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Orijinal araştırma (Original article)

Aphids (Hemiptera: Aphididae) and their parasitoids on ornamental trees and shrubs in Erzurum, Turkey[1]

Erzurum'da ağaç ve çalı formundaki süs bitkilerinde bulunan yaprakbiti türleri (Hemiptera: Aphididae) ve parazitoitleri

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Summary

This study was carried out to determine the aphid species and their parasitoids on trees and shrubs collected in the center of Erzurum every week between May and October during 2004 and 2005. In this study 17 aphid species (Hemiptera: Aphididae) and 8 parasitoid species (Hymenoptera: Aphidiidae) were recorded on 11 different host plants. The Aphididae, *Chaitophorus nigritus* Hille Ris Lambers 1966, *Loniceraphis paradoxa* Narzikulov 1962, *Chaitophorus vitellinae vitellinae* (Schrank 1801) and the Aphidiidae *Aphidius aquilus* Mackauer 1961, *Aphidius schimitscheki* (Starý, 1960), *Binodoxys heraclei* (Haliday, 1833), *Lipolexis gracilis* Foester 1862, *Pauesia unilachni* (Gahan, 1927) and *Trioxys humuli* Mackauer, 1960 are new records for the Turkish fauna. New hosts to four parasitoid species were also listed.

Key words: Aphididae**,** Aphidiidae, ornamental plants, hosts of parasitoids

Özet

Erzurum Merkezde ağaç ve çalı formundaki süs bitkilerde bulunan yaprakbiti türleri ve bu türlerin parazitoitlerini belirlemek amacıyla 2004 ve 2005 yılları mayıs-ekim aylarında yürütülen bu çalışmada örnekler her hafta toplanmıştır. Çalışmada 11 farklı konukçu bitki üzerinde 17 yaprakbiti (Hemiptera: Aphididae) ve 8 parazitoit (Hemiptera: Aphidiidae) türü belirlenmiştir. Afitlerden *Chaitophorus nigritus* Hille Ris Lambers 1966, *Loniceraphis paradoxa* Narzikulov 1962 *Chaitophorus vitellinae vitellinae* (Schrank 1801), aphidiidlerden *Aphidius aquilus* Mackauer 1961, *Aphidius schimitscheki* (Starý, 1960), *Binodoxys heraclei* (Haliday, 1833), *Lipolexis gracilis* Foester 1862, *Pauesia unilachni* (Gahan, 1927) ve *Trioxys humuli* Mackauer, 1960 Türkiye faunası için yeni kayıttır. Ayrıca dört parazitoit tür için yeni konukçu kaydı verilmiştir.

Anahtar sözcükler: Aphididae**,** Aphidiidae, süs bitkileri, parazitoit konukçuları

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Introduction

Aphids are very important pests, which cause great damages in agricultural, ornamental and forest areas worldwide. Diagnosis of aphids is complicate due to their characteristic seasonal polymorphism, with the presence of parthenogenetic apterous or alate viviparae, sexuparae, males and egg-laying sexual females. Most deciduous tree-dwelling aphids have up to 8 different morphs depending on biotic and abiotic factors (Blackman & Eastop, 2000).

Till now 4700 aphid species are known worldwide, mainly distributed in temperate regions. Among these aphid species, 1758 species, belonging to 270 genera, are tree-dwelling aphids, spending all or part of their life cycles on woody hosts (Blackman & Eastop 1994, 2006; Remaudière & Remaudière, 1997).

The knowledge of aphids from Turkey is still limited (Kaygin et al., 2010; Şenol et al., 2014) and major data on aphid species were given by Düzgüneş et al. (1982), Toros et al. (2002), Aslan et al. (2004), Görür (2002, 2004a,b), Aslan & Uygun (2005), Özdemir et al. (2005), Remaudière et al. (2006), Çıraklı et al. (2008), Görür et al. (2009, 2011a,b, 2012) and Akyürek et al. (2010, 2011). Based on the results of these studies, till now a total of 466 species and 12 subspecies have been reported in Turkey.

Aphids have several natural enemies such as Aphidiidae (Hymenoptera) which play a significant role in the control of aphid populations. All Aphidiidae are solitary koinobiont parasitoids of ovoviviparous aphids. But there is no available information about their relationships with the oviparous groups of Aphidoidea (Adelgidae and Phylloxeridae). Several species have been manipulated successfully in biological control programs (Hagen & van den Bosch, 1968; Clausen, 1978) and the potential importance of Aphidiidae in the population dynamics of harmful agricultural pests is well known.

Aphidiidae are small and weakly sclerotised wasps, often having more or less profoundly reduced forewing venation, although in some genera the venation remains essentially complete. More than 400 species of these kinds of aphid parasitoids are described worldwide (Starý, 1988; Dolphine & Quicke, 2001). In the past decades, many new aphidiid species were recorded/described from Southeastern Europe (Starý et al., 1998; Kavallieratos & Lykouressis, 2000; Tomanović & Starý, 2001; Tomanović & Kavallieratos, 2002; Tomanović et al., 2002, 2003a,b; Kavallieratos et al., 2003; Kavallieratos & Tomanović, 2003).

Material and Methods

Aphids and their parasitoids were collected from ornamental trees and shrubs every week between May and October during 2004 and 2005 in Erzurum center. Leafs and shoots infested with aphids were put in polyethylene bags and were brought to the laboratory. The aphid specimens, both alata and apterous forms, were put into tubes containing 85% alcohol and labeled. Mummified aphids were brought to the laboratory in polyethylene bags and adult parasitoids were obtained under laboratory conditions (24±2^{o}C and 60% RH).

Aphid specimens were identified by Dr. Işıl ÖZDEMİR and Dr. Georges REMAUDIERE (INRA, France). Parasitoid specimens were identified by Dr. Coşkun GÜÇLÜ and Elena DAVIDIAN (Biological Research Institute, St. Petersburg, Russia). Distribution of aphidiid species was checked from Taxapad (Yu et al., 2012).

Results

In the center of Erzurum, 17 aphid species belonging to Aphididae and 8 parasitoid species belonging to Aphidiidae have been collected on ornamental trees and shrubs and identified during 2004 and 2005. Among these, two species and one subspecies of Aphididae, *Chaitophorus nigritus* Hille Ris Lambers 1966, *Loniceraphis paradoxa* Narzikulov 1962, *Chaitophorus vitellinae vitellinae* (Schrank 1801) and six species of Aphidiidae, *Aphidius aquilus* Mackauer 1961, *Aphidius schimitscheki* (Starý, 1960), *Binodoxys heraclei* (Haliday, 1833), *Lipolexis gracilis* Foester 1862, *Pauesia unilachni* (Gahan, 1927) and *Trioxys humuli* Mackauer, 1960, resulted new for the Turkish fauna. Moreover new host records related to four parasitoid species were also observed and are listed.

Hemiptera: Aphidinae

***Aphis craccivora* (Koch, 1854)**

Material examined: Specimens were collected from *Robinia pseudoacacia* L. in Erzurum center.

Distributions: Worldwide (Nieto Nafria, 2014).

***Aphis* (s. str.) *spiraephaga* F.P. Müller, 1961**

Material examined: Specimens were collected from *Spiraea vanhouttei* (Briot) Zabel in Erzurum center.

Distributions: Most European countries, East Palaearctic and Near East regions (Nieto Nafria, 2014).

***Aphis* (s. str.) ?*sambuci* Linnaeus, 1758**

Material examined: Specimens were collected from *Syringa vulgaris* L. in Erzurum center.

Distributions: Worldwide except Afro-tropical and Australian regions (Nieto Nafria, 2014).

***Cavariella* (s. str.) *aquatica* (Gillette & Bragg, 1916)**

Material examined: Specimens were collected from *Salix* sp. in Erzurum center.

Distributions: Austria, Britain Is.(Incl. Shetlands, Orkneys, Hebrides and Man Is.), Finland, French mainland, Italian mainland, Norwegian mainland, Spanish mainland (Incl. Alboran Is.), Sweden (Incl. Gotland Is.), East Palaearctic, Near East, Nearctic and Oriental regions (Nieto Nafria, 2014).

***Cavariella* (s. str.) *theobaldi* (Gillette & Bragg, 1918)**

Material examined: Specimens were collected from *Salix* sp. in Erzurum center.

Distributions: Palaearctic, Near East and Nearctic regions (Nieto Nafria, 2014).

***Chaetosiphon (Pentatrichopus) tetrarhodum* (Walker, 1849)**

Material examined: Specimens were collected from *Rosa canina* L. in Erzurum center.

Distributions: Worldwide (Nieto Nafria, 2014).

***Chaitophorus nigritus* Hille Ris Lambers, 1966**

Material examined: Specimens were collected from *Salix* sp. in Erzurum center.

C. nigritus is new for the Turkish aphid fauna.

Distributions: India, Pakistan, Iran and Iraq (Blackman & Eastop 1994).

***Chaitophorus populeti* (Panzer, 1801)**

Material examined: Specimens were collected from *Populus alba* L. and *Salix* sp. in Erzurum center.

Distributions: Palaearctic, Near East and Oriental regions (Nieto Nafria, 2014).

***Chaitophorus vitellinae vitellinae* (Schrank, 1802)**

Material examined: Specimens were collected from *Salix* sp. in Erzurum center.

C. vitellinae vitellinae is new for the Turkish aphid fauna.

Distributions: Austria, Britain Is., Czech Republic, Finland, French mainland, Netherlands, Poland, Romania, Slovakia, Sweden, Ukraine, East Palaearctic and Nearctic regions (Nieto Nafria, 2014).

***Cryptomyzus* (s. str.) *ribis* (Linnaeus, 1758)**

Material examined: Specimens were collected from *Ribes* sp. in Erzurum center.

Distributions: Palaearctic (except North Africa), Near East, Nearctic and Oriental regions (Nieto Nafria, 2014).

***Euceraphis punctipennis* (Zetterstedt, 1828)**

Material examined: Specimens were collected from *Betula* sp. in Erzurum center.

Distributions: Palaearctic (except North Africa), Australian, Nearctic and Oriental regions (Nieto Nafria, 2014).

***Loniceraphis paradoxa* Narzikulov, 1962**

Material examined: Specimens were collected from *Lonicera* sp. in Erzurum center.

L. paradoxa is new for the Turkish aphid fauna.

Distributions: Central Asia (Blackman & Eastop, 2006).

***Longicaudus trirhodus* (Walker, 1849)**

Material examined: Specimens were collected from *Rosa canina* L. in Erzurum center.

Distributions: Palaearctic (except North Africa), Near East, Nearctic and Oriental regions (Nieto Nafria, 2014).

***Myzaphis rosarum* (Kaltenbach, 1843)**

Material examined: Specimens were collected from *Rosa canina* L. in Erzurum center.

Distributions: Worldwide except some European countries (Nieto Nafria, 2014).

***Pterocomma pilosum* (Buckton, 1879)**

Material examined: Specimens were collected from *Salix* sp. in Erzurum center.

Distributions: Most European countries, East Palaearctic, Near East, Nearctic and Oriental regions (Nieto Nafria, 2014).

***Sitobion avenae* (Fabricius, 1775)**

Material examined: Specimens were collected from *Rubus* sp. in Erzurum center.

Distributions: Worldwide except some European countries (Nieto Nafria, 2014).

Hemiptera: Lachninae

***Eulachnus rileyi* (Williams, 1911)**

Material examined: Specimens were collected from *Pinus sylvestris* L. in Erzurum center.

Distributions: Andorra, Austria, Azores, Belarus, Belgium, Britain Is., Bulgaria, Canary Is., Corsica, Czech Republic, Danish mainland, Finland, French mainland, Germany, Hungary, Italian mainland, Macedonia, Madeira, Moldova, Norwegian mainland, Poland, Portuguese mainland, Romania, Sicily, Slovakia, Spanish mainland, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia, North Africa, Afro-tropical, Near East, Nearctic, Neotropical and Oriental regions (Nieto Nafria, 2014).

Hymenoptera: Aphidiidae

***Adialytus salicaphis* (Fitch, 1855)**

Material examined: ex *Chaitophorus populeti*, Erzurum center; 10.xii.2004, 2♂♂1♀.

Known hosts: *Aphis craccivora* (Koch), *A. farinose* J.F. Gmelin, *A. illinoisensis* Shimer, *Chaitophorus capreae* (Mosley), *C. euphraticus* Hodjat, *C. kapuri* Hille Ris Lambers, *C. leucomelas* Koch, *C. matsumurai* Hille Ris Lambers, *C. melanosiphon* Pintera, *C. nassonowi* Mordvilko, *C. pakistanicus* Hille Ris Lambers, *C. populeti* (Panzer), *C. populialbae* (Boyer de Fonscolombe), *C. populicola* Thomas, *C. populifolii* (Essig), *C. remaudieri* Pintera, *C. saliciti* (Schrank), *C. salijaponicus* Essig & Kuwana, *C. saliniger* Shinji, *C. tremulae* Koch, *C. truncates* (Hausmann), *C. utahensis* (Knowlton), *C. viminalis* Monell ex Riley & Monell, *C. vitellinae* (Schrank), *Cryptomyzus ribis* (Linnaeus) (Hemiptera: Aphididae) (Yu et al., 2012).

Distributions: Palaearctic, Nearctic, Neotropical and Oriental regions (Yu et al., 2012).

***Aphidius aquilus* Mackauer, 1961**

Material examined: ex *Euceraphis punctipennis*, Erzurum center; 21.vii.2005, 1♂.

A. aquilus is new for the Turkish parasitoid fauna.

Known hosts: *Aphis pomi* De Geer, *Betulaphis brevipilosa* Börner, *B. quadrituberculata* (Kaltenbach), *Calaphis betulicola* (Kaltenbach), *C. flava* Mordvilko, *Callipterinella calliptera* (Hartig), *C. tuberculate* (von Heyden), *Cavariella aegopodii* (Scopoli), *Euceraphis punctipennis* (Zetterstedt), *Monaphis antennata* (Kaltenbach) (Hemiptera: Aphididae) (Yu et al., 2012).

Distributions: Bulgaria, Finland, France, Georgia, Germany, Hungary, Italy, Japan, Latvia, Lithuania, Mongolia, Netherlands, Poland, Russia, Slovakia, Spain, United Kingdom and Serbia (Yu et al., 2012).

***Aphidius schimitscheki* (Starý, 1960)**

Material examined: ex *Cryptomyzus ribis* new host record, Erzurum center; 05.vii.2004, 4♂♂2♀♀, 07.vii.2004,1♂2♀♀, 09.vii.2004, 5♀♀, 26.vii.2004, 2♂♂, 26.vii.2004, 9♂♂, 30.vii.2004, 2♀♀, 02.vi.2005, 1♂2♀♀, 07.vi.2005, 1♀, 13.vi.2005, 1♂2♀♀, 17.vi.2005, 1♂, 06.vii.2005, 2♀♀.

A. schimitscheki is new for the Turkish parasitoid fauna.

Known Hosts: *Aphis gossypii* Glover, *Elatobium abietinum* (Walker) (Hemiptera: Aphididae) (Yu et al., 2012).

Distributions: Germany, Hungary, India, Slovakia and United Kingdom (Yu et al., 2012).

***Binodoxys heraclei* (Haliday, 1833)**

Material examined: ex *Cavariella aquatica* new host record, Erzurum center; 02.vi.2005, 5♂♂9♀♀.

B. heraclei is new for the Turkish parasitoid fauna.

Known Hosts: *Aphis fabae* Scopoli, *A. rumicis* Linnaeus, *Capitophorus hippophaes* Walker, *Cavariella aegopodii* (Scopoli), *C. aquatica* (Gillette & Bragg), *C. theobaldi* (Gillette & Bragg), *Cryptomyzus galeopsidis* Kaltenbach, *Pterocomma salicis* (Linnaeus), *Uroleucon sonchi* (Linnaeus) (Hemiptera: Aphididae), *Anacampsis populella* Clerck (Lepidoptera: Gelechiidae), *Bostrichus binodulus* Ratzeburg (Coleoptera: Bostrichoidea), *Trypophloeus asperatus* (Gyllenhal) (Coleoptera: Curculionidae), *Rabdophaga rosaria* Loew, *R. salicis* (Schrank) (Diptera: Cecidomyiidae) (Yu et al., 2012).

Distributions: Andorra, Belgium, France, Georgia, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Spain, Tajikistan, United Kingdom and Serbia (Yu et al., 2012).

***Lipolexis gracilis* Foester, 1862**

Material examined: ex *Aphis craccivora,* Erzurum center; 07.vii.2004, 1♀.

L. gracilis is new for the Turkish parasitoid fauna.

Known Hosts: *L. gracilis* has got to 280 host species in world (Yu et al., 2012).

Distributions: Palaearctic and Oriental regions (Yu et al., 2012).

***Pauesia unilachni* (Gahan, 1927)**

Material examined: ex *Eulachnus rileyi* new host record, Erzurum center; 07.vi.2005, 1♀.

P. unilachni is new for the Turkish parasitoid fauna.

Known Hosts: *Cinara formosana* (Takahashi), *C. pini* (Linnaeus), *C. pinea* (Mordvilko), *Cranaphis formosanus* (Takahashi), *Eulachnus agilis* (Kaltenbach), *Mindarus abietinus* Koch, *Schizolachnus obscurus* Börner, *S. orientalis* (Takahashi), *S. pineti* (Fabricius), (Hemiptera: Aphididae) (Yu et al., 2012).

Distributions: Andorra, Bulgaria, Burundi, China, Taiwan, Finland, France, Germany, Hungary, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Netherlands, Poland, Russia, Slovakia, Spain, Sweden and Serbia (Yu et al., 2012).

***Praon volucre* (Haliday, 1833)**

Material examined: ex *Cryptomyzus ribis,* Erzurum center; 10.vi.2005, 1♀; 17.vi.2005, 1♀.

Known Hosts: *P. volucre* has got to 240 host species in world (Yu et al., 2012).

Distributions: Entirely Palearctic (Yu et al., 2012).

***Trioxys humuli* Mackauer, 1960**

Material examined: ex *Chaetosiphon tetrarhodum* new host record, Erzurum center; 23vii.2005, 2♂♂.

T. humuli is new for the Turkish parasitoid fauna.

Known Hosts: *Phorodon cannabis* Passerini, *P. humuli* (Schrank), (Hemiptera: Aphididae) (Yu et al., 2012).

Distributions: France, Georgia, Germany, Hungary, India, Serbia and Slovakia (Yu et al., 2012).

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