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Original article (***Orijinal araştırma***)

Aphid (Hemiptera: Aphididae) species in Burdur urban parks with three records for the fauna of Turkey, their host plants and predators[1]

Türkiye faunası için üç yeni kayıt ile birlikte Burdur kent parklarındaki yaprak biti türleri (Hemiptera: Aphididae), konukçu bitkileri ve avcıları

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Abstract

This study was conducted to identify the aphid species on 34 ornamental plants in 16 urban parks in the provincial center of Burdur and their predators in April-November 2018-2019. Forty-eight species in 23 genera of Aphididae were detected. *Aphis craccivora* Koch, 1854, *Cinara* (*Cupressobium*) *tujafilina* (Del Guercio, 1909) and *Macrosiphum rosae* (L., 1758) were most abundant species. *Aphis berberidorum* Ortego & Mier Durante, 1997, *Hannabura alnicola* Matsumura, 1917 and *Prociphilus fraxinifolii* (Riley, 1879) were three new records for the aphid fauna of Turkey. The genus *Hannabura* was recorded for the first time in Turkey. Twenty-nine insect predators of aphids were identified from Coccinellidae (24), Cantharidae (1) (Coleoptera), Nabidae (1), Miridae (1) (Hemiptera), Sryphidae (1) (Diptera) and Forficulidae (1) (Dermaptera). No predators were seen on 12 aphid species and just a single predator each for 11 aphid species. The highest host plant diversity was observed for *A. craccivora* and *Aulacorthum solani* (Kaltenbach, 1843), with three plant species each. The highest number of aphid species (8 species) was found on *Pinus nigra* subsp. *pallasiana* (Lamb.) Holmboe.

Keywords: Aphid, Burdur, predator species, Turkey, urban parks

Öz

Bu çalışma 2018-2019 Nisan-Kasım aylarında Burdur İli merkezinde 16 kent parkındaki 34 ağaç ve çalı üzerindeki yaprak bitlerini belirlemek amacıyla yapılmıştır. Araştırmada, Aphididae familyasından 23 cinse ait 48 tür belirlenmiştir. En fazla popülasyona sahip olan türler *Aphis craccivora* Koch, 1854, *Cinara* (*Cupressobium*) *tujafilina* (Del Guercio, 1909) ve *Macrosiphum rosae* (L., 1758) olmuştur. *Aphis berberidorum* Ortego & Mier Durante, 1997, *Hannabura alnicola* Matsumura, 1917 ve *Prociphilus fraxinifolii* (Riley, 1879) türleri Türkiye afit faunası için üç yeni kayıttır. *Hannabura* cinsi de Türkiye'de ilk kez bu çalışma ile kaydedilmiştir. Yaprak bitlerinin Coccinellidae (24), Cantharidae (1) (Coleoptera), Nabidae (1), Miridae (1) (Hemiptera), Sryphidae (1) (Diptera) ve Forficulidae (1) (Dermaptera) familyalarından 29 avcı türü tespit edilmiştir. 12 yaprak biti türünün avcısı görülmemiş, 12 yaprak biti türünün sadece bir avcı türü görülmüştür. En fazla konukçu bitki çeşitliliği 3 bitki türü ile *A. craccivora* ve *Aulacorthum solani* (Kaltenbach, 1843) türlerinde görülmüştür. En yüksek yaprak biti tür sayısı (8 tür) *Pinus nigra* subsp. *pallasiana* (Lamb.) Holmboe'da bulunmuştur.

Anahtar sözcükler: Yaprak biti, Burdur, avcı türler, Türkiye, kent parkları

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Introduction

Parks and gardens give opportunities for people to meet nature in urban environments, giving aesthetic and visual pleasure from encountering both living and inanimate materials. Living materials consist of ornamental plants which are generally under physiological stress in urban ecosystems with their green parts exposed to high concentrations of many undesirable chemicals due to air pollution; this exposure can result in proliferation of several harmful species. The most common harmful species found in parks and landscape areas include aphids, white flies, Thripidae, Coccoidea and onion flies (Yaşar, 2017).

More than 5 600 species of aphids are known globally, over 75% of which are found in the Palearctic (Holman, 2009; Özdemir, 2020; Blackman & Eastop, 2021; Favret, 2021). In Turkey, 591 species with 26 aphid subspecies in 147 genera in 3 families and 15 subfamilies have been reported (Kök & Özdemir, 2021). Most of these species are of foreign origin within only about 2% of Turkey's aphid fauna originating in Turkey (Görür et al., 2020). Aphids cause direct harm by sucking plant sap while indirect harm arises from secreted honeydew leading to sooty mold formation; aphids also transmit many plant diseases, particularly viruses (Uygun et al., 2000). Sooty mold obstructs plant stomata with honeydew and fungal growth, inhibiting photosynthesis and transpiration. Also, gall formation, leaf roll, yellowing and dehydration due to aphid feeding, can, in turn, decrease seed yield, shoot formation photosynthetic rates, chlorophyll quantities and nutrient concentrations. All these effects result in quality and yield loss in plants (Görür, 2008). Biological methods, however, can be crucial for controlling aphids, since the organisms are small, reproduce rapidly, including by cyclic parthenogenesis, and adapt easily to climate change (Dixon, 1998; Uygun et al., 2000). Aphids can feed on many parts of trees such as leaves, branches, shoots, trunks and roots, according to their mouth structure. For this reason, more than one aphid species can be found on a tree (Carter & Maslen, 1982). Especially the species in the Lachninae subfamily of the Aphididae family feed on both the leaves and stems of needle and broadleaf trees (Chen et al., 2016). Many species from Coleoptera, Hemiptera, Neuroptera, Diptera and Hymenoptera are fed with aphids, and some of these species are used as biological control agents (Aslan & Uygun, 2005; Aslan, 2015; Kök et al., 2020). Of known aphid species globally, 56% feed on trees (Blackman & Eastop, 2021); it is important, therefore, to identify aphid species damaging trees, determine the natural enemies and implement biological control methods with a view to protecting forests.

Turkey is noted for having a remarkable diversity of flora and fauna. Within this diversity, it is important to identify potentially damaging pest species in natural ecosystems and in landscape areas, parks and gardens, and to determine the species of natural enemies present so that appropriate, sustainable measures can be taken against problematic species. In Turkey, harmful and beneficial species were identified in landscape areas, parks and gardens in several cities; in contrast, no comprehensive study has been conducted to date in the parks and gardens of Burdur Province. Various harmful insects were observed on trees and shrubs in the parks and landscape areas in Burdur, which occasionally reduced the aesthetics of these parks' gardens, sometimes killing the affected plants (pers. observations). No detailed study has been conducted to date with a view to identifying and controlling pest insects in Burdur. However, there are certain records reported in some studies. The aim for the word described here, therefore, was to conduct a comprehensive survey of aphid pests and associated predator species in parks and gardens of Burdur.

Materials and Methods

The study focused on 34 ornamental trees and shrubs located in 16 parks near the center of Burdur. Surveys were conducted in April-November 2018-2019 (land surveys conducted 3-4 times on different dates) and aphid and predator species collected. In order to collect samples, sites were visited on dry and sunny days and trunks, branches, shoots, leaves and flowers of the plants examined. Insects in pre-adult stages were collected from the plants on which the insects were found. Plant samples were labeled and

placed in polyethylene bags for transport to the laboratory. Voucher specimens were deposited at the Entomology Department of Forestry Faculty in Isparta University. For collection and transport of insects, polyethylene bags, secateurs, sweep nets, suction tubes, soft brushes, pliers, Falcon tubes, Japanese umbrellas, killing jars, insect needles, labels, Petri dishes, 70% ethanol, paper bags, a notebook and GPS were used. Where possible, adult insects were collected manually, flying insects were collected with a sweep net. After preparation, insects were numbered and placed in insect boxes. Smaller insects were caught with an aspirator and suction bottles, numbered and placed in insect boxes. Winged and wingless insects on the plants contaminated with aphids were collected with a number zero brush and placed in tubes containing 96% ethanol along with necessary label information (location, date of collection and host plant). During the collection of predators, if a living organism that they could feed on was observed on the same plant, this species was also noted as prey.

All adult insects collected were preserved as museum specimens through penetration methods, such as needling and attaching on cards. Cotton impregnated with lavender oil was placed in boxes to avoid the exposure of the samples stored in collection boxes to damage by the pests. After aphids were stored in 96% alcohol and separated under the microscope, they were prepared according to Martin (1983). Prepared samples were identified based on an existing identification key (Blackman & Eastop, 2021). For scientific nomenclature, the literature and online databases (fauna-eu.org and aphidspeciesfile.org; access date: 20 April 2021) were used as a reference. Families of predator species were segregated and identified based on morphological characteristics using a Nikon SMZ445 model stereo microscope. Morphologies were identified based on literature and existing museum material in the Faculty of Forestry, Isparta Applied Sciences University. Samples that could not be identified were referred to other experts. All samples were prepared as museum materials and placed in collection boxes after labeling in Entomology Museum in Faculty of Forestry.

Results and Discussion

The trees and shrubs in the urban parks of Burdur yielded 48 aphid species were found from Aphidinae (22 species), Calaphidinae (7 species), Chaitophorinae (2 species), Lachninae (14 species), Mindarinae (1 species), Eriosomatinae (1 species) and Thelaxinae (2 species) subfamilies in the Aphididae. The data about the species is presented below.

Subfamily: Aphidinae

Tribe: Aphidini

***Aphis berberidorum* Ortego & Mier Durante, 1997**

Material examined. Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 20.04.2018, *Berberis thunbergii* DC. (18 specimens).

Aphis berberidorum is new species for the Turkish aphid fauna.

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

Material examined. Cemil District Park, 37°43’13” N, 30°17'43" E, 975 m, 02.06.2018, *Gleditsia triacanthos* L. (98 specimens); 26.08.2018, *Robinia pseudoacacia* L. (87 specimens); 27.07.2019, *R. pseudoacacia* L. (88 specimens); 03.08.2019, *R. pseudoacacia* L. (51 specimens); Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 07.07.2019, *Punica granatum* L. (14 specimens); Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 16.06.2019, *R. pseudoacacia* L. (46 specimens); Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 29.06.2019, *R. pseudoacacia* L. (42 specimens) (426 specimens in total).

***Aphis* (*Aphis*) *fabae* Scopoli, 1763**

Material examined. Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 01.06.2019, *Ligustrum japonicum* Thunb. (7 specimens).

***Aphis* (*Aphis*) *gossypii* Glover, 1877**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 19.07.2019, *Salix babylonica* L. (23 specimens).

***Aphis* (*Aphis*) *hederae* Kaltenbach, 1843**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 12.05.2018, *Hedera helix* L. (25 specimens); Cumhuriyet Park, 37°43'07" N, 30°16'54" E, 960 m, 14.08.2018, *H. helix* (13 specimens) (38 specimens in total).

***Aphis* (*Aphis*) *punicae* Passerini, 1863**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 12.05.2018, *P. granatum* (105 specimens).

***Aphis* (*Aphis*) *sambuci* L., 1758**

Material examined. Cumhuriyet Park, 37°43'07" N, 30°16'54" E, 960 m, 02.05.2018, *Pittosporum tobira* (Thunb.) W. T. Aiton (2 specimens); 18.05.2019, *H. helix* (25 specimens) (27 specimens in total).

***Aphis* (*Aphis*) *viburni* Scopoli, 1763**

Material examined. Barış Park, 37°43'15" N, 30°17'08" E, 957 m, 18.05.2019, *Viburnum tinus* L. (7 specimens).

***Hyalopterus amygdali* (E. Blanchard, 1840)**

Material examined. Emekevler Park, 37°43'10" N, 30°15'11" E, 917 m, 04.08.2019 (26 specimens); 16.06.2019 (20 specimens), *Prunus dulcis* (Mill.) D.A.Webb (46 specimens) (92 specimens in total).

***Hyalopterus arundiniformis* (Ghulamullah, 1942)**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 16.06.2019, *Prunus armeniaca* L. (12 specimens).

***Rhopalosiphum padi* (L., 1758)**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 12.05.2018, *P. granatum* (11 specimens).

***Hyalopterus pruni* (Geoffroy, 1762)**

Material examined. Cemil District Park, 37°43'13" N, 30°17'43" E, 975 m, 02.06.2018, *Prunus domestica* L. (56 specimens).

Tribe: Macrosiphini

***Acyrthosiphon* (*Acyrthosiphon*) *gossypii* Mordvilko, 1914**

Material examined. Fevzi Çakmak Park, 37°43'31" N, 30°14'24" E, 882 m, 16.06.2019, *Rosa* sp. (15 specimens).

***Acyrthosiphon* (*Acyrthosiphon*) *malvae* (Mosley, 1841)**

Material examined. Üçgen Park, 37°43'20" N, 30°17'14" E, 952 m, 12.05.2019, *B. thunbergii* (6 specimens).

***Cavariella* (*Cavariella*) *aegopodii* (Scopoli, 1763)**

Material examined. Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 21.11.2018, *Salix babylonica* L. (9 specimens); Emekevler Park, 37°43'10" N, 30°15'11" E, 917 m, 21.04.2018 (77 specimens), 19.05.2019 (12 specimens) and 04.08.2019 (3 specimens), *S. babylonica* L.; Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 12.05.2019, *S. babylonica* L. (69 specimens); Pazaryeri Park, 37°43'13" N, 30°17'10" E, 960 m, 12.05.2019, *Salix alba* L. (110 specimens) (280 specimens in total).

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

Material examined. Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 19.07.2019, *Rosa* sp. (10 specimens).

***Liosomaphis berberidis* (Kaltenbach, 1843)**

Material examined. Pazaryeri Park, 37°43'13" N, 30°17'10" E, 960 m,19.05.2019, *B. thunbergii* (30 specimens).

***Aulacorthum* (*Aulacorthum*) *solani* (Kaltenbach, 1843)**

Material examined. Cemil District Park, 37°43'13" N, 30°17'43" E, 975 m, 26.08.2018, *Ligustrum vulgare* L. (102 specimens); Aşıklar Park, 37°43'12" N, 30°16'50" E, 953 m, 03.05.2019, *Prunus laurocerasus* L. (72 specimens); Pazaryeri Park, 37°43'13" N, 30°17'10" E, 960 m,12.05.2019, *P. laurocerasus* (12 specimens); Üçgen Park, 37°43'20" N, 30°17'14" E, 952 m, 12.05.2019, *Viburnum opulus* L. (31 specimens); Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 12.05.2019, *R. pseudoacacia* (42 specimens) (259 specimens in total).

***Macrosiphum* (*Macrosiphum*) *euphorbiae* (Thomas, 1878)**

Material examined. Üçgen Park, 37°43'20" N, 30°17'14" E, 952 m, 27.04.2018, *P. laurocerasus* (10 specimens); Aşıklar Park, 37°43'12" N, 30°16'50" E, 953 m, 09.05.2018 (12 specimens) and 28.10.2018 (9 specimens), *P. laurocerasus* (31 specimens in total).

***Macrosiphum* (*Macrosiphum*) *rosae* (L., 1758)**

Material examined. Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 22.04.2018 (11 specimens), 18.05.2018 (23 specimens) and 19.07.2019 (10 specimens), *Rosa* sp.; Barış Park, 37°43'15" N, 30°17'08" E, 957 m, 20.11.2018 (8 specimens), 18.05.2019 (243 specimens) and 04.08.2019 (21 specimens), *Rosa* sp.; Öğretmenevi Park, 37°43'04" N, 30°16'32" E, 959 m, 03.08.2019, *Rosa* sp. (9 specimens); İstasyon Çay Bahçesi, 37°43'25" N, 30°17'03" E, 946 m, 27.07.2019, *Rosa* sp. (60 specimens); Fevzi Çakmak Park, 37°43'31" N, 30°14'24" E, 882 m, 16.06.2019, *Rosa* sp. (15 specimens); Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 27.04.2018, *R. pseudoacacia* (15 specimens) (415 specimens in total).

***Macrosiphum pallidum* (Oestlund, 1887)**

Material examined. Barış Park, 37°43'15" N, 30°17'08" E, 957 m, 02.05.2018, *V. tinus* (2 specimens); Öğretmenevi Park, 37°43'04" N, 30°16'32" E, 959 m, 18.05.2018, *P. tobira* "Nana" (20 specimens) (22 specimens in total).

***Ovatus* (*Ovatus*) *insitus* (Walker, 1849)**

Material examined. Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 19.05.2019, *Chaenomeles japonica* (Thunb.) Lindl. ex Spach (23 specimens).

Subfamily: Calaphidinae

Tribe: Calaphidini

****Hannabura alnicola* Matsumura, 1917**

Material examined. Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 20.11.2018, *Alnus glutinosa* (L.) Gaertn. (62 specimens).

Hannabura alnicola is new species for the Turkish aphid fauna.

Tribe: Panaphidini

***Hoplochaitophorus dicksoni* (Quednau, 1999)**

Material examined. Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 03.05.2019, *Quercus robur* L. (108 specimens).

***Myzocallis* (*Myzocallis*) *boerneri* Stroyan, 1957**

Material examined. Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 20.10.2018, *Q. robur* (20 specimens).

***Tuberculatus maximus* Hille Ris Lambers, 1974**

Material examined. Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 20.04.2018 (9 specimens) and 20.10.2018 (25 specimens), *Q. robur* (34 specimens in total).

***Panaphis juglandis* (Goeze, 1778)**

Material examined. Cemil District Park, 37°43'13" N, 30°17'43" E, 975 m, 02.06.2018, *Juglans regia* L. (36 specimens); Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 16.06.2019, *J. regia* (14 specimens) (50 specimens in total).

***Eucallipterus tiliae* (L., 1758)**

Material examined. Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 21.09.2018 (20 specimens), 12.05.2019 (65 specimens) and 29.06.2019 (7 specimens), *Tilia platyphyllos* Scop.; Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 16.06.2019, *T. platyphyllos* (22 specimens); Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 10.06.2019, *T. platyphyllos* (6 specimens); Barış Park, 37°43'15" N, 30°17'08" E, 957 m, 18.05.2019, *T. platyphyllos* (8 specimens); Öğretmenevi Park, 37°43'04" N, 30°16'32" E, 959 m, 10.06.2019, *T. platyphyllos* (50 specimens); Fevzi Çakmak Park, 37°43'31" N, 30°14'24" E, 882 m, 16.06.2019, *Tilia tomentosa* Moench (14 specimens) (192 specimens in total).

***Sarucallis kahawaluokalani* (Kirkaldy, 1907)**

Material examined. Öğretmenevi Park, 37°43'04" N, 30°16'32" E, 959 m, 19.05.2019, *Lagerstroemia indica* L. (one specimen).

Subfamily: Chaitophorinae

Tribe: Chaitophorini

***Capitophorus elaeagni* (Del Guercio, 1894)**

Material examined. Emekevler Park, 37°43'10" N, 30°15'11" E, 917 m, 16.06.2019, *Elaeagnus angustifolia* L. (4 specimens).

***Chaitophorus lapponum* (Ossiannilsson, 1959)**

Material examined. Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 04.08.2019, *Salix babylonica* L. (63 specimens).

Subfamily: Lachninae

Tribe: Eulachnini

***Cinara* (*Cinara*) *cedri* Mimeur, 1936**

Material examined. Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 21.11.2018, *Cedrus libani* A. Rich. (3 specimens); Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 27.07.2019, *C. libani* (48 specimens) (51 specimens in total).

***Cinara* (*Cinara*) *curvipes* (Patch, 1912)**

Material examined. Cumhuriyet Park, 37°43'07" N, 30°16'54" E, 960 m, 02.05.2018, *Abies nordmanniana* subsp. *equi-trojani* (Asch. & Sint. Ex Boiss.) Coode & Cullen (4 specimens); Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 01.06.2019, *C. libani* (4 specimens) (8 specimens in total).

***Cinara* (*Cinara*) *occidentalis* (Davidson, 1909)**

Material examined. Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 02.09.2018, *A. nordmanniana* subsp. *equi-trojani* (1 specimen).

***Cinara* (*Cinara*) *pilicornis* (Hartig, 1841)**

Material examined. Cumhuriyet Park, 37°43'07" N, 30°16'54" E, 960 m, 18.05.2019, *Picea glauca* 'Conica' (Moench) Voss (3 specimens); 04.08.2019, *Picea orientalis* (L.) Peterm. (12 specimens) (15 specimens in total).

***Cinara* (*Schizolachnus*) *pineti* (Fabricius, 1781)**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 18.04.2018, *Pinus nigra* Arnold subsp. *pallasiana* (Lamb.) Holmboe (47 specimens).

***Cinara* (*Cinara*) *piniphila* (Ratzeburg, 1844)**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 18.04.2018, *P. nigra* subsp. *pallasiana* (8 specimens).

***Cinara* (*Cinara*) *pinivora* (Wilson, 1919)**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 20.04.2018, *P. nigra* subsp. *pallasiana* (12 specimens).

***Cinara* (*Cupressobium*) *tujafilina* (Del Guercio, 1909)**

Material examined. Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 06.04.2018 (13 specimens), 26.08.2018 (30 specimens) and 01.06.2019 (3 specimens), *Platycladus orientalis* (L.) Franco; Fevzi

Çakmak Park, 37°43'31" N, 30°14'24" E, 21.04.2018 (11 specimens), 21.11.2018 (84 specimens) and 16.06.2019 (39 specimens), *P. orientalis*; Forest Office Garden, 37°43'05" N, 30°16'38" E, 956 m, 20.11.2018, *P. orientalis* (98 specimens); Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 19.07.2019, *P. orientalis* (9 specimens); Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 12.05.2019 (145 specimens), 29.06.2019 (52 specimens) and 27.07.2019 (45 specimens), *P. orientalis;* Cumhuriyet Park, 37°43'07" N, 30°16'54" E, 960 m, 18.05.2019, *P. orientalis* (5 specimens) (534 specimens in total).

***Cinara wahluca* (Hottes, 1952)**

Material examined. Öğretmenevi Park, 37°43'04" N, 30°16'32" E, 959 m, 18.05.2018, *Juniperus foetidissima* Willd. (13 specimens).

***Cinara watanabei* (Inouye, 1970)**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 20.04.2018, *P. nigra* subsp. *pallasiana* (24 specimens).

***Eulachnus cembrae* Börner, 1950**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 20.04.2018 (22 specimens) and 05.10.2018 (23 specimens), *P. nigra* subsp. *pallasiana* (45 specimens in total).

***Eulachnus nigricola* (Pasek, 1953)**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, *P. nigra* subsp. *pallasiana,* 07.07.2018 (14 specimens) and 05.10.2018 (20 specimens)*;* Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 27.04.2018, *P. nigra* subsp. *pallasiana* (28 specimens); Gençlik Park, 37°42'59" N, 30°16'15" E, 958 m, 21.04.2018, *Pinus brutia* Ten. (68 specimens) (137 specimens in total).

***Eulachnus pumilae* (Inouye, 1939)**

Material examined. Özgür District Park, 37°43'27" N, 30°17'18" E, 948 m, 27.04.2018 (7 specimens) and 12.05.2019 (12 specimens), *P. nigra* subsp. *pallasiana* (19 specimens in total).

***Eulachnus tuberculostemmatus* (Theobald, 1915)**

Material examined. Hospital Park, 37°43'26" N, 30°17'38" E, 959 m, 26.08.2018 (8 specimens) and 01.06.2019 (38 specimens), *P. nigra* subsp. *pallasiana* (46 specimens in total).

Subfamily: Mindarinae

***Mindarus abietinus* Koch, 1857**

Material examined. Güzelleştirme Park, 37°43'21" N, 30°16'55" E, 948 m, 03.05.2019, *A. nordmanniana* subsp. *equi-trojani* (16 specimens).

Subfamily: Eriosomatinae

Tribe: Pemphigini

***Prociphilus* (*Meliarhizophagus*) *fraxinifolii* (Riley, 1879)**

Material examined. Pazaryeri Park, 37°43'13" N, 30°17'10" E, 960 m, 27.07.2019 (105 specimens) and 04.08.2019 (178 specimens), *Fraxinus excelsior* L. (283 specimens).

Prociphilus (*M.*) *fraxinifolii* is new species for the Turkish aphid fauna.

Subfamily: Thelaxinae

Tribe: Thelaxini

***Thelaxes suberi* (Del Guercio, 1911)**

Material examined. Eczacı Nurhan Çiftçibaşı Park, 37°43'17" N, 30°16'43" E, 947 m, 20.10.2018, *Q. robur* (45 specimens).

In all, 3698 aphid individuals were collected. The species with the highest population were *C. tujafilina* (534 individuals; 14,4%), *A. craccivora* (426; 11.5%) and *M. rosae* (415; 11.2%). *Cinara occidentalis* and *S. kahawaluokalani* were the least common aphid species with one individual each. Across the 16 parks examined, *M. rosae*, *E. tiliae* and *C. tujafilina* were found in six parks and the most common aphid species in all parks. Thirty-two aphid species were observed in 2018, compared with 30 in 2019: 10 were found in both years. Across the years, 1468 individuals were found in 2018, 2230 in 2019. According to months, it was seen that the greatest number of specimens (1029 specimens) is in May 2019. Aphid was not determined in November 2018 and in April, September, October and November 2019 (Table 1).

Table 1. Aphid species and the number of specimens identified in 2018-2019 (April-November)

Species	2018								2019							Total	%
	A	M	J	J	A	S	O	N	A	M	J	J	A	S	O	N		
Aphidinae: Aphidini																		
**Aphis berberidorum*	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	0.5
Aphis (*Aphis*) *craccivora*	-	-	98		87	-	-	-	-	-	88	102	51	-	-	-	426	11.5
Aphis (*Aphis*) *fabae*	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	7	0.2
Aphis (*Aphis*) *gossypii*	-	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	23	0.6
Aphis (*Aphis*) *hederae*	-	25	-	-	13	-	-	-	-	-	-	-	-	-	-	-	38	1.0
Aphis (*Aphis*) *punicae*	-	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105	2.8
Aphis (*Aphis*) *sambuci*	-	2	-	-	-	-	-	-	-	25	-	-	-	-	-	-	27	0.7
Aphis (*Aphis*) *viburni*	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	7	0.2
Hyalopterus amygdali	-	-	-	-	-	-	-	-	-	-	20	-	26	-	-	-	46	1.2
Hyalopterus arundiniformis	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	12	0.3
Hyalopterus pruni	-	-	56	-	-	-	-	-	-	-	-	-	-	-	-	-	56	1.5
Rhopalosiphum padi	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	0.3
Aphidinae: Macrosiphini																		
Acyrthosiphon (*Acyrthosiphon*) *gossypii*	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	15	0.4
Acyrthosiphon (*Acyrthosiphon*) *malvae*	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	6	0.2
Cavariella (*Cavariella*) *aegopodii*	77	-	-	-	-	-	-	9	-	191	-	-	3	-	-	-	280	7.6
Chaetosiphon (*Pentatrichopus*) *tetrarhodum-*		-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	10	0.3
Liosomaphis berberidis	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	30	0.8
Aulacorthum (*Aulacorthum*) *solani*	-	-	-	-	102	-	-	-	-	157	-	-	-	-	-	-	259	7.0
Macrosiphum (*Macrosiphum*) *euphorbiae*	10	12	-	-	-	-	9	-	-	-	-	-	-	-	-	-	31	0.8
Macrosiphum pallidum	-	2	20	-	-	-	-	-	-	-	-	-	-	-	-	-	22	0.6
Macrosiphum (*Macrosiphum*) *rosae*	26	23	-	-	-	-	-	8	-	243	15	70	30	-	-	-	415	11.2
Ovatus (*Ovatus*) *insitus*	-	-	-	-	-	-	-	-	-	23	-	-	-	-	-	-	23	0.6

Table 1. (Continued)

Species	2018								2019								Total	%
	A	M	J	J	A	S	O	N	A	M	J	J	A	S	O	N		
Calaphidinae: Calaphidini																		
**Hannabura alnicola*	-	-	-	-	-	-	-	62	-	-	-	-	-	-	-	-	62	1.7
Hoplochaitophorus dicksoni	-	-	-	-	-	-	-	-	-	108	-	-	-	-	-	-	108	2.9
Myzocallis (*Myzocallis*) *boerneri*	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	20	0.5
Tuberculatus maximus	9	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	34	0.9
Panaphis juglandis	-	-	36	-	-	-	-	-	-	-	14	-	-	-	-	-	50	1.4
Eucallipterus tiliae	-	-	-	-	-	20	-	-	-	73	99	-	-	-	-	-	192	5.2
Sarucallis kahawaluokalani	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	0.0
Chaitophorinae: Chaitophorini																		
Chaitophorus elaeagni	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	4	0.1
Chaitophorus lapponum	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	63	1.7
Lachninae: Eulachnini																		
Cinara (*Cinara*) *cedri*	-	-	-	-	-	-	-	3	-	-	-	48	-	-	-	-	51	1.4
Cinara (*Cinara*) *curvipes*	-	4	-	-	-	-	-	-	-	-	4	-	-	-	-	-	8	0.2
Cinara (*Cinara*) *occidentalis*	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	0.0
Cinara (*Cinara*) *pilicornis*	-	-	-	-	-	-	-	-	-	3	-	-	12	-	-	-	15	0.4
Cinara (*Schizolachnus*) *pineti*	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	1.3
Cinara (*Cinara*) *piniphila*	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	0.2
Cinara pinivora	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	0.3
Cinara (*Cupressobium*) *tujafilina*	24	-	-	-	30	-	-	182	-	150	94	54	-	-	-	-	534	14.4
Cinara wahluca	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	0.4
Cinara watanabei	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	0.6
Eulachnus cembrae	22	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	45	1.2
Eulachnus nigricola	96	-	-	14	-	-	20	-	-	-	-	-	-	-	-	-	130	3.5
Eulachnus pumilae	7	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	19	0.5
Eulachnus tuberculostemmatus	-	-	-	-	8	-	-	-	-	-	38	-	-	-	-	-	46	1.2
Mindarinae																		
Mindarus abietinus	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	16	0.4
Eriosomatinae: Pemphigini																		
**Prociphilus* (*Meliarhizophagus*) *fraxinifolii*	-	-	-	-	-	-	-	-	-	-	-	105	178	-	-	-	283	7.7
Thelaxinae: Thelaxini																		
Thelaxes suberi	-	-	-	-	-	-	45	-	-	-	-	-	-	-	-	-	45	1.2
TOTAL	380	197	210	14	240	21	142	264	0	1029	426	412	363	0	0	0	3698	100
	1468											2230					3698	100,0

When the distribution of the number of aphid specimens by parks is examined, the highest number of individuals (479 specimens) was found in Özgür District Park (P14) in 2019. In 2018, the highest number of specimens (379 specimens) was seen in the Cemil District Park (P3). When looking at the number of species in parks, Güzelleştirme Park (in 2018) and Gençlik Park (in 2019) were detected six and seven, respectively (Figure 1).

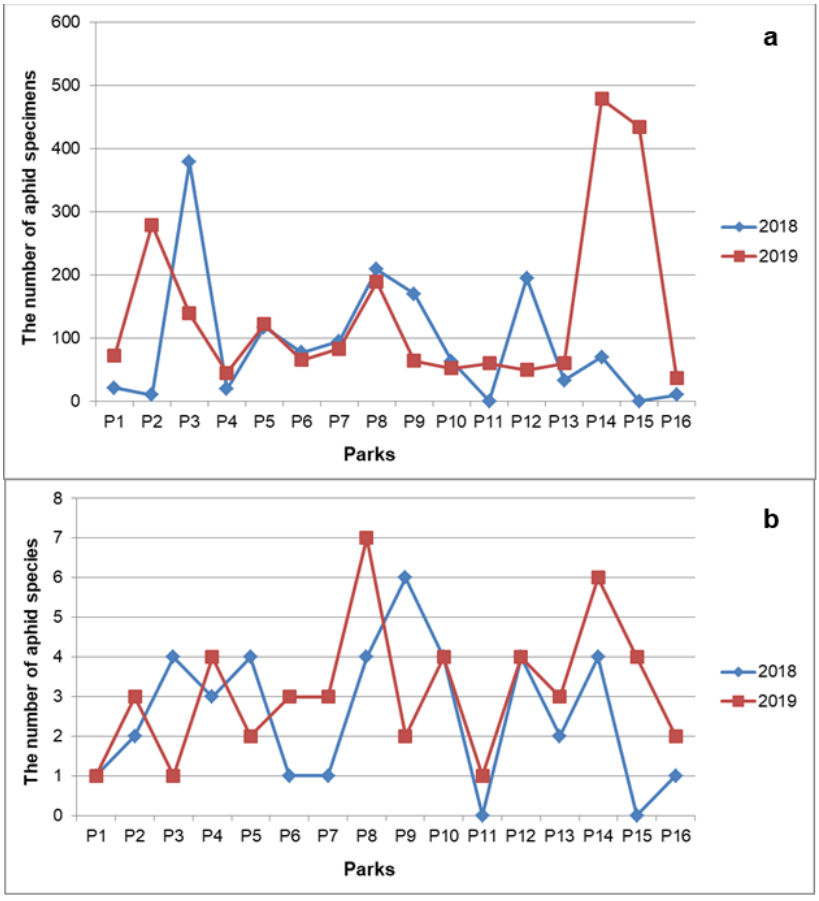

Figure 1. Number of aphid specimens (a) and species (b) in parks in 2018-2019 (P1, Aşıklar Park; P2, Barış Park; P3, Cemil District Park; P4, Cumhuriyet Park; P5, Eczacı Nurhan Çiftçibaşı Park; P6, Emekevler Park; P7, Fevzi Çakmak Park; P8, Gençlik Park; P9, Güzelleştirme Park; P10, Hospital Park; P11, İstasyon Çay Bahçesi; P12, Forest Office Garden; P13, Öğretmenevi Park; P14, Özgür District Park; P15, Pazaryeri Park; and P16, Üçgen Park).

In this work, 29 predator species comprising 289 individuals were detected with one species of Nabidae and one species of Miridae in the order Hemiptera, 24 species of Coccinellidae and one species of Cantharidae family in the Coleoptera, one species of Syrphidae in the Diptera order and one species of Forficulidae in the Dermaptera. The most common predator species found were *Stethorus gilvifrons* with 72 individuals (24.9%), *Propylaea quatuordecimpunctata* (L., 1758) with 42 individuals (14.5%) and *Oenopia conglobata* (L., 1758) (Coleoptera: Coccinellidae) with 28 individuals (9.7%) (Table 2).

Table 3 presents the host plant species and predators of aphid species found in Burdur. Forty-eight aphid species and 29 predator species were detected on 34 host plant species. In terms of tritrophic interactions, 36 aphid species were found on one host plant species. No predators were found on 12 aphids. For 11 aphid species, only a single predator species was found. The highest host plant diversity was observed for *A. craccivora* and *A. solani* species which occurred on three plant species each. The highest predator diversity was found in *E. tiliae* with 11 species, *C. tujafilina* and *E. tuberculostemmatus* each with seven species, and *A. craccivora* and *M. rosae* with five species. The highest number of aphid species (8 species) was observed on *P. nigra*. subsp. *pallasiana* (Table 3).

Table 2. Number of individual predator species sampled and their relative abundance

Order: Family	Predator Species	Number of Specimens	Presence (%)
Hemiptera: Nabidae	*Nabis* (*Nabis*) *pseudoferus* Remane, 1949	1	0,3
Hemiptera: Miridae	*Deraeocoris* (*Knightocapsus*) *lutescens* (Schilling, 1837)	1	0,3
Coleoptera: Coccinellidae	*Adalia* (*Adalia*) *bipunctata* (L., 1758)	25	8,7
	Adalia (*Adalia*) *decempunctata* (L., 1758)	3	1,0
	Adalia fasciatopunctata revelierei (Mulsant,1866)	25	8,7
	Chilocorus bipustulatus (L., 1758)	10	3,5
	Clitostethus arcuatus (Rossi, 1794)	1	0,3
	Coccinella (*Coccinella*) *septempunctata* L., 1758	2	0,7
	Exochomus quadripustulatus (L., 1758)	4	1,4
	Harmonia axyridis (Pallas, 1773)	3	1,0
	Harmonia quadripunctata (Pontoppidan, 1763)	7	2,4
	Hippodamia (*Hippodamia*) *variegata* (Goeze, 1777)	4	1,4
	Hippodamia undecimnotata (Schneider, 1792)	1	0,3
	Myrrha (*Myrrha*) *octodecimguttata* (L., 1758)	6	2,1
	Oenopia conglobata (L., 1758)	28	9,7
	Oenopia lyncea (Olivier, 1808)	2	0,7
	Propylaea quatuordecimpunctata (L., 1758)	42	14,5
	Scymnus (*Scymnus*) *apetzi* (Mulsant, 1846)	3	1,0
	Scymnus (*Scymnus*) *bivulnerus* (Baudi, 1894)	6	2,1
	Scymnus (*Mimopullus*) *flagellisiphonatus* (Fursch, 1969)	1	0,3
	Scymnus (*Scymnus*) *frontalis* (Fabricius, 1787)	10	3,5
	Scymnus (*Scymnus*) *interruptus* (Goeze, 1777)	4	1,4
	Scymnus (*Scymnus*) *rubromaculatus* (Goeze, 1778)	14	4,8
	Scymnus (*Pullus*) *subvillosus* (Goeze, 1777)	8	2,8
	Scymnus pallipediformis (Gunther, 1958)	1	0,3
	Stethorus gilvifrons (Mulsant, 1850)	72	24,9
Coleoptera: Cantharidae	*Cantharis* (*Cantharis*) *livida* (L., 1758)	2	0,7
Diptera: Syrphidae	*Scaeva dignota* (Rondani, 1857)	1	0,3
Dermaptera: Forficulidae	*Forficula auricularia* L., 1758	2	0,7
TOTAL		289	100

Several recent publications have emphasized that Turkey has a diverse aphid fauna (Görür et al., 2020; Özdemir, 2020; Kök & Özdemir, 2021). Three new Turkish records of species in this study are also consistent with this finding. Two of these species originated from South America and one from the Far East (Cœur d'acier, 2010; Blackman & Eastop, 2021). *Aphis berberidorum* was identified by Ortego & Mier Durante (1997) in Chile and Argentina, and subsequently detected in Turkey after this time (Ortego & Mier Durante, 1997; Blackman & Eastop, 2021).

The genus *Hannabura* comprises two species as *H. alnicola* and *Hannabura alnosa* (Pepper, 1950). *Hannabura alnicola* is an East Asia-originated species and *H. alnicola* is North America-originated one. The genus *Hannabura* recorded from Turkey firstly with this study. *H. alnicola* was firstly described in 1917 from Japan and has not been recorded from any country up to date (Matsumura, 1917; Blackman & Eastop, 2021). *Prociphilus* (*M*.) *fraxinifolii* widely distributed in North America, and also occurs in Chile, South Africa, Europe (Hungary, England, Slovenia, Serbia, Spain, Romania, Bulgaria), Russia, Iran, and China (Baker & Martin, 2011; Seljak, 2017; Olenici et al., 2018; Bienkowskaja & Orlova-Bienkowskaja, 2018; Blackman & Eastop, 2021). In this study, *Oenopia conglobata* and *S.* (*S.*) *subvillosus* were recorded for the first time as predators of *A. berberidorum*. Predators associated with aphids have all been previously reported except *O. conglobata* and *S.* (*S.*) *subvillosus* (Coleoptera: Coccinellidae).

Table 3. Aphid species, host plants and predators found in parks and gardens of Burdur

Aphid species	Host Plants	Predators
Acyrthosiphon (*Acyrthosiphon*) *gossypii*	*Rosa* sp.	*Hippodamia undecimnotata, H.* (*Hippodamia*) *variegata*
Acyrthosiphon (*Acyrthosiphon*) *malvae*	*Berberis thunbergii*	-
**Aphis berberidorum*	*B. thunbergii*	*Oenopia conglobata, Scymnus* (*Scymnus*) *subvillosus*
Aphis (*Aphis*) *craccivora*	*Gleditsia triacanthos, Punica granatum, Robinia pseudoacacia*	*Exochomus quadripustulatus, H.* (*H.*) *variegata, O. conglobata, Scymnus* (*Scymnus*) *apetzi, Scymnus* (*Scymnus*) *rubromaculatus*
Aphis (*Aphis*) *fabae*	*Ligustrum japonicum*	*Scymnus* (*Scymnus*) *bivulnerus*
Aphis (*Aphis*) *gossypii*	*Salix babylonica*	*Adalia fasciatopunctata revelierei*
Aphis (*Aphis*) *hederae*	*Hedera helix*	*Coccinella* (*Coccinella*) *septempunctata, O. conglobata*
Aphis (*Aphis*) *punicae*	*Punica granatum*	*Adalia* (*Adalia*) *decempunctata*, *A. fasciatopunctata revelierei*, *Adalia* (*Adalia*) *bipunctata*, *O. conglobata*
Aphis (*Aphis*) *sambuci*	*Hedera helix, Pittosporum tobira* ("nana")	*Clitostethus arcuatus*
Aphis (*Aphis*) *viburni*	*Viburnum tinus*	-
Aulacorthum (*Aulacorthum*) *solani*	*Prunus laurocerasus,* L. vulgare, *V. opulus*	*A. fasciatopunctata revelierei*, *A.* (*A.*) *bipunctata, O. conglobata, S.* (*S.*) *subvillosus*
Cavariella (*Cavariella*) *aegopodii*	*S.babylonica, S. alba*	*A. fasciatopunctata revelierei, A.* (*A.*) *bipunctata, Harmonia axyridis, O. conglobata*
Cinara (*Cinara*) *cedri*	*Cedrus libani*	*E. quadripustulatus*
Cinara (*Cinara*) *curvipes*	*Abies nordmanniana* subsp. *equi-trojani*	*O. conglobata*, *Stethorus gilvifrons*
Cinara occidentalis	*A. nordmanniana* subsp. *equi-trojani*	*S. gilvifrons*
Cinara (*Cinara*) *pilicornis*	*Picea glauca '*Conica', *P. orientalis*	*E. quadripustulatus*, *Scymnus* (*Mimopullus*) *flagellisiphonatus*, *S. gilvifrons*
Cinara (*Schizolachnus*) *pineti*	*Pinus nigra* subsp. *pallasiana*	*C.* (*C.*) *septempunctata, H. quadripunctata, S. gilvifrons*
Cinara (*Cinara*) *piniphila*	*P. nigra* subsp. *pallasiana*	*C.* (*C.*) *septempunctata*
Cinara pinivora	*P. nigra* subsp. *pallasiana*	*C.* (*C.*) *septempunctata*
Cinara (*Cupressobium*) *tujafilina*	*Platycladus orientalis*	*A.* (*A.*) *decempunctata, Chilocorus bipustulatus, C.* (*C.*) *septempunctata, H. quadripunctata, O. conglobata, S.* (*S.*) *subvillosus, Scymnus interruptus, S. gilvifrons*
Cinara wahluca	*Juniperus foetidissima*	*A.* (*A.*) *bipunctata*, *E. quadripustulatus*, *O. conglobata*, *S.* (*S.*) *rubromaculatus*
Cinara watanabei	*P. nigra* subsp. *pallasiana*	*Scaeva dignota*
Chaitophorus elaeagni	*Elaeagnus angustifolia*	*A. fasciatopunctata revelierei*, C. *bipustulatus*, *O. conglobata*
Chaitophorus lapponum	*S. babylonica*	-
Chaetosiphon (*Pentatrichopus*) *tetrarhodum*	*Rosa* sp.	*S.* (*S.*) *rubromaculatus*
Eulachnus cembrae	*P nigra* subsp. *pallasiana*	*S. gilvifrons*
Eulachnus nigricola	*P nigra* subsp. *pallasiana, P. brutia*	*Nabis* (*Nabis*) *pseudoferus, O.conglobata, S. gilvifrons*
Eulachnus pumilae	*P nigra* subsp. *pallasiana*	-
Eulachnus tuberculostemmatus	*P nigra* subsp. *pallasiana, P. brutia*	*C. bipustulatus*, *Myrrha* (*Myrrha*) *octodecimguttata*, *H. quadripunctata*, *S. gilvifrons*
Eucallipterus tiliae	*Tilia platyphyllos, T. tomentosa*	*A.* (*A*). *decempunctata*, *A. fasciatopunctata revelierei*, *A.* (*A.*) *bipunctata*, *M.* (*M.*) *octodecimguttata*, *H. quadripunctata*, *O. conglobata*, *Propylaea quatuordecimpunctata*, *S.* (*S.*) *rubromaculatus, S.* (*S.*) *subvillosus, S. gilvifrons, Cantharis* (*Cantharis*) *livida*

Table 3. (Continued)

Aphid species	Host Plants	Predators
**Hannabura alnicola*	*Alnus glutinosa*	-
Hoplochaitophorus dicksoni	*Quercus robur*	*Deraeocoris* (*Knightocapsus*) *lutescens, O. lyncea*
Hyalopterus amygdali	*Prunus dulcis*	*A. fasciatopunctata revelierei*, *A.* (*A.*) *bipunctata*, *O. conglobata*
Hyalopterus arundiniformis	*P. armeniaca*	-
Hyalopterus pruni	*P. domestica*	-
Liosomaphis berberidis	*B. thunbergii* var. *atropurpurea*	-
Macrosiphum (*Macrosiphum*) *euphorbiae*	*P. laurocerasus*	*P. quatuordecimpunctata*, *S. interruptus, Forficula auricularia*
Macrosiphum pallidum	*V. tinus, P. tobira "nana"*	-
Macrosiphum (*Macrosiphum*) *rosae*	*R. pseudoacacia, Rosa sp.*	*A.* (*A.*) *bipunctata*, *C. bipustulatus*, *H. undecimnotata*, *H.* (*H.*) *variegata*, *P. quatuordecimpunctata*, *S.* (*S.*) *rubromaculatus*, *F. auricularia*
Mindarus abietinus	*A. nordmanniana* subsp. *equi-trojani*	*A.* (*A.*) *bipunctata*, *H. quadripunctata*, *S.* (*S.*) *bivulnerus*
Myzocallis (*Myzocallis*) *boerneri*	*Q. robur*	*P. quatuordecimpunctata*, *S. gilvifrons*
Ovatus (*Ovatus*) *insitus*	*Chaenomeles japonica*	-
Panaphis juglandis	*Juglans regia*	*A. fasciatopunctata revelierei*, *O. conglobata*
**Prociphilus* (*Meliarhizophagus*) *fraxinifolii*	*Fraxinus excelsior*	-
Rhopalosiphum padi	*P. granatum*	*A.* (*A.*) *decempunctata*, A. *fasciatopunctata revelierei*, *A.* (*A.*) *bipunctata*, *O. conglobata*
Sarucallis kahawaluokalani	*Lagerstroemia indica*	-
Thelaxes suberi	*Q. robur*	*P. quatuordecimpunctata*, *S. gilvifrons*
Tuberculatus maximus	*Q. robur*	*P. quatuordecimpunctata*, *S.gilvifrons*

* New records for Turkey fauna.

Aphis (*A.*) *hederae*, *A.* (*A.*) *sambuci*, *A.* (*A.*) *viburni*, *H. arundiniformis*, *H. pruni*, *R. padi*, *A.* (*A.*) *gossypii*, *Ac.* (*Ac.*) *malvae*, *L. berberidis*, *A.* (*A.*) *solani*, *M.* (*M.*) *euphorbiae*, *M. pallidum*, *O.* (*O.*) *insitus*, *H. dicksoni*, *M.* (*M.*) *boerneri*, *T. maximus*, *P. juglandis*, *E. tiliae*, *S. kahawaluokalani*, *C. lapponum*, *C*. (*C.*) *curvipes*, *C. occidentalis*, *C.* (*C.*) *pilicornis*, *C.* (*S.*) *pineti*, *C.* (*C.*) *piniphila*, *C. pinivora*, *C.* (*C.*) *tujafilina*, *C. wahluca*, *C. watanabei*, *E. cembrae*, *E. nigricola*, *E. pumilae* and *E. tuberculostemmatus* species were found for the first time in Burdur Province.

New host records in the present study were as follow; *A.* (*A.*) *sambuci* on *P. tobira*, *R. padi* on *P. granatum*, *A.* (*A.*) *malvae* on *B. thunbergii*, *A.* (*A.*) *solani* on *L. vulgare* and *P. laurocerasus*, *M.* (*M.*) *euphorbiae* on *P. laurocerasus*, *M.* (*M.*) *rosae* on *R. pseudoacacia*, *M. pallidum* on *V. tinus* and *P. tobira*.

Several species of Coccinellidae (Coleoptera) are known to feed on aphids (Uygun, 1981; Giorgi et al., 2009; Weber & Lundgren, 2009; Honek et al., 2017). *Coccinella septempunctata* was the most commonly detected and most widespread species found in many studies (Aslan & Uygun, 2005; Başţuğ & Kasap, 2015; Kök et al., 2017, 2020) whereas only two individuals of this species was found in this study. The most commonly detected predator species in present work were *S. gilvifrons, P. quatuordecimpunctata* and *O. conglobata*. Nine predator species (*Adalia decempunctata* (L., 1758)*, Clitostethus arcuatus* (Rossi, 1794)*, Harmonia axyridis* (Pallas, 1773), *Oenopia lyncea* (Olivier, 1808), *Scymnus rubromaculatus* (Goeze, 1778), *Scymnus frontalis* (Fabricius, 1787)*, Scymnus flagellisiphonatus* (Fursch, 1969)*, Scymnus interruptus* (Goeze, 1777) and *Scaeva dignota* (Rondani, 1857)) were first records for Burdur Province. The *H. axyridis*, a species from East Asia, was detected in the current study, but this species recorded from Turkey in 2014 from the Inner Anatolian part of Turkey (Cappadocia). This species is currently being used for biological control of aphid species in many countries of Europe and North America (Brown et al., 2007; Bukejs & Telnov, 2014). It has now been observed in Bartın, Çanakkale, Düzce, Isparta, Nevşehir and

Tekirdağ (Aysal & Kıvan, 2014; Baştuğ & Kasap, 2015; Kaygın & Kaptan, 2017; Öztemiz & Yayla, 2018; Oğuzoğlu & Avcı, 2019).

In this study, *S. dignota* from the Syrphidae (Diptera) was detected; *Scaeva* spp. have been reported to be among important aphid predators (Demirsoy, 1990; Yetkin, 2006). In this study, *S. dignota* found to predate *C. watanabei* has previously been reported feeding on *A. solani, A. gossypii, Aphis nasturtii* Kaltenbach, 1843 and *Myzus* (*Nectarosiphon*) *persicae* Sulzer, 1776 (Alaserhat et al., 2021). *Forficula auricularia* L., 1758 (Dermaptera: Forficulidae) feeds on aphids (Mueller et al., 1988; Dib et al., 2011; Aslan, 2015; Ölmez-Bayhan et al., 2015), and has been reported as a predator of *A. craccivora* (Ölmez-Bayhan et al., 2015), *Myzus* (*Myzus*) *cerasi* (Fabricius, 1775), *Dysaphis pyri* (Boyer de Fonscolombe, 1841) and *Dysaphis devecta* (Walker, 1849) (Aslan, 2015) in Turkey. In our study, *F. auricularia* was found feeding on *M. rosae* and *M. euphorbia*. In the present work, *N. pseudoferus* was found to be a predator of *E. nigricola*, while *Deraeocoris* (*Knightocapsus*) *lutescens* (Schilling, 1837) (Hemiptera: Miridae) was predating *H. dicksoni*. It is argued that *N. pseudoferus* is a generalist predator and feeds on several organisms, including aphids (Mahdavi & Madadi, 2016; Mahdavi et al., 2020). *Nabis pseudoferus* is recorded as predator of *A. craccivora* (Kök et al., 2020). The prey of *Cantharis* larvae is known to include aphids and Mollusca species (Traugott, 2002; 2003). In this study, *Cantharis livida* was found as a predator of *E. tiliae*.

Increasing global trade over the last 50 years, and ecological changes as a result of climate change have enabled a varied group of organisms, including aphids, to invade new geographical areas and become invasive. The geographical location and floristic richness of Turkey makes the country suitable for numerous invasive species. The work presented here adds support to this hypothesis as *A. berberidorum*, *H. alnicola* and *P. fraxinifolii* were recorded for the first time in the state and are clearly invasive species in the aphid fauna of Turkey, with origins in the Nearctic and Orient. These findings are consistent with previous reports, since about 9% of recent new records added to the Turkey aphid fauna are invasive (Akyıldırım et al., 2013; Görür et al., 2017). The number of the aphid species listed for Turkey increased to about 594 with these new records. Further detailed studies are required to clarify the potential of these invasive aphid species to cause damage and to understand the full extent of host plant relationships, including trees growing in natural environments and in parks and gardens.

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