

## A Survey of Aphid Parasitoids in Kahramanmaras, Turkey (Hymenoptera: Braconidae, Aphidiinae; and Hymenoptera: Aphelinidae)

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A list of aphid parasitoids found in a survey conducted between 1999 and 2001 in Kahramanmaras Province of Turkey is presented. Nineteen taxa of aphid parasitoids were found on 30 hosts. *Pauesia picta* (Haliday) is reported for the first time from Turkey. Two check-lists are presented, by host aphids and by plant species.

KEY WORDS: Aphid parasitoids; survey; tritrophic associations; Kahramanmaras; Turkey.

### INTRODUCTION

Aphids (Homoptera: Aphidoidea) are an economically important group of insects in Turkey as well as many other countries. Their economic importance is due mostly to their destructiveness to agricultural and ornamental plants, by causing direct damage and also indirectly as vectors of plant viruses (4,5,6,15). Aphids have many natural enemies including hymenopteran parasitoids, which may play a significant role in reducing aphid populations (9,23). These parasitoids belong to two groups: *Aphelinus* and related genera (Aphelinidae) and the aphidiines (Braconidae: Aphidiinae), which is comprised of approximately 60 genera and subgenera and more than 400 species from all over the world. Aphidiines are small wasps, with an adult size ranging from ~1 mm to several mm. They are all solitary endophagous parasitoids and strictly specific to aphids (14,18,21,23). Very few investigations of aphid parasitoids have been conducted in Turkey (7,8,16). The aim of this study was to survey the aphid parasitoids from a wide range of habitats in the Kahramanmaras province of Turkey.

### MATERIALS AND METHODS

Samples of plants, aphid hosts and parasitoids were collected between 1999 and 2001 from several different locations (Center, Pazarcık, Narlı, Türkoğlu, Çağlayancerit, Nurhak, Göksun, Afşin, Elbistan, Ekinözü and Andırın) in Kahramanmaras Province, which is located between the eastern Mediterranean and the central Anatolia regions of Turkey. Both cultivated and non-cultivated areas were sampled, but our attention was centered on fruit and ornamental trees and on weeds in non-cultivated habitats.

Plant samples were placed separately in plastic bags and brought to the laboratory where the plants were identified to species. Pieces of plants with aphid colonies were

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gently cut with scissors and placed in plastic cages to obtain parasitoid adults in the laboratory. Some of the collected aphids was preserved in 70% ethanol for subsequent identification. The emerging parasitoids were transferred with a fine brush into Eppendorf tubes containing 70% ethanol.

Parasitoid material was identified by P. Starý and voucher specimens are deposited in his collection (at České Budějovice).

## REVIEW OF PARASITOID–APHID–PLANT ASSOCIATIONS

### 1. *Aphelinus* spp.

*Aphis affinis* Del Guercio: Andırın-Yenice kale, 16.VI.2000, and Suçatı, 27.V.2001, both on *Mentha arvensis*

*Aphis fabae* Scopoli: Center, 01.V.2001, on *Rumex crispus*; Tekir, 27.V.2001, on *Pimpinella* sp.

*Aphis ruborum* (Börner): Afşin, 02.VI.2001, Çataloluk, 27.V.2000, and Göksun-Fırnız, 19.V.2001, all on *Rubus caesius*

*Aphis nerii* Boyer de Fonscolombe: Karacasu, 20.V.2001, and Pazarcık, 26.V.2001, both on *Nerium oleander*

### 2. *Aphidius absinthii* Marshall, 1896

*Capitophorus* sp. (?): Karaelbistan, 15.VI.2001, on *Artemisia vulgaris*

*Macrosiphoniella artemisiae* (Boyer de Fonscolombe): Elbistan, 15.VI.2001, on *Artemisia vulgaris*

Distribution in Turkey: Without locality (22)

### 3. *Aphidius funebris* Mackauer, 1961

*Uroleucon* sp.: Afşin, 02.VI.2001, on *Centaurea urvillei*

*Uroleucon* (*Uroleucon*) sp.: Elbistan-Akçırı, 15.VI.2001, and Tekir, 27.V.2001, both on *Chondrilla juncea*

Distribution in Turkey: Ankara (7)

### 4. *Aphidius matricariae* Haliday, 1834

*Aphis affinis* Del Guercio: Andırın-Yenice kale, 16.VI.2000, Çağlayancerit, 21.VI.2000, and Suçatı, 27.V.2001, all on *Mentha arvensis*

*Brachycaudus* (*Appelia*) *tragopogonis* (Kaltenbach): Göksun-Doğankonak, 15.VI.2001, and Göksun-Yantepe, 02.VI.2001, both on *Tragopogon pratensis* subsp. *orientalis* - Tekir, 27.V.2001; Türkoğlu-Beyoğlu, 25.V.2000, on *Tragopogon pterocarpus*

Distribution in Turkey: Adana, Diyarbakır, Hatay, İçel, İzmir (10,13,25,26)

### 5. *Aphidius transcaspicus* Telenga, 1958

*Hyalopterus amygdali* (Blanchard): Güzlek-Ahır Mtn., 24.V.2001, and Sarıkaya, 18.V.1999, both on *Amygdalus communis*

*Hyalopterus pruni* (Geoffroy): Center, 08.V.2001, Döngüle, 16.VI.2000, Gaffarlı, 21.VI.2000, Karacasu, 20.V.2001, and Pazarcık-Kirni, 26.V.2001, all on *Phragmites australis*; Ağabeyli, 21.VI.2000, on *Prunus armeniaca*; Elbistan, 15.VI.2001, and Karaelbistan, 15.VI.2001, both on *Prunus spinosa*; Narlı, 26.V.2001, on *Prunus persica*

Distribution in Turkey: Muğla, Diyarbakır (1)

### 6. *Aphidius* cf. *transcaspicus* Telenga, 1958 –group

*Rhopalosiphum padi* (L.): Aksu, 06.I.1999, on *Typha latifolia*

### 7. *Aphidius uzbekistanicus* Luthetzki, 1960

*Metopolophium dirhodum* (Walker): Center, 05.V.2000, on *Hordeum vulgare*

*Rhopalosiphum padi* (L.): Aksu, 06.I.1999, on *Triticum aestivum*; Göksun-Kireç, 15.VI.2001, on *Typha latifolia*

Distribution in Turkey: Ankara, Tekirdağ (7,19)

#### **8. *Aphidius* sp. A**

*Aphis craccivora* Koch: Center, 31.VII.1999 and 19.VI.2000, on *Robinia pseudoacacia*; Afşin, 02.VI.2001, on *Trigonella monantha* subsp. *noeouana* and *Vicia* sp.; Göksun-Yantepe, 02.VI.2001, on *Medicago sativa*, *Vicia garveiflora* and *Trifolium* sp.; Pazarcık, 26.V.2001, on *Vicia cypria*; Tekir, 27.V.2001, on *Galium aparine* and *Astragalus* sp.

#### **9. *Aphidius* sp. B**

*Aphis ruborum* Börner: Afşin, 02.VI.2001, Çataloluk, 27.V.2000, Göksun-Fırnız, 19.V.2001, on *Rubus caesius*

#### **10. *Binodoxys angelicae* (Haliday, 1833)**

*Aphis craccivora* Koch: Center, 31.VII.1999 and 19.VI.2000, on *Robinia pseudoacacia*; Afşin, 02.VI.2001, on *Trigonella monantha* subsp. *noeouana* and *Vicia* sp.; Göksun-Yantepe, 02.VI.2001, on *Medicago sativa*, *Vicia garveiflora* and *Trifolium* sp.; Pazarcık, 26.V.2001, on *Vicia cypria*; Tekir, 27.V.2001, on *Galium aparine* and *Astragalus* sp.

*Aphis fabae* subsp. *cirsiiacanthoidis* Scopoli: Center, 18.V.2001, Sarıkaya, 18.V.1999, and Türkoğlu, 09.V.2001, all on *Cirsium arvense*

*Aphis ruborum* Börner: Afşin, 02.VI.2001, Çataloluk, 27.V.2000, and Göksun-Fırnız, 19.V.2001, all on *Rubus caesius*

Distribution in Turkey: Adana, Antalya, Diyarbakır, Hatay, İçel, İzmir (10,20,24,26,27)

#### **11. *Diaeretiella rapae* (McIntosh, 1855)**

*Brevicoryne brassicae* (L.): Center, 13.V.2001, on *Brassica oleracea* var. *acephala*; Elbistan-Akçırı, 15.VI.2001, on *Brassica oleracea* var. *capitata*; Tekir, 27.V.2001, on *Crambe* sp.

*Hyadaphis tataricae* (Aizenberg): Ahır Mtn., 18.V.2001, on *Lonicera tatarica*

Distribution in Turkey: Ankara, Diyarbakır, Erzurum İçel, İzmir, Adana, Konya (3,7,8,10,16, 20,22,24,27)

#### **12. *Ephedrus persicae* Froggatt, 1904**

*Hyalopterus amygdali* (Blanchard): Sarıkaya, 18.V.1999, and Güzlek-Ahır Mtn., 24.V.2001, both on *Amygdalus communis*

*Dysaphis devecta* (Walker): Afşin-Çobanbey, 29.VI.2000, and Çağlayançerit, 21.VI.2000, both on *Malus communis*

*Myzus cerasi* (Fabricius): Andırın-Ismailli, 16.VI.2000, Çataloluk, 27.V.2000, and Pazarcık-Bağsağır, 26.05.2001, all on *Prunus avium*

Distribution in Turkey: Ankara, Diyarbakır, İzmir, Adana, Tekirdağ (7,10,14,19,20,27)

#### **13. *Lysiphlebus confusus* Tremblay et Eady, 1978**

*Aphis fabae* subsp. *cirsiiacanthoidis* Scopoli: Sarıkaya, 18.V.1999, and Center, 18.V.2001, both on *Cirsium arvense*

*Aphis punicae* Passerini: Çataloluk, 27.V.2000, on *Punica granatum*

*Aphis ruborum* (Börner): Çataloluk, 27.V.2000, Afşin, 02.VI.2001, and Göksun-Fırnız, 19.V.2001, all on *Rubus caesius*

*Brachycaudus helichrysi* (Kaltenbach): Çağlayançerit-Belen, 21.VI.2000, on *Achillea millefolium*; Hasancık, 16.VI.2000, on *Centaurea solstitialis*

Distribution in Turkey: Adana, Hatay, İçel (2,26)

#### **14. *Lysiphlebus fabarum* (Marshall, 1896)**

*Aphis craccivora* Koch: Center, 31.VII.1999 and 19.VI.2000, on *Robinia pseudoacacia*; Afşin, 02.VI.2001, on *Trigonella monantha* subsp. *noeouana* and *Vicia* sp.; Pazarcık, 26.V.2001, on *Vicia cypria*; Tekir, 27.V.2001, on *Galium aparine*

*Aphis fabae* Scopoli: Center, 01.V.2001, on *Pimpinella* sp.; Tekir, 27.V.2001, on *Rumex crispus*

*Aphis fabae* subsp. *cirsiacanthoidis* Scopoli: Center, 18.V.2001, and Sarıkaya, 18.V.1999, on *Cirsium arvense*

*Aphis intybi* Koch: Tekir, 27.V.2001, on *Cichorium intybus*

*Aphis nerii* Boyer de Fonscolombe: Karacasu, 20.V.2001, and Pazarcık, 26.V.2001, both on *Nerium oleander*

Distribution in Turkey: Adana, Ankara, Diyarbakır, Hatay, İçel, İzmir, Konya, Mardin, Muğla, Şanlıurfa, Tekirdağ (1,2,7,8,10,11,12,17,19,25,26,27)

**15. *Lysiphlebus* cf. *fabarum* (Marshall) –group**

*Brachycaudus helichrysi* (Kaltenbach): Çağlayancerit-Belen, 21.VI.2000, on *Achillea millefolium*; Hasancık, 16.VI.2000, on *Centaurea solstitialis*

*Brachycaudus* sp.: Çağlayancerit, 21.VI.2000, on *Eryngium campestre* L.

*Brachycaudus* (*Acaudus*) *cardui* (L.): Sarıkaya, 18.V.1999, on *Cirsium arvense*; Tekir, 27.V.2001, on *Eryngium compestre*

*Dysaphis* (*Pomaphis*) *plantaginea* (Passerini): Afşin-Erçene, 02.VI.2001, on *Malus communis*

*Uroleucon* (*Uromelan*) *jaceae* (L.): Göksun, 27.V.2001, on *Onopordum anatolicum*

**16. *Pauesia picta* (Haliday, 1834)**

*Cinara pini* (L.): Tekir, 27.V.2001, on *Pinus nigra* subsp. *pallasiana*

Distribution in Turkey: *Pauesia picta* (Haliday) is reported for the first time from Turkey

**17. *Pauesia* sp. A**

*Cinara cedri* Mimeur: Karacasu, 20.V.2001, on *Cedrus libani*

**18. *Praon* sp.**

*Acyrtosiphon ilka* Mordvilko: Suçatı, 27.V.2001, on *Glaucium corniculatum*

**19. *Trioxyis pallidus* (Haliday, 1833)**

*Chromaphis juglandicola* (Kaltenbach): Çitosan, 21.VI.2000, on *Juglans regia*

Distribution in Turkey: Without locality (22)

APHID-PARASITOID LIST

*Acyrtosiphon ilka* Mordvilko

*Praon* sp.

*Aphis affinis* Del Guercio

*Aphelinus* sp.

*Aphidius matricariae* Haliday

*Aphis craccivora* Koch

*Aphidus* sp. A

*Binodoxys angelicae*

*Lysiphlebus fabarum*

*Aphis fabae* Scopoli

*Aphelinus* sp.

*Binodoxys angelicae*

*Lysiphlebus confusus*

*Lysiphlebus fabarum*  
**Aphis intybi** Koch  
*Lysiphlebus fabarum*  
**Aphis nerii** Boyer de Fonscolombe  
*Lysiphlebus fabarum*  
*Aphelinus* sp.  
**Aphis punicae** Passerini  
*Lysiphlebus confusus*  
**Aphis ruborum** (Börner)  
*Aphelinus* sp.  
*Lysiphlebus confusus*  
*Binodoxys angelicae*  
**Aphis ruborum** Börn.  
*Aphidius* sp. B  
**Brachycaudus helichrysi** (Kaltenbach)  
*Lysiphlebus confusus*  
*Lysiphlebus* cf. *fabarum*-group  
**Brachycaudus (Acaudus) cardui** (L.)  
*Lysiphlebus* cf. *fabarum*-group  
**Brachycaudus (Appelia) tragopogonis** (Kaltenbach)  
*Aphidius matricariae*  
**Brachycaudus** sp.  
*Lysiphlebus* cf. *fabarum*-group  
**Brevicoryne brassicae** (L.)  
*Diaeretiella rapae*  
**Capitophorus** sp. (?)  
*Aphidius absinthii*  
**Cinara cedri** Mimeur  
*Pauesia* sp. A  
**Chromaphis juglandicola** (Kaltenbach)  
*Trioxyys pallidus*  
**Cinara pini** (L.)  
*Pauesia picta*  
**Dysaphis devectora** (Walker)  
*Ephedrus persicae*  
**Dysaphis (Pomaphis) plantaginea** (Passerini)  
*Lysiphlebus fabarum*  
**Hyadaphis tataricae** (Aizenberg)  
*Diaeretiella rapae*  
**Hyalopterus amygdali** (Blanchard)  
*Aphidius transcaspicus*  
*Ephedrus persicae*  
**Hyalopterus pruni** (Geoffroy)  
*Aphidius transcaspicus*  
**Macrosiphoniella artemisiae** (Boyer de Fonscolombe)  
*Aphidius absinthii*

**Metopolophium dirhodum** (Walker)  
*Aphidius uzbekistanicus*  
**Myzus cerasi** (Fabricius)  
*Ephedrus persicae*  
**Rhopalosiphum padi** (L.)  
*Aphidius* cf. *transcaspicus* -group  
*Aphidius uzbekistanicus*  
**Uroleucon** (*Uromelan*) **jaceae** (L.)  
*Lysiphlebus fabarum*  
**Uroleucon** sp.  
*Aphidius funebris*

#### PLANT-APHID-PARASITOID LIST

**Achillea millefolium**- *Brachycaudus helichrysi* (*Lysiphlebus* cf. *fabarum*-group, *Lysiphlebus confusus*)  
**Amygdalus communis**- *Hyalopterus amygdali* (*Aphidius transcaspicus*, *Ephedrus persicae*)  
**Artemisia vulgaris**- *Capitophorus* sp. (*Aphidius absinthii*)  
**Artemisia vulgaris**- *Macrosiphoniella artemisiae* (*Aphidius absinthii*)  
**Astragalus** sp.- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*)  
**Brassica oleracea** var. **acephala**- *Brevicoryne brassicae* (*Diaeretiella rapae*)  
**Brassica oleracea** var. **capitata**- *Brevicoryne brassicae* (*Diaeretiella rapae*)  
**Cedrus libani**- *Cinara cedri* (*Pausia* sp.)  
**Centaurea solstitialis**- *Brachycaudus helichrysi* (*Lysiphlebus confusus*, *Lysiphlebus* cf. *fabarum*-group)  
**Centaurea urvillei**- *Uroleucon* sp. (*Aphidius funebris*)  
**Chondrilla juncea**- *Uroleucon* (*Uroleucon*) sp. (*Aphidius funebris*)  
**Cichorium intybus**- *Aphis intybi* (*Lysiphlebus fabarum*)  
**Cirsium arvense**- *Aphis fabae* subsp. *cirsiacanthoidis* (*Binodoxys angelicae*, *Lysiphlebus confusus*, *Lysiphlebus fabarum*)  
**Cirsium arvense**-*Brachycaudus* (*Acaudus*) *cardui* (*Lysiphlebus* cf. *fabarum*-group)  
**Crambe** sp.- *Brevicoryne brassicae* (*Diaeretiella rapae*)  
**Eryngium campestre**- *Brachycaudus* sp. (*Lysiphlebus* cf. *fabarum*-group)  
**Eryngium compestre**- *Brachycaudus* (*Acaudus*) *cardui* (*Lysiphlebus* cf. *fabarum*-group)  
**Galium aparine**- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*, *Lysiphlebus fabarum*)  
**Glaucium corniculatum**- *Acyrtosiphon ilka* (*Praon* sp.)  
**Hordeum vulgare**- *Metopolophium dirhodum* (*Aphidius uzbekistanicus*)  
**Hyalopterus pruni**- *Hyalopterus amygdali* (*Aphidius transcaspicus*)  
**Juglans regia**- *Chromaphis juglandicola* (*Trioxys pallidus*)  
**Lonicera tatarica**-*Hyadaphis tataricae* (*Diaeretiella rapae*)  
**Malus communis**- *Dysaphis devector* (*Ephedrus persicae*)  
**Malus communis**- *Dysaphis* (*Pomaphis*) *plantaginea* (*Lysiphlebus* cf. *fabarum*-group)  
**Medicago sativa**- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*)  
**Mentha arvensis**- *Aphis affinis* (*Aphelinus* sp., *Aphidius matricariae*)  
**Nerium oleander**- *Aphis nerii* (*Aphelinus* sp., *Lysiphlebus fabarum*)

*Onopordum anatolicum*- *Uroleucon* (*Uromelan*) *jaceae* (*Lysiphlebus* cf. *fabarum*-group)  
*Phragmites australis*- *Hyalopterus amygdali* (*Aphidius transcaspicus*)  
*Pimpinella* sp.- *Aphis fabae* (*Aphelinus* sp., *Lysiphlebus fabarum*)  
*Pinus nigra* subsp. *pallasiana*- *Cinara pini* (*Pauesia picta*)  
*Prunus armeniaca*- *Hyalopterus amygdali* (*Aphidius transcaspicus*)  
*Prunus avium*- *Myzus cerasi* (*Ephedrus persicae*)  
*Prunus percica*- *Hyalopterus amygdali* (*Aphidius transcaspicus*)  
*Prunus spinosa*- *Hyalopterus amygdali* (*Aphidius transcaspicus*)  
*Punica granatum*- *Aphis punicae* (*Lysiphlebus confusus*)  
*Robinia pseudoacacia*- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*,  
*Lysiphlebus fabarum*)  
*Rubus caesius*- *Aphis ruborum* (*Aphelinus* sp., *Aphidius* sp., *Binodoxys angelicae*,  
*Lysiphlebus confusus*)  
*Rumex crispus*- *Aphis fabae* (*Aphelinus* sp., *Lysiphlebus fabarum*)  
*Tragopogon pratensis* subsp. *orientalis*- *Brachycaudus* (*Appelia*) *tragopogonis* (*Aphidius*  
*matricariae*)  
*Tragopogon pterocarpus*- *Brachycaudus* (*Appelia*) *tragopogonis* (*Aphidius matricariae*)  
*Trifolium* sp.- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*)  
*Trigonella monantha* subsp. *noeouana*- *Aphis craccivora* (*Aphidius* sp., *Binodoxys*  
*angelicae*, *Lysiphlebus fabarum*)  
*Triticum aestivum*- *Rhopalosiphum padi* (*Aphidius uzbekistanicus*)  
*Typha latifolia*- *Rhopalosiphum padi* (*Aphidius* cf. *transcaspicus*-group, *Aphidius*  
*uzbekistanicus*)  
*Vicia cypria*- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*, *Lysiphlebus fabarum*)  
*Vicia garveiflora*- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*)  
*Vicia* sp.- *Aphis craccivora* (*Aphidius* sp., *Binodoxys angelicae*, *Lysiphlebus fabarum*)

#### DISCUSSION

Additional research is required on the parasitoids of aphids in Turkey. Until now, research has been directed predominantly to specific pest aphids on various crops, but a study of parasitoid-aphid-plant associations has been lacking. Research on native species as potential biocontrol agents for exportation also merits serious attention.

In the present survey 19 taxa of aphid parasitoids were found in the Kahramanmaraş area, which has not yet been exposed to massive applications of pesticides. The aphid hosts found include both economic and non-economic species, and certain species of aphid parasitoids attacked both types of host. The presumed switching of some parasitoid species between different aphid species belonging to these two groups, as well as the potential role of non-economic species as alternative hosts of key-parasitoid species, are topics worthy of further research.

We regard this study as only a preliminary step in describing the aphid-parasitoid complex of Turkey.

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