biskra province covers a large area of over 21, 671 km<sup>2</sup>. This area is characterized by an arid climate with hot summers and temperate winters. The total annual rainfall is 156 mm and the average temperature is 22.8°C. This survey was conducted in eight sites. They were chosen arbitrarily to cover the maximum of territory variability (Fig. 1). This study was based on samples of galls collected from 2012 to 2019. Sampling effort was accomplished by the authors on plant parts bearing galls. Host plants were pressed and preserved as voucher species of host records. Photographs of the galls were taken both *in situ* and from the herbrized material. Gall samples were reared in the laboratory conditions inside mesh covered semi-transparent plastic boxes until all live insects emerged. Insects were preserved in 70% alcohol for identification at later date. Identification of all galls is based on the keys of Houard (1908, 1909, 1922, 1923), the only significant resource of information about galls in Algeria and on others including Blackman & Eastop (2006), Sanchez (2016) and Moeinadini et al. (2017). Nomenclature of gall midge species follows Gagné & Jaschhof (2017). Specimens and galls were deposited in the collection of Systematic and Biodiversity laboratory of Scientific and Technical Research Centre for Arid Areas CRSTRA, Biskra, (Algeria). The majority of gall midge species in the collection of Marcela Skuhřavá (Prague, Czech Republic), since the time they were sent by authors in 2016 and 2019 for identification.



**Figure 1.** Map of the sampling localities in Biskra province, South-East of Algeria.

## Results

Fourteen species of gall-inducing insects were found in Biskra province during investigation in years 2012–2019. The largest group of gall inducing is represented by gall midges (Cecidomyiidae) with eight species; they were not previously registered in Biskra. The species; *Houardiella salicornia* Kieffer, 1912 and *Gephyraulius moricandiae* Sylven & Solinas, 1989 were recorded for the first time from Algeria. *Rhopalomyia navasi* Tavares, 1904, causing galls on *Artemisia herba alba*, usually known to occur in north - western of Algeria, was recorded for the first time in the Biskra province.

### Order: Diptera

#### Family Cecidomyiidae Newman, 1834

##### *Asphondylia punica* Marchal, 1897

**Material examined:** 30♀♀, 6♂♂, ALGREIA: Biskra province, El-Outaya, 34°57'391" N, 05°30'289" E, 192.5 m a.s.l., reared from galls in apical and axillary buds of *Atriplex halimus* (Chenopodiaceae), 14 February 2017, S. Tahar-Chaouche, leg.

**General characters:** These hypertrophied tissues known as rosettes galls are composed of small unilocular gall set with small and dense leaves (Fig. 2). The fresh galls with green color and they became yellowish after emergence of adult. Each gall includes many chambers. Occurrence: very common.

**Remarks:** In Algeria, Houard (1902) is the first who described *Asphondylia punica* galls on *Atriplex halimus* collected in Oran province situated in western region and the similar galls were found in Biskra province.

**Distribution:** Widespread in Mediterranean region: Greece, Algeria, Tunisia, Libya (Houard, 1902; Dorchin et al., 2014; Gagné & Jaschhof, 2017). First record for Biskra.



**Figure 2.** Rosette bud galls of *Asphondylia punica* Marchal, 1897 (Dipt. Cecidomyiidae) on buds of *Atriplex halimus*. Algeria: Biskra province; El-Outaya, at an altitude of 192.5 meters above sea levels.

***Contarinia nasturtii* (Kieffer, 1888)**

**Material examined:** 20 Larvae, ALGERIA: Biskra province; El Faidh, 34°30'03.05" N, 06°31'24.19" E, -13 m a.s.l., reared from galls on flower buds of *Diplotaxis harra* (Brassicaceae), 21 May 2019, S. Tahar-Chaouche, leg.

**General Characters:** The larvae are gregarious with lemon yellow color. This species has several generations per year. At the time of sampling, most galls were empty (Fig. 3). Occurrence: scarce

**Remarks:** In Algeria, *Contarinia nasturtii* galls were reared in Oran region by (Houard, 1902, 1908, 1909) and in Algiers (Houard, 1922, 1923). First record for Biskra.

**Distribution:** Widespread in Europe, Asia, immigrant to Canada and USA (Gagné & Jaschhof, 2017).

***Gephyraulius moricandiae* Sylven & Solinas, 1989**

**Material examined:** Larvae, ALGERIA: Biskra province; El-Outaya, 34°57'39.1" N, 05°30'28.9" E, 192, 5 m a.s.l, reared from galls on flower buds of *Moricandia arvensis* (Brassicaceae), 30 April 2017, S. Tahar-Chaouche, leg.

**General Characters:** The larvae of *Gephyraulius moricandiae* Sylven & Solinas, 1989 are white and gregarious, they cause galls on the flower buds of *Moricandia arvensis* (Brassicaceae) (Fig. 4). Occurrence: very common.

**Distribution:** Tunisia (Gagné & Jaschhof, 2017), Spain (Sanchez, 2016). Algeria (New record).

***Houardiella salicorniae* Kieffer, 1912**

**Material examined:** Larvae, ALGERIA: Biskra province; Ourelal, 34°42'006" N, 05°33'502" E, 65 m a.s.l., reared from galls on stems of *Arthrocnemum glaucum* (Chenopodiaceae), 21 February 2019, H. Guesmia, leg.

**General Characters:** The Larvae cause conspicuous and fusiform galls by thickening of several internodes (Fig. 5). The galls measure 15-20 mm of longer and 7-8 mm of transverse diameter. Occurrence: very common.

**Distribution:** Mediterranean region. Tunisia, Libya and Sicily (Skuhrová et al., 2007). Algeria (New record).

***Rhopalomyia navasi* Tavares, 1904**

**Material examined:** 2♀♀, ALGERIA: Biskra province; Ain Zaatout, 2♀♀, 11 June 2019, 35°11'171" N, 05°50'106" E, 1282 m a.s.l., reared from galls on stem sides of *Artemisia herba alba* (Asteraceae)., 11 June 2019, S. Tahar-Chaouche, leg.

**General Characters:** the Larvae cause woolen fibers galls with 8–10 mm in diameter (Fig. 6). Several chambers occur inside each gall. Occurrence: common.

**Distribution:** Euro-Asian and Mediterranean. Spain, Romania and Egypt (Gagné & Jaschhof, 2017). In Algeria, it detected in Oran and Ain-Sefra regions (Houard, 1912). Recent records of this species in two provinces (Saida and Sidi Bel Abbes) (Tahar-chaouche & Salemkour, 2016). First record for Biskra.



**Figure 3.** Galls on flower buds of *Contarinia nasturtii* (Kieffer, 1888) (Dipt. Cecidomyiidae) on *Diplotaxis harra*. Algeria: Biskra province; El Faidh, at an altitude of - 13.5 meters above sea levels.



**Figure 4.** Galls on flower buds of *Gephyraulus moricandiae* Sylven & Solinas, 1989 (Dipt. Cecidomyiidae) on *Moricandia arvensis*. Algeria: Biskra province; El-Outaya, at an altitude of 192.5 meters above sea levels. Arrow head indicating the larvae.



**Figure 5.** Fusiform galls of *Houardiella salicorniae* Kieffer, 1912 (Dipt. Cecidomyiidae) on *Arthrocnemum glaucum*. Algeria: Biskra, Ourelal, at an altitude of 65 meters above sea levels. Arrow head indicating the larvae.



**Figure 6.** Woolen fibers galls of *Rhopalomyia navasi* Tavares, 1904 (Dipt. Cecidomyiidae) on *Artemisia herba-alba*. Algeria: Biskra province; Ain Zaatout, at an altitude of 1282 meters above sea level.

#### *Stefaniella atriplicis* Kieffer, 1898

**Material examined:** Larvae, ALGERIA: Biskra, El-Outaya, 34°57'391" N, 05°30'289" E, 192.5 m a.s.l., reared from stem of *Atriplex halimus* (Chenopodiaceae), 14 February 2017, S. Tahar-Chaouche, leg.

**General Characters:** Larvae cause swelling gall (Fig. 7). Each gall includes many chambers. At sampling, most reared galls were empty. Occurrence: very scarce.

**Distribution:** Italy, former Czechoslovakia, Greece, Russia, former Yugoslavia (Gagné & Jaschhof, 2017). In Algeria it found in Oran region by (Houard, 1902). First record for Biskra.

#### *Stefaniella trinacriae* Stefani, 1900

**Material examined:** Larvae, ALGERIA, Biskra province, El-Outaya, 34°57'391" N, 05°30'289" E, 192, 5 m a.s.l., reared from galls on stem of *Atriplex halimus* (Chenopodiaceae), 14 February 2017, S. Tahar-Chaouche, leg.

**General Characters:** Larvae cause fusiform woody galls (Fig. 8) with green or red color and nearly 20 mm of size. In each enclosed gall, we found one yellow-whitish larvae develop. Occurrence: scarce.

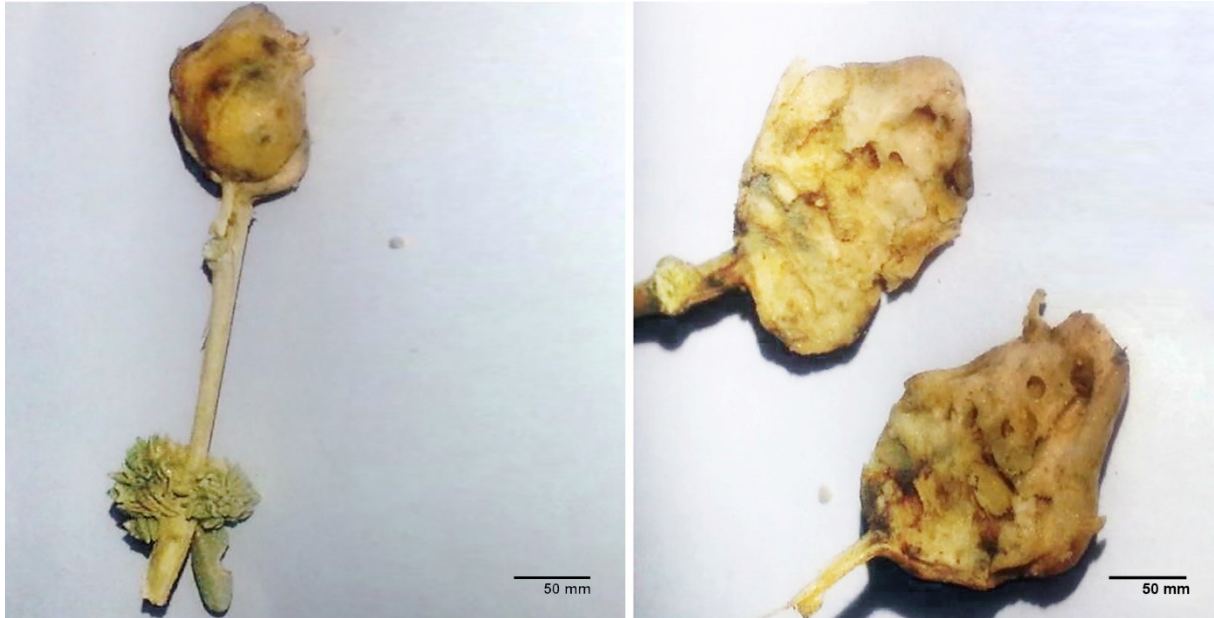
**Distribution:** Mediterranean (Italy - Sicily), Spain, Algeria and Tunisia) (Skuhravá & Skuhravý, 1994). In Algeria, it found in Oran region by Houard (1902). First record for Biskra.

#### *Stefaniella salsolae* Tavares, 1904

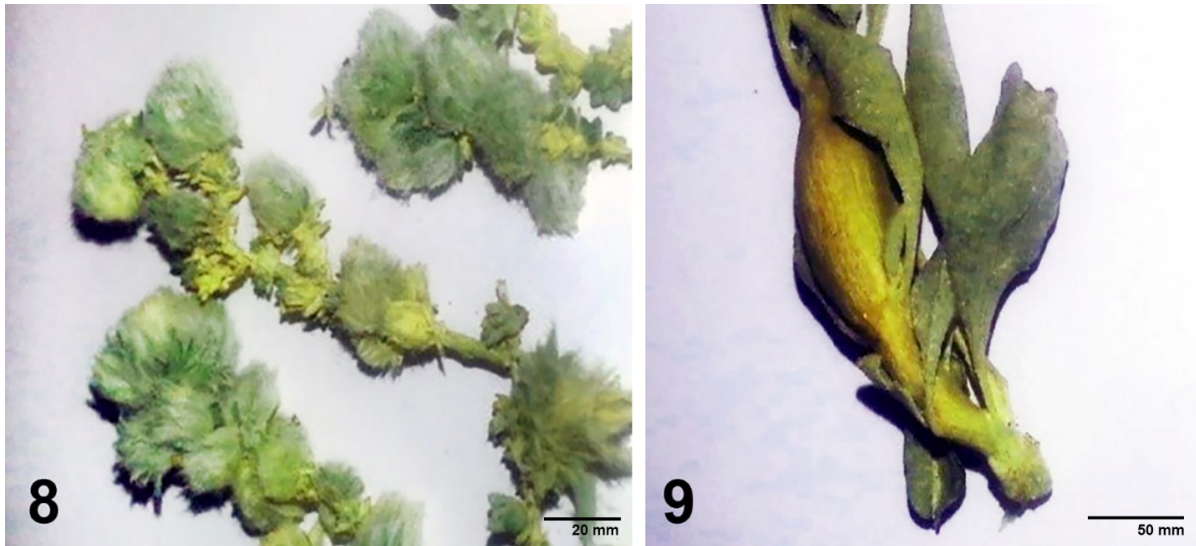
**Material examined:** 26♀♀, ALGERIA: Biskra province; El-Outaya, 34°57'391" N, 05°30'289" E, 192.5 m a.s.l., reared from stem galls on *Salsola vermiculata* (Chenopodiaceae), 14 February 2017, S. Tahar-Chaouche, leg.

**General Characters:** Larvae changed buds into a fleshy rosette gall of 15-18 mm, covered with long whitish hairs (Fig. 9). Occurrence: very common.

**Distribution:** Mediterranean. Spain, Portugal (Gagné & Jaschhof, 2017). In Algeria, it found in Oran region by Houard (1912). First record for Biskra.



**Figure 7.** Swelling gall of *Stefaniella atriplicis* Kieffer, 1898 (Dipt. Cecidomyiidae) on *Atriplex halimus*. Algeria: Biskra province; El-Outaya, at an altitude of 192.5 meters above sea levels.



**Figures 8-9.** Galls by the cecidomyiids on Chenopodiaceae host plants. **8.** Fleshy rosette gall of *Stefaniella salsolae* Tavares, 1904 on *Salsola vermiculata*. **9.** Fusiform woody gall of *Stefaniella trinacriae* Stefani, 1900 on *Atriplex halimus*; Algeria: Biskra province; El-Outaya, at an altitude of 192.5 meters above sea levels.

**Order:** Hemiptera

**Superfamily:** Psylloidea Handirsch, 1903

**Family:** Aphalaridae Löw, 1879

*Rhodochlanis salsolae* (Lethierry, 1874)

**Material examined:** Larvae, ALGERIA: Biskra province; Biskra city, 23 April 2019, 34°51'015" N, 05°41'280" E, 107 m a.s.l., reared from galls on young shoots of *Haloxylon salicornicum* (Amaranthaceae), 23 April 2019, H. Guesmia, leg.

**General Characters:** Larvae induce galls on young shoots of *Haloxylon salicornicum* and transformed them into big scales, concave in spoon. These scales envelop the between-nodes greatly hypertrophied (Fig. 10). Occurrence: common.

**Remarks:** The materials of this galls found in Biskra and described by Houard (1908, 1909).

**Distribution:** Algeria, Morocco, Tunisia, Madeira and Afghanistan (Ouvrard, 2019).

**Family:** Aphididae Latreille, 1802

**Subfamily:** Eriosomatinae Kirkaldy, 1905

*Forda riccobonii* (De Stefani, 1899)

**Material examined:** Colonies, ALGERIA: Biskra province; Besbes, 34°11'579" N, 05°01'957" E, 297 m a.s.l., reared on leaves of *Pistacia atlantica* (Anacardiaceae), 16 July 2017, S. Tahar-Chaouche, leg.

**General Characters:** Fundatrigeniae of this specie induce on *Pistacia atlantica* leaf - edge galls (Fig. 11). Occurrence: common.

**Distribution:** Mediterranean and South-western of Asia regions (Blackman & Eastop, 2006). Known from Algeria (Houard, 1922, 1923; Blackman & Eastop, 2000; Laamari et al., 2010). First record for Biskra.



**Figure 10.** Galls and nymph of *Rhodochlanis salsolae* (Lethierry, 1874) (Hemi., Aphalaridae) on *Haloxylon salicornicum*. Algeria: Biskra province; Biskra city, at an altitude of 107 meters above sea levels.





**Figures 11–13.** Various leaf galls on *Pistacia* by the aphids. **11.** Leaf - edge galls of *Forda riccobonii* (De Stefani, 1899) on *Pistacia atlantica*; **12.** Spherical galls of *Geoica* sp. on *Pistacia atlantica*. **13.** Spindle-shaped galls of *Smynthuroides betae* Westwood 1849 on *Pistacia atlantica*. Algeria: Biskra province; Besbes, at an altitude of 297 meters above sea levels.

#### *Geoica* sp.

**Material examined:** ALGERIA: Biskra province; Besbes, 34°11'579"N, 05°01'957"E, 297 m a.s.l., reared on leaves of *Pistacia atlantica* (Anacardiaceae), 16 July 2017, S. Tahar-Chaouche, leg.

**General Characters:** This species induces spherical galls on the abaxial side of leaflets (Fig. 12) (Nogal, 2011). At the time of sampling, most opening galls were empty.

**Distribution:** Throughout Europe, North Africa (Morocco), Middle East, Central Asia, North America and China (Blackman & Eastop, 2006). In Algeria, Louzabi et al. (2020) found the species *Geoica mimeuri* (Gaumont 1930) on *Pistacia atlantica* in Djelfa province. First record for Biskra.

#### *Smynthuroides betae* Westwood 1849

**Material examined:** Colonies, ALGERIA: Biskra province; Besbes, 34°11'579" N, 05°01'957" E, 297m a.s.l., reared on leaves of *Pistacia atlantica* (Anacardiaceae), 16 July 2017, S. Tahar-Chaouche, leg.

**General Characters:** This species produces galls on *Pistacia atlantica* which are yellow-green or red, spindle-shaped, and formed by rolling of the edge of the leaflet near its base (Fig. 13). Occurrence: Scarce.

**Distribution:** Mediterranean origin (Blackman & Eastop, 2000), Algeria (Blackman & Eastop, 2000; Laamari et al., 2010). First record for Biskra.

#### Order: Lepidoptera

##### Family: Gelechiidae Stainton, 1854

##### *Amblypalpis olivierella* Ragonot 1886

**Material examined:** ALGERIA: Biskra province; El Faidh, 34°30'030.5" N, 06°31'241.9" E, -13 m a.s.l., reared on the branches of *Tamarix gallica* (Tamaricaceae), 21 May 2019, H. Fadlaoui, leg.



**Figure 14.** Fusiform galls of *Amblypalpis olivierella* Ragonot 1886 (Lep. Gelechiidae) on *Tamarix gallica*. Algeria: Biskra province; El Faidh, at an altitude of -13.5 meters above sea levels.

**General Characters:** Upon the branches of *Tamarix* trees, larvae penetrate its center and feed upon pith. The tunnel grows in size. The fusiform galls measure about 20-30mm in length and 7-10 in width (Fig. 14). Occurrence: very common.

**Distribution:** North Africa (Houard, 1922, 1923), Iran and India (Lupo & Gerling, 1984). First record for Biskra.

#### *Oecocercis guyonianum* Guenée, 1870

**Material examined:** 2♀♀, ALGERIA: Biskra province; Guadila, 5 May 2012, 35°03'018" N, 05°45'35" E, 390.4 m a.s.l., reared on flower steams of *Limoniastrum guyonianum* (Plumbaginaceae), 5 May 2012, H. Fadlaoui, leg.

**General Characters:** Larvae induce ovoid galls on flower steams of *Limoniastrum guyonianum*. Found for the first time in Biskra province and described by (Guenée, 1869 in Coutin, 1995) (Fig. 15). Occurrence: very common.

**Distribution:** Mauritania, Cyprus, Syria, Tunisia (Houard, 1912).

#### Discussion

In Algeria, little attention has given to knowledge the diversity of gall inducing fauna so the current knowledge about species richness is mainly based on various oldest collections. Fourteen species of gall-inducing insects belonging to diverse orders are associated with different plant families were found. According to available information cited in the literature, the species *Rhodochlanis salsolae* and *Oecocercis guyonianum* were previously recorded in Biskra province, respectively (Houard, 1908; Coutin, 1995).



**Figure 15.** Ovoid galls, *Oecocecis guyonianum* Guenée, 1870 (Lep. Gelechiidae) on *Limoniastrum guyonianum*. Algeria: Biskra province; Guadila at an altitude of 390.4 meters above sea levels.

Several gall inducing insects such as *Amblypalpis olivierella* Ragonot 1886, *Forda riccobonii* (De Stefani, 1899), *Geoica* sp., *Smynthuroides betae* Westwood 1849, *Rhopalomyia navasi* Tavares, 1904, *Contarinia nasturtii* (Kieffer, 1888), *Stefaniella salicorbiae* Tavares, 1904, *Stefaniella trinacrianae* Stefani, 1900, *Stefaniella atriplicis* Kieffer, 1898 and *Asphondylia punica* Marchal, 1897 were known in Algeria, but two gall midge species *Houardiella salicorniae* Kieffer, 1912 and *Gephyraulus moricandiae* Sylven & Solinas 1989 are newly detected in Algeria. The galls induced by *Houardiella salicorniae* Kieffer, 1912 are rarely collected comparing to *Gephyraulus moricandiae* Sylven & Solinas, 1989.

Dipterous gall makers represented by Cecidomyiidae family were the richest order with eight species followed by Hemiptera order with four species. *Stefaniella* (Diptera: Cecidomyiidae) is the most species rich genus, representing by three species associating with ten host plant species. Among the host plants of cecidomyiids, Chenopodiaceae family (three plant species) hosting the highest number of gall insect, followed by Brassicaceae (two plant species). Other plant families such as Asteraceae, Amaranthaceae, Plubaginaceae and Tamaricaceae have been subjected to attack of only one species of gall-forming insect. Two host plant species *Atriplex halimus* (Chenopodiaceae) and *Pistacia atlantica* (Anacardiaceae) had more to one type of galls caused by several species. The majority of host plant species are shrubs and plant parts attacked were different and galls were found on stems, shoots, flower buds and leaves. Most gallers are Mediterranean origin and regarded as economically indifferent species. The taxonomical knowledge of the Algerian species of inducing-gall insects is still insufficient; therefore, there is a lot of potential for further discoveries in Biskra and Algeria.

### Acknowledgments

We would like to thank Dr. Marcella Skuhrava (Czech Republic) for invaluable help and time in identification of gall midge samples and encouragement, and we are grateful to all people for help with collect the samples. "This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors".

### Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

### ORCID

Souad Tahar-Chaouche: <https://orcid.org/0000-0001-8223-7826>

Hadjer Guesmia: <https://orcid.org/0000-0002-9164-2572>

Haroun Fadlaoui: <https://orcid.org/0000-0002-5867-2198>

Imene Tahar-Chaouche: <https://orcid.org/0000-0002-0654-0839>

### References

- Benia, F., Khelil, M.A. & Pujade-Villar, J. (2010) Espèces de *Plagiotrochus* Mayr, 1881 collectées en Algérie (Hymenoptera: Cynipidae). *Nouvelle revue d'Entomologie*, (N.S.), 26 (3), 195–198.
- Bequaert, J.C.H.C. (1914) Sur quelques cécidies observées en Algérie. *Revue Zoologique d'Afrique, Bruxelles* 3, 245–259.
- Blackman, R.L. & Eastop, V.F. (2000) *Aphids on the World's Crops – An identification and information guide*. Ltd John Wiley & Son Ed. The Natural History Museum, London. 466 pp.
- Blackman, R.L. & Eastop, V.F. (2006) *Aphids on the World's Herbaceous Plants and Shrubs*. Volume 2: The Aphids. John Wiley & Son, Chichester, UK. 1439 pp.
- Boukreris, F., Bouhraoua, R.T. & Pujade-Villar J. (2015) Gestion des Subéraies et la Qualité du liège. (eds.) Les actes du Med Suber 1: 1ère Rencontre Méditerranéenne Chercheurs-Gestionnaires-Industriels sur la Gestion des Subéraies et la Qualité du liège, 2009, de 19 au 20 octobre, Tlemcen, Algérie. Université de Tlemcen, pp. 160–167.
- Byers, J.A., Brewer, J.W. & Denna, D.W. (1976) Plant growth hormones in pinyon insect galls. *Marcellia*, 39, 125–134.
- Cerasa, G., Lo Verde, G. et Massa, B. (2014) New records of gall-inducer and inquiline insects in a few Mediterranean countries, with biological notes. *Entomological Research Society*, 16 (1), 1–14.
- Chakali, G., Attal-Bedreddine, A. & Ouzani, H. (2002) Les insectes ravageurs des chênes, *Quercus suber* et *Q. ilex*, en Algérie. *IOBC/WPRS Bulletin*, 25, 93–100.
- Coutin, R. (1995) A propos d'une curieuse galle de tige de *Limoniastrum* provoquée par la chenille d'une teigne (Lepidoptera, Tinaeidae). *Insectes*, 97 (2), 11.  
[https://doi.org/10.1007/978-1-4020-6359-6\\_1022](https://doi.org/10.1007/978-1-4020-6359-6_1022)
- Dorchin, N., Mifsud, D. & Askew, R. (2014) Saltbush-associated *Asphondylia* species (Diptera: Cecidomyiidae) in the Mediterranean Basin and their chalcidoid parasitoids (Hymenoptera: Chalcidoidea). *Zootaxa*, 4, 383–396. <https://doi.org/10.11646/zootaxa.3869.4.3>
- Fedotova, Z.A. (2003) new species from new genera of gall midges (Diptera, Cecidomyiidae) from the Russian Far East. *International Journal Dipterological Research*, 14 (1), 43–72.
- Gagnè, R.J. & Jaschhof, M. (2017) *A Catalog of the Cecidomyiidae (Diptera) of the World*. (4th Edition). Digital version. 762 pp.
- Ghanema, R., Adjamia, Y., Daasa, H., Ouakida, M.L. & Pujade-Villar, J. (2016) Inventaire des galles de chêne-liège (*Quercus suber*) et chêne zeen (*Quercus faginea*) dans les forêts de l'Est Algérien. *Turkish Journal of Forestry*, 17, 7–10. <https://doi.org/10.18182/tjf.05811>
- Guenée, A. (1870) Notice sur l'Oecocecis guyonella, Gn., et sur la Galle qu'elle produit. *Annales de la Société Entomologique de France*, 10 (4), 5–16.
- Hodkinson, I.D. (1984) The biology and ecology of the gall-forming Psylloidea (Homoptera). In: Ananthakrishnan (ed.) *Biology of Gall Insect*. New Delhi, India, pp. 59–77.
- Houard, C. (1902) Note sur trois zoocécidies d'Algérie. *Marsellia*, 1, 89–91.
- Houard, C. (1908–1909) *Les Zoocécidies des Plantes d'Europe et du Bassin de la Méditerranée*. Vols 1+2. Paris : A. Hermann et Fils, 1247pp., 1365 figs.

- Houard, C. (1912) Les Zoocécidies du Nord de l'Afrique. *Annales de la Société Entomologique de France*, 81, 1-236.
- Houard, C. (1922-1923) *Les Zoocécidies des Plantes d'Afrique, d'Asie et d'Océanie*. Vols 1+2. Paris : J. Hermann, 1056 pp., 1909 figs.
- Kieffer, J.J. (1898) Synopse des Cécidomyies d'Europe et d'Algérie décrites jusqu'à ce jour. *Bulletin de la Société d'Histoire Naturelle de Metz*, 8, 1-64.
- Kieffer, J.J. (1913) Deux nouvelles Cécidomyies d'Algérie. *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord*, 5, 90-92.
- Laamari, M., Jousselin, E. & Cœur d'Acier, A. (2010) Assessment of aphid Diversity (Hemiptera: Aphididae) in Algeria: fourteen-year investigation. *Faunistic Entomology*, 62 (2), 73-87.
- Louzabi, S., Belhadj, S., Merbah, K.Z.A. & Bouragba Brague, N. (2020) Nouvelle observation de *Geoica mimeuri* (Gaumont, 1930) et description de *Forda riccobonii* (Stefani 1899) sur *Pistacia atlantica* Desf. en Algérie. *Faunistic Entomology*, 73, 145-157.
- Lupo, A. & Gerling, D. (1984) Bionomics of the *Tamarix* Spindle - gall moth *Amblypalpis olivierella* Rag. (Lepidoptera Gelechiidae) and its natural enemies. *Bollettino del Laboratorio di Entomologica Agraria 'Filippo Silvestri'*, 41, 71-90.
- Mapes, C.C. (2008) Gall Formation. In: Encyclopedia of Entomology, (Capinera J.L. Eds) Springer, Dordrecht, Netherlands, pp. 1576-1580.
- Marchal, P. (1897) Notes d'entomologie biologique sur une excursion en Algérie et en Tunisie. *Mémoires de la Société Zoologique de France*, 10, 5-25.
- Moeinadini, A., Madjdzadeh, S.M. & Skuhrová, M. (2017) First record of two species of gall midges (Diptera: Cecidomyiidae) from Iran. *Insect Biodiversity and Systematic*, 03 (4), 309-318.
- Nogal, A. (2011) Initial stages in the formation of galls induced by *Geoica utricularia* in *Pistacia terebinthus* leaflets: origin of the two vascular bundles which characterize the wall of the galls. *American Journal of Plant Sciences*, 2, 175-179. <https://doi.org/10.4236/ajps.2011.22019>
- Ouvrard, D. (2019) Dataset: Psyllist. In: The World Psylloidea Database. Natural History Museum Data Portal. <http://www.hemiptera-databases.com/psyllist> [Accessed 10th May 2019].
- Pérez Hidalgo, N., Bouhraoua, R.T., Boukreris, F., Benia, F., Khelil, M. A. & Pujade-Villar, J. (2012) New aphid records (Hemiptera: Aphididae) from Algeria and the Northern Africa. *Redia*, 95, 31-34.
- Pujade-Villar, J., Mata-Casanova, N., Ben-Jamâa, M.L., Grami, M., Ouakid, M., Adjami, Y., Ghanem, R., Bouhraoua, R., Boukreris, F., Benia, F., Messaoudene, M. & Haddar, L. (2012) Les cynipidés gallicoles des chênes d'Afrique du Nord: espèces curieuses et espèces potentiellement dangereuses (Hymenoptera: Cynipidae). *IOBC/WPRS Bulletin*, 76, 225-232.
- Sanchez, I. (2016) New data on gall midges (Diptera: Cecidomyiidae) of the Cadiz province (Southern Spain). *Sociedad Gaditana de Historia Natural*, 10, 43-52.
- Skuhrová, M. (1986) Family: Cecidomyiidae. In: Soós, Á. & Papp, L. (eds), *Catalogue of Palaearctic Diptera*, Vol. 4. Budapest, Akadémiai Kiadó and Elsevier, Amsterdam, Hungarian Academy of Sciences, pp. 72-297.
- Skuhrová, M. & Skuhrový, V. (1994) Gall Midges (Diptera: Cecidomyiidae) of Italy. *Entomologica*, 28, 45-76.
- Skuhrová, M., Skuhrový, V. & Massa, B. (2007) Gall Midges (Diptera: Cecidomyiidae) of Sicily. *IL Naturalista Siciliano*, 31 (3-4), 261-309.
- Sylvén, E. and Solinas, M. (1989) Structural and systematic review of *Gephyraulus* Rübsaamen (Diptera, Cecidomyiidae, Oligotrophini) with description of *G. moricandiae* sp. n. from Tunisia. *Entomologica*, 22, 15-34.
- Tahar-Chaouche, S. & Salemkour, N. (2016) First resurgence of *Rhopalomia navasi*, gall midge (Dip: Cecidomyiidae) on *Artemisia herba alba* in Algeria. *Journal Algeriendes Régions Arides (JARA)*, 3, 81-85.
- Tiberi, R., Branco, M., Bracalini, M., Croci, F. & Panzavolta, T. (2016) Cork oak pests: a review of insect damage and management. *Annals of Forest Science*, 73, 219-23. <https://doi.org/10.1007/s13595-015-0534-1>

## مطالعه حشرات گالزای استان بسکره، الجزایر

سعاد طاهر شاولس<sup>۱\*</sup>، هاجر قاسیمه<sup>۱</sup>، هارون فضلاوی<sup>۱</sup> و ایمان طاهر شاولس<sup>۲</sup>

۱ مرکز تحقیقات علمی و فنی مناطق خشک، بسکره، الجزایر.

۲ آزمایشگاه خطرات طبیعی و برنامه‌ریزی فضایی LRNAT، دانشگاه مصطفی بن بولعید، باتنه، الجزایر.

\* پست الکترونیکی نویسنده مسئول مکاتبه: [souadhouda@gmail.com](mailto:souadhouda@gmail.com)

| تاریخ دریافت: ۲۰ شهریور ۱۳۹۹ | تاریخ پذیرش: ۱۴ مرداد ۱۴۰۰ | تاریخ انتشار: ۲۳ مرداد ۱۴۰۰ |

**چکیده:** براساس نمونه‌برداری در استان بسکره طی سال‌های ۲۰۱۲ تا ۲۰۱۹، چهارده نوع گال ایجاد شده توسط حشرات در گیاهان میزبان مختلف یافت شد. این گال‌ها متعلق به سه راسته، چهار خانواده و ۱۲ جنس از حشرات مختلف بود. اکثر گال‌ها توسط پشه‌های گالزا (Diptera: Cecidomyiidae) که اخیراً از استان بسکره گزارش شده‌اند، ایجاد شده بود. دو گونه *Houardiella salicornia* Kieffer, 1912 و *Gephyraulus moricandiae* Sylven & Solinas, 1989 برای اولین بار از الجزایر گزارش می‌شود. تنها گونه پسیل گالزا (*Rhodochlanis salsolae* (Lethierry, 1874) از استان بسکره (الجزایر) و همچنین سه گونه شته مرتبط با *Pistacia atlantica* برای اولین بار از استان بیسکره شناسایی شد. این گونه‌های گیاهخوار با ده گونه گیاهی میزبان در ارتباط هستند که خانواده Chenopodiaceae دارای بیشترین تعداد حشرات گالزا بود. اغلب حشرات گالزا منشا مدیترانه‌ای دارند و از نظر اقتصادی بی‌اهمیت هستند.

**واژگان کلیدی:** گالزا، پسیل، پشه‌های گالزا، بسکره، الجزایر