

New data on aphid fauna (Hemiptera, Aphididae) in Algeria

Malik Laamari¹, Armelle Coeur d'Acier², Emmanuelle Jousset²

1 LATPPAM Laboratory, Department of Agronomy, Institute of Agronomic and Veterinary Sciences, University of Batna, Algeria **2** INRA, UMR CBGP (INRA/IRD/Cirad/Montpellier SupAgro), Campus International

Corresponding author: *Malik Laamari* (laamarimalik@yahoo.fr)

Academic editor: *E. Tashva* | Received 16 November 2012 | Accepted 4 April 2013 | Published 30 July 2013

Citation: Laamari M, d'Acier AC, Jousset E (2013) New data on aphid fauna (Hemiptera, Aphididae) in Algeria. In: Popov A, Grozeva S, Simov N, Tashva E (Eds) *Advances in Hemipterology*. ZooKeys 319: 223–229. doi: 10.3897/zookeys.319.4340

Abstract

A survey of aphids was carried out during the period 2008–2011 in different regions of Algeria by collecting and identifying aphids and their host plants. Aphids were collected from 46 host plants. Forty-six species were reported including thirty-six species which were recorded for the first time in this country and thirty species which were recorded for the first time in the Maghreb (North Africa). This study extends the number of known Algerian aphid to 156 species.

Keywords

Aphids, biodiversity, Algeria, Maghreb, North Africa

Introduction

The aphid fauna of North Africa has been poorly studied. One hundred and fifty eight species have been recorded from Morocco (Mimeur 1932, 1934, 1935a, 1935b, 1937, 1941, 1942, Blackman and Eastop 1994, 2000, 2006, Sekkat 1987). One hundred and three species are recorded from Tunisia (Bodenheimer and Swirsky 1957, Blackman and Eastop 1994, 2000, 2006, Ben Halima-Kamel 1991, 1995, Ben Halima-Kamel and Ben Hamouda 1993, 1998, 2004, 2005, Boukhris-Bouhachem et al. 1996, Boukhris-Bouhachem et al. 2007). Ninety nine species are listed from Egypt (Theobald

1922, Habib and El Kady 1961, Darwish 2009). Aphids in Libya are represented by seventy three species (Trotter 1912, 1914, Damiano 1961, 1962, Blackman and Eastop 1994, Ahmeid Al Nagar 2000, Ahmeid Al-Najar and Nieto Nefrya 1998). The Algerian aphid fauna is now partly known (Mimeur and Bernard 1944, Bodenheimer and Swirsky 1957, Remaudière and Leclant 1974, Dartigues 1993, Blackman and Eastop 1994, 2000, 2006, Laamari and Akkal 2002). Laamari et al. (2010) present a list of aphids and their host plants in Algeria. In this important publication, 120 aphid species are listed and commented/discussed. The bibliography of most papers concerning the aphid fauna of the country is provided.

Material and methods

The regions chosen for sample collection belonged to different bioclimatic stages. The regions of Annaba, Taref and Algiers are located on the Mediterranean coast and are characterized by a humid and sub humid climate. Other regions (Guelma, Constantine, Setif and Oum El Bouaghi) are located on the high plateaus and high plains, where cereal crops are cultivated (semi arid climate). Khenchela, Batna and Biskra are located on the slopes north and south of the Saharan Atlas. Their natural vegetation is dominated by steppe plants. Ouargla and Ghardaia are located almost in the center of the Algerian Sahara (arid climate). Their natural vegetation is composed of desertic plants (Fig. 1).

This study, conducted between 2008 and 2011, considers only the new aphid species of Algeria and the species already mentioned but without specified host plants. Specimens were collected from wild and cultivated plants, tree and shrubs bearing aphid colonies. The aphids were preserved in 75% ethyl alcohol until their prepara-

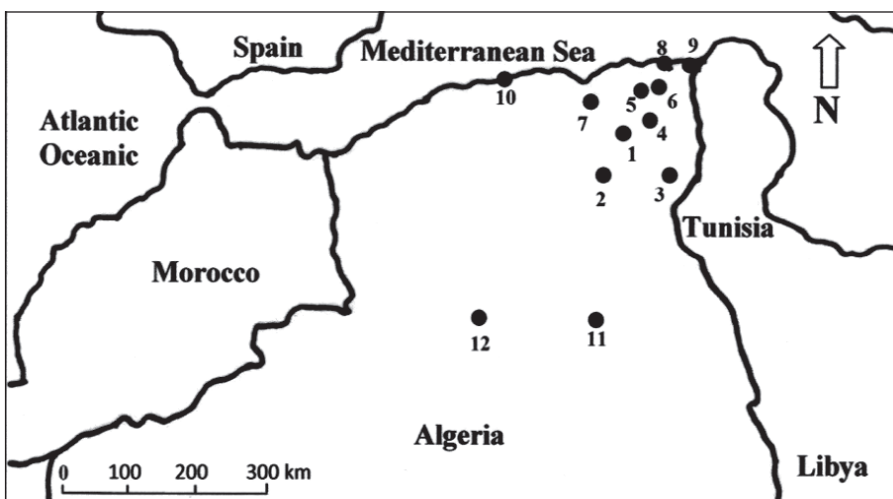


Figure 1. Map of the regions where samples were collected. **1** Batna **2** Biskra **3** Khenchela **4** Oum El Bouaghi **5** Constantine **6** Guelma **7** Setif **8** Annaba **9** Taref **10** Algiers **11** Ouargla **12** Ghardaia

tion for slide-mounting. They were identified using the keys of Blackman and Eastop (1994, 2000), Nieto Nafria et al. (2002, 2005) and Remaudière et al. (1985). The nomenclature used was that proposed by Remaudière and Remaudière (1997). The aphid preserving techniques are mainly based on the method of Hille Ris Lambers (1950). The majority of the studied and identified specimens were deposited in the insect collection of the Department of Agronomy, University of Batna (Algeria) and a minor part of aphids were deposited in the collection of the National Institute of Agronomic Research (INRA) at the CBGP in Montpellier, France.

Results

During this study, 320 samples were collected from the investigated regions. A total of 46 aphid species were reported including 36 species which were recorded for the first time in the country and 30 species which were recorded for the first time in the Maghreb (North Africa). The presence of 10 species already reported from Algeria was confirmed. Aphid species were listed in systematic category alphabetically, including the host plant and region for each aphid species (Table 1).

Table 1. List of aphid species present/found in Algeria.

Aphid species	Host plants	Regions
** <i>Acyrtosiphon kondoi</i> Shinji, 1938	<i>Fagonia glutinosa</i> Delile	Biskra
<i>Aphis acanthoidis</i> (Börner, 1940)	<i>Carduncellus plumosus</i> Pomel	Khenchela
** <i>Aphis acetosae</i> Linnaeus, 1761	<i>Rumex crispus</i> L.	Batna
** <i>Aphis astragali</i> Ossiannilsson, 1959	<i>Astragalus armatus</i> Willd	Batna
** <i>Aphis balloticola</i> Szelegiewicz, 1968	<i>Balota nigra</i> L.	Batna
** <i>Aphis cytisorum</i> Hartig, 1841	<i>Calicotome villosa</i> (Poiret) Link	Guelma
* <i>Aphis illinoisensis</i> Shimer, 1866	<i>Vitis vinifera</i> L.	Taref, Batna
** <i>Aphis impatientis</i> Thomas, 1878	<i>Rosa damascena</i> Mill.	Biskra
** <i>Aphis intybi</i> Koch, 1855	<i>Cichorium intybus</i> L.	Taref
** <i>Aphis medicaginis</i> Koch, 1854	<i>Ononis angustissima</i> Lam.	Khenchela
** <i>Aphis middletonii</i> Thomas, 1879	<i>Taraxacum officinale</i> F.H. Wigg	Khenchela
** <i>Aphis potentillae</i> Nevsky, 1929	<i>Potentilla reptans</i> L.	Batna
** <i>Aphis salviae</i> Walker, 1952	<i>Lavandula multifida</i> L.	Batna
** <i>Aphis stroyani</i> Szelegiewicz, 1961	<i>Picris echioides</i> L.	Guelma
** <i>Aphis thomasi</i> (Börner, 1950)	<i>Knautia arvensis</i> (L.) J.M. Coult	Batna
** <i>Aphis umbrella</i> (Börner, 1950)	<i>Malva sylvestris</i> L.	Batna
<i>Aphis verbasci</i> Schrank, 1801	<i>Verbascum thapsus</i> L.	Batna
* <i>Brachycaudus persicae</i> (Passerini, 1860)	<i>Ononis natrix</i> L.	Batna
* <i>Brachyunguis tamaricis</i> (Lichtenstein, 1885)	<i>Tamarix gallica</i> L.	Biskra
* <i>Chaitophorus leucomelas</i> Koch, 1854	<i>Populus alba</i> L.	Guelma
<i>Cinara cedri</i> Mimeur, 1936	<i>Cedrus atlantica</i> (Endl.) G. Manetti ex Carrière	Batna

Aphid species	Host plants	Regions
** <i>Cinara juniperi</i> (de Geer, 1773)	<i>Juniperus oxycedrus</i> L.	Batna
* <i>Clypeoaphis suaedae</i> (Mimeur, 1934)	<i>Suaeda fruticosa</i> Forsk.	Biskra
<i>Capitophorus elaeagni</i> (del Guercio, 1894)	<i>Silybum marianum</i> Garten, <i>Lawsonia inermis</i> L.	Biskra
<i>Dysaphis tulipae</i> (Boyer de Fonscolombe, 1814)	<i>Iris germanica</i> L.	Batna
* <i>Greenidea ficicola</i> Takahashi, 1921	<i>Ficus retusa</i> L.	Algiers
** <i>Indiochaitophorus furcatus</i> Verma, (1970)	<i>Ulmus campestris</i> L.	Biskra
** <i>Liosomaphis berberidis</i> (Kaltenbach, 1843)	<i>Achillea santolina</i> L.	Batna
** <i>Macrosiphoniella grandicauda</i> Tak. & Mor., 1963	<i>Artemisia herba-alba</i> Asso	Biskra
<i>Nasonovia ribisnigri</i> (Mosley, 1841)	<i>Andryala integrifolia</i> L., <i>Geranium pusillum</i> L.	Batna
** <i>Pterocomma pilosum</i> Buckton, 1879	<i>Salix pedicellata</i> Desf.	Batna
** <i>Semiaphis heraclei</i> (Takahashi, 1921)	<i>Torilis nodosa</i> (L.) Gaertn.	Khenchela
<i>Sipha maydis</i> Passerini, 1860	<i>Digitaria sanguinalis</i> (L.) Scop	Guelma
** <i>Sitobion lambersi</i> David, 1956	<i>Bromus squarrosus</i> L.	Batna
** <i>Stomaphis pini</i> Takahashi, 1920	<i>Pinus halepensis</i> Mill.	Batna
** <i>Therioaphis riehmii</i> (Börner, 1949)	<i>Trigonella anguina</i> Delile	Biskra
** <i>Tinocallis takachihensis</i> Higuchi, 1972	<i>Ulmus campestris</i> L.	Biskra
** <i>Uroleucon ambrosiae</i> (Thomas, 1878)	<i>Carthamus lanatus</i> L.	Batna
** <i>Uroleucon aeneum</i> (Hille Ris Lambers, 1939)	<i>Onopordum Illyricum</i> L.	Batna
** <i>Uroleucon bifrons</i> (Passerini, 1879)	<i>Dittrichia viscosa</i> (L.) Greuter	Khenchela
** <i>Uroleucon carthami</i> (Hille Ris Lambers, 1948)	<i>Carthamus lanatus</i> L.	Batna
** <i>Uroleucon chrysanthemi</i> (Oestlund, 1886)	<i>Calendula arvensis</i> L.	Khenchela
<i>Uroleucon compositae</i> (Theobald, 1915)	<i>Borago officinalis</i> L.	Batna
<i>Uroleucon erigeronense</i> (Thomas, 1878)	<i>Erigeron canadensis</i> L., <i>A. herba-alba</i> Asso	Khenchela
** <i>Uroleucon inulicola</i> (Hille Ris Lambers, 1939)	<i>Senecio vulgaris</i> L.	Batna
<i>Uroleucon pilosellae</i> (Börner, 1933)	<i>Leontodon hispidus</i> L.	Biskra

* = species reported for the first time in Algeria, ** = species reported for the first time in the Maghreb

Discussion

With 46 species, this survey constitutes the most important contribution to the knowledge on aphid diversity in Algeria. Organization of the similar local studies would play an important role in the applied entomological studies and may add more species to Algerian aphid fauna. There is a very large volume of literature about all the major pest aphid species and two factors that have the greatest influence on intraspecific variation in aphids: the life cycle and the host plant. Among the species inventoried, *Aphis illinoisensis* is the aphid that has the greatest agricultural importance. This invasive aphid was reported for the first time in the Mediterranean from southern Turkey in 2002, and identified as a new possible threat to the respective grape-growing areas (Remaudière et al. 2003). A general historical set of invasive grape aphid detection is as follows: 2002 in southern Turkey (Remaudière et al. 2003), 2005 in Crete - Greece

(Tsitsipis et al. 2005), 2007 in Israel (Barjadze and Ben-Dov 2011), 2009 in Tunisia (Ben Halima-Kamel and Mdellel 2010). In Algeria this aphid was detected for the first time in 2007 in several regions of viticulture (Laamari and Coeur d'Acier 2010).

Greenidea ficicola is considered as another invasive species. It was encountered for the first time in 2007 on *Ficus nitida* in Tunisia (Ben Halima-Kamel 2009). In Algeria it was collected in April, 2008.

A total of 34 aphid species were collected on the steppe plants specific of the Saharian Atlas. This mountain range forms the boundary between the northern (Mediterranean area) and southern (African area) of Algeria. It is home to many endemic plants, which may harbour very specific and uncommon aphid species. All aphid species reported as new to Algeria and North Africa were found in this transition area (Batna, Biskra and Khenchela regions).

Conclusion

In this study, 36 aphid species were reported for the first time in Algeria, increasing the number of species known to be present in this country to 156. Given the high level of climatic and plant diversity in Algeria, the expansion of prospect activities to a larger number of plant species and environments would undoubtedly provide a more accurate picture of the Algerian aphid fauna and would increase the number of species known to be present in this country. Furthermore, prospect studies in the Sahara and steppe zones, which are known to have a highly endemic flora, might lead to the description of species new to science.

References

- Ahmeid Al-Najar OA (2000) Survey for aphid species in Libya. Arab Journal of Plant Protection 18 (1): 24–27.
- Ahmeid Al-Najar OA, Nieto Nefria KM (1998) Notes on Libyan aphids: new recorded species from North Africa. In: Nieto Nefria JM, Dixon AFG (Eds) Aphids in natural and managed ecosystems. Proceedings of the Fifth International Symposium on Aphids, Universidad de Leon (Spain), September 1997, 325–327.
- Barjadze S, Ben-Dov Y (2011) The grapevine aphid, *Aphis illinoisensis* Shimer (Hemiptera: Aphididae): An invasive pest in Israel. Phytoparasitica 39(1): 55–57. doi: 10.1007/s12600-010-0129-1
- Ben Halima-Kamel M (1991) Contribution à l'étude de la dynamique des populations aphidiennes en cultures protégées. Thèse de Doctorat, Faculté des Sciences, Université de Tunis.
- Ben Halima-Kamel M (1995) Contribution à l'étude de la dynamique des populations de pucerons en vergers d'agrumes. Bulletin OILB/SROB 18 (5): 39–46.
- Ben Halima-Kamel M (2009) First report of *Greenidea ficicola* in Tunisia. Tunisian Journal of Plant Protection 4: 107–110.

- Ben Halima-Kamel M, Ben Hamouda MH (1993) Les pucerons des cultures protégées et leurs ennemis naturels. *Tropicultura* 11(2): 50–53.
- Ben Halima-Kamel M, Ben Hamouda H (1998) Contribution à l'étude de la bioécologie des aphides d'une région côtière de la Tunisie. *Mediterranean Faculty Landbouw* 63(2a): 365–378.
- Ben Halima-Kamel M, Ben Hamouda H (2004) Aphids of fruit trees in Tunisia. In: Simon JC, Dedryver CA, Rispe C, Hullé M (Eds) *Aphids in a new millennium*. Proceedings of the VIth International Symposium on Aphids, Paris, 119–123.
- Ben Halima-Kamel M, Ben Hamouda MH (2005) A propos des pucerons des arbres fruitiers de Tunisie. *Notes faunistiques de Gembloux* 58: 11–16.
- Ben Halima-Kamel M, Mdellel L (2010) First record of the grapevine aphid, *Aphis illinoisensis* Shimer, in Tunisia. *EPPO Bulletin* 40: 191–192. doi: 10.1111/j.1365-2338.2010.02373.x
- Blackman RL, Eastop VF (1994) *Aphids on the world's trees*. An Identification and Information guide. CAB International, Wallingford, 987 pp.
- Blackman RL, Eastop VF (2000) *Aphids on the world's crops*. An Identification and Information guide. The Natural History Museum, London, 466 pp.
- Blackman RL, Eastop VF (2006) *Aphids on the world's Herbaceous Plants and Shrubs*. The Natural History Museum, London, 1439 pp.
- Bodenheimer FS, Swirski E (1957) *The Aphidoidea of the Middle East*. Weizmann Science Press of Israel, Jerusalem, 378 pp.
- Boukhris-Bouhachem S, Jerraya A, Boudhir H (1996) Etude préliminaire sur la présence des espèces aphidiennes en verger d'Agrumes (Cap bon, Tunisie). *Annales d'INRATunis* 69: 55–72.
- Boukhris-Bouhachem S, Souissi R, Turpeau E, Rouzé Jouan J, Fahem M, Hullé M (2007) Aphid (Hemiptera, Aphidoidea) diversity in Tunisia in relation to seed potato production. *Annales de la Société Entomologique de France (NS)* 43(3): 311–318.
- Damiano A (1961) Elenco delle specie di insetti dannosi ricordati per la Libia al 1960 fin al 1960. *Nazirato dell'Agricoltura Tripolitania, Tripoli*, 81 pp.
- Damiano A (1962) Rassegna dei principi casi entomologici osservati in Tripolitania nel 1960. *Rivista Di Agricoltura Subtropicale E Tropicale Annale* 56(1/3): 21–36.
- Dartigues D (1993) Analyse comportementale des interactions entre la fourmi *Tapinoma simrothi* et le puceron *Toxoptera aurantii*. *Entomologia Experimentalis Applicata* 68: 25–30. doi: 10.1111/j.1570-7458.1993.tb01685.x
- Darwish ETE (2009) Studies on maize's aphids ecology and taxonomy in Egypt. *Journal of Applied Entomology* 107(1/5): 155–159. doi: 10.1111/j.1439-0418.1989.tb00244.x
- Habib A, El Kady EA (1961) *The Aphididae of Egypt*. Technical Science Service, Scope Ministry of Agriculture, Egypt Bulletin 68: 1–62.
- Hille Ris Lambers D (1950) On the mounting aphids and other Soft skinned insects. *Entomologische Berichten* 13: 55–58.
- Laamari M, Akkal Y (2002) Aphid population dynamics and the rate of virus diseases in potato fields in the Setif region of Algeria. *Arab Journal of Plant Protection* 20(2): 111–117.
- Laamari M, Coeur d'Acier A (2010) Le puceron de la vigne *Aphis illinoisensis* arrive en Algérie. *EPPO Bulletin* 40: 167–168. doi: 10.1111/j.1365-2338.2009.02368.x

- Laamari M, Cœur d'Acier A, Joussellin E (2010) Assesment of aphid diversity (Hemiptera : Aphididae) in Algeria: a fourteen-year investigation. *Faunistic Entomology* 62: 73–87.
- Mimeur JM (1932) Notes d'entomologie agricole et forestière. *Mémoire de la Société Scientifique Nationale du Maroc* 31: 119–129.
- Mimeur JM (1934) Aphididae du Maroc (Troisième note). *Mémoire de la Société Scientifique Nationale du Maroc* 40: 1–69.
- Mimeur JM (1935a) Aphididae du Maroc (Septième note). *Bulletin de la Société Scientifique Nationale du Maroc* 15(1): 251–258.
- Mimeur JM (1935b) Plantes hôtes des Aphididae du Maroc (Addition à la première liste). *Bulletin de la Société Scientifique Nationale du Maroc* 40: 259–260.
- Mimeur JM (1937) Contribution à l'étude de la faune entomologique du moyen atlas. *Bulletin de la Société Scientifique Nationale du Maroc* 17: 69–73.
- Mimeur JM (1941) Aphididae Nord-Africains. Espèces nouvelles constituant un genre nouveau. *Bulletin de la Société Scientifique Nationale du Maroc* 21: 67–70.
- Mimeur JM (1942) Aphididae du Maroc. (Douzième note). *Bulletin de la Société Scientifique Nationale du Maroc* 22: 121–123.
- Mimeur JM, Bernard F (1944) Mission française au Fezzân. *Bulletin d'Histoire Naturelle d'Afrique du Nord* 37: 43–44.
- Nieto Nafria JM, Mier Durante MP, Binazzi A, Hidalgo NP (2002) Fauna Iberica Hemiptera Aphididae II. Vol 29, Museo Nacional de Ciencias Naturales & Consejo Superior de Investigaciones Científicas, Madrid, 350 pp.
- Nieto Nafria JM, Mier Durante MP, Prieto FG, Hidalgo NP (2005) Fauna Iberica Hemiptera Aphididae III. Vol 28, Museo Nacional de Ciencias Naturales & Consejo Superior de Investigaciones Científicas, Madrid, 362 pp.
- Remaudière G, Leclant F (1974) Nouveaux *Drepanosiphoniella*, *Macrosiphielliella* et *Aphis* du bassin méditerranéen et du massif Alpin (Hom. Aphididae). *Annales de la Société Entomologique de France* 3(1): 73–109.
- Remaudière G, Remaudière M (1997) Catalogue des Aphididae du monde –Catalogue of the world's Aphididae (Homoptera, Aphididae). INRA, Paris, 376 pp.
- Remaudière G, Sertkaya E, Özdemir I (2003) Alerte! Découverte en Turquie du puceron américain *Aphis illinoisensis* nuisible à la vigne. *Revue Française d'Entomologie (NS)* 25: 170–172.
- Remaudière G, Autrique A, Eastop VF, Stary P, Aymonin G, Kafurera J, Dedonder R (1985) Contribution à l'écologie des aphides africains. *Etude FAO Production végétale et protection des plantes*. FAO, Roma, 214 pp.
- Sekkat A (1987) Etude bioécologique des aphides du Saïs et du Moyen Atlas (Maroc). Implications agronomiques. Thèse de Doctorat Es Sciences, USTL, Montpellier II, 250 pp.
- Theobald FV (1922) New Aphididae found in Egypt. *Bulletin Society Royaume Entomology of Egypt* 6: 39–80.
- Trotter A (1912) Contributo alla conoscenza delle galle tripolitana. *Marcellia* 11: 116–210.
- Trotter A (1914) Nuovo contributo alla conoscenza delle galle tripolitana. *Marcellia* 13: 3–18.
- Tsitsipis JA, Angelakis E, Margaritopoulos JT, Tsamandali K, Zarpas KD (2005) First record of the grapevine aphid *Aphis illinoisensis* in the island Kriti, Greece. *OEPP/EPPO Bulletin* 35: 541–542.