

Contributions of the Cicadellidae (Hemiptera: Cicadomorpha) Fauna of Sinop and Black Sea Region of Turkey

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ABSTRACT

In this study, Cicadellidae (Hemiptera: Cicadomorpha) specimens collected from Sinop and its surrounding in 2016-2018 were evaluated. Overall, 27 species belonging to 7 subfamilies were identified from the study area. Number of specimens, localities and distribution of species in Turkey are given. Of the identified species, 11 are the first records for the local fauna of Sinop and 5 for the Black Sea Region of Turkey.

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ÖZET

Bu çalışmada, 2016-2018 yıllarında Sinop ve çevresinden toplanan Cicadellidae (Hemiptera: Cicadomorpha) örnekleri değerlendirilmiştir. Çalışma alanından 7 subfamilyaya ait 27 tür tespit edilmiştir. Bölgede dağılım gösteren türlerin toplandığı lokaliteler, örnek sayısı ve Türkiye'deki dağılımları verilmiştir. Tespit edilen türlerden 11'i Sinop ili lokal faunası için, 5'i de Karadeniz Bölgesi için ilk kayıt niteliğindedir.

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INTRODUCTION

Cicadellidae is the largest family in the order Hemiptera, with approximately 20000 species defined in more than 40 subfamilies (Abdollahi et al., 2015). They distributed in around the world from tropical rainforests to arctic tundra. They can feed on almost all vascular plants. Most Cicadellidae species feed on phloem and can cause direct or indirect damage to plant tissues. The most important form of indirect damage is caused by phytoplasms. Most of the phytoplasma vectors known among insects are members of Cicadellidae and therefore they have economic importance (Dietrich, 2013).

Fauna of Cicadomorpha group in Turkey includes 510 species belonging to 6 families. (Demir, 2019; Tulum, 2012). These families are; Aphrophoridae, Cercopidae, Cicadidae, Cicadellidae, Membracidae and Tibicinidae (Önder et al., 2011). Current literature and recent new records of Turkey Cicadellidae fauna consists of 476 species (Demir,

2006a, 2006c, 2006d, Karavin et al., 2011).

Despite the economic importance and diversity studies for the Cicadellidae family in Turkey, overall studies are not at the desired level. Objective of the current study was to presents some contributions to Cicadellidae fauna for the region and Turkey.

MATERIAL and METHOD

The studied material was collected by sweeping net and a hand aspirator over the plants during the daytime between May 2016 and October 2018 from different localities in Sinop and surroundings. The collected samples were taken into insect killing jars, labeled and brought to the laboratory and placed in insect storage packages. Collected specimens were dissected according to the methods of Bittner and Remane (1977), the genital capsule of males were separated from the body with the help of a dissecting needle. In the genital capsule, genital structures which have taxonomically reliable characteristics,

aedeagus, stylus, connective, pygofer, genital plate, anal tube in males and pregenital sternite VII in females, were separated. From the materials prepared, shape, size, structure, color, patterning and features of the genital structures were examined and they were identified by being compared with diagnosed museum materials and literature.

Specimens were deposited in Sinop University, Faculty of Arts and Sciences, Department of Biology, Invertebrata Laboratory.

RESULTS

Subfamily: Agalliinae Kirkaldy, 1901

Anaceratagallia venosa (Fourcroy, 1785)

Material examined: 12/08/2017: 41° 28' 48.9" 34° 46' 07.5" Sinop (between Durağan-Boyabat), (4♂♂, 7♀♀), 41° 36' 03.5" 34° 51' 28.3" Sinop, Boyabat, (6♂♂, 2♀♀).

Distribution in Turkey: Antalya, Konya (Demir, 2019). New record of Cicadellidae fauna for Sinop and Black Sea Region.

Dryodurgades anatolicus Dlabola, 1957

Material examined: 12/08/2017: 41° 25' 13.1" 34° 58' 44.2" Sinop (Durağan), (12♂♂, 14♀♀); 41° 36' 03.5" 34° 51' 28.3" Sinop (Boyabat), (12♂♂, 5♀♀).

Distribution in Turkey: Adana, Ankara, Antalya, Konya (Demir, 2006c; Demir, 2007; Demir, 2019). New record of Cicadellidae fauna for Sinop and Black Sea Region.

Subfamily: Aphrodinae Haupt, 1927

Aphrodes bicinctus (Schrank, 1776)

Material examined: 01/06/2016: 42° 01' 03.9" 34° 54' 03.7" Sinop, Sarıkum, (7♂♂, 6♀♀); 01.06.2016, 41° 52' 32" 34° 51' 1.2" Sinop, Molla Village (12♂♂, 5♀♀); 07/06/2016: 44° 04' 44.3" 34° 58' 17.1" Sinop, İnceburun, (24♂♂, 14♀♀); 08/06/2017: 41° 46' 20.0" 35° 12' 18.4" Sinop, Gerze, (14♂♂, 9♀♀); 09/06/2017: 41° 59' 41.7" 34° 54' 00.2" Sinop, Ayancık, (2♂♂, 2♀♀).

Distribution in Turkey: Adana, Afyon, Ankara, Antalya, Bilecik, Bursa, Çanakkale, Diyarbakır, Edirne, Elazığ, Erzincan, Erzurum, Gaziantep, Gümüşhane, Giresun, Hakkari, İstanbul, İzmir, Kars, Kırklareli, Konya, Kütahya, Manisa, Muğla, Ordu, Rize, Samsun, Sinop, Tekirdağ, Tokat, Trabzon, Uşak, Van, Zonguldak (Demir, 2008).

Aphrodes makarovi Zachvatkin, 1948

Material examined: 18/06/2016: 42° 00' 50.5" 34° 56' 906" Sinop, Abalı Village, (11♂♂, 6♀♀), 24/06/2016: 42° 01' 25.6" 35° 11' 05.9" Sinop, Nisi pond, (8♂♂, 6♀♀); 08/06/2017: 42° 01' 21.6" 35° 12' 06.8", Sinop, Erfelek (4♂♂, 6♀♀).

Distribution in Turkey: Adana, Ankara, Antalya, Balıkesir, Erzincan, Konya (Başpınar and Uygun, 1991; Demir, 2008; Demir, 2019; Demir & Demirsoy,

2016). New record of Cicadellidae fauna for Sinop.

Subfamily: Cicadellinae Latreille, 1825

Cicadella viridis (Linnaeus, 1758)

Material examined: 31/05/2016: 41° 53' 07.9" 34° 33' 52.6" Sinop, Tevfikiye (8♂♂, 6♀♀);

30/07/2017: 41° 41' 58.1" 34° 35' 42.1" , Sinop, Akgöl (4♂♂, 6♀♀).

Distribution in Turkey: Amasya, Artvin, Balıkesir, Bartın, Bolu, Bursa, Çanakkale, Diyarbakır, Edirne, Erzincan, Erzurum, Iğdır, İstanbul, İzmir, Kars, Kırklareli, Manisa, Mardin, Muğla, Samsun, Tekirdağ (Lodos & Kalkandelen 1983; Toper Kaygın et al., 2008) New record of Cicadellidae fauna for Sinop.

Subfamily: Deltocephalinae Fieber, 1869

Allygidius (Allygidius) atomarius (Fabricius, 1794)

Material examined: 09/06/2017: 42° 00' 52.1" 34° 58' 24.4" Sinop, Abalı Village (4♂♂, 6♀♀).

Distribution in Turkey: Bursa, Çanakkale, İstanbul, İzmir, Muğla, Sakarya, Samsun, Sinop, Tekirdağ (Zeybekoğlu, 1998).

Artianus interstitialis (Germar, 1821)

Material examined: 06/08/2017: 41° 49' 54.0" 35° 05' 21.1" Sinop, Boyabat (5♂♂, 9♀♀).

Distribution in Turkey: Bursa, Erzurum (Önder et al., 2011). New record of Cicadellidae fauna for Sinop and Black Sea Region.

Euscelis lineolatus Brullé, 1832

Material examined: 18/06/2016: 42° 00' 50.5" 34° 56' 906" Sinop, Abalı location, (8♂♂); 06/06/2016: 42° 01' 03.9" 34° 54' 03.1" Sinop, Sarıkum (9♂♂, 6♀♀); 07/06/2017: 44° 04' 44.3" 34° 58' 17.1" Sinop, İnceburun (7♂♂).

Distribution in Turkey: Ankara, Amasya, Artvin, Balıkesir, Bursa, İstanbul, İzmir, Kırıkkale, Kırklareli, Kırşehir, Konya, Malatya, Manisa, Niğde, Uşak, Giresun, Ordu, Rize, Samsun, Sinop, Tokat, Trabzon (Zeybekoğlu, 1998; Önder et al., 2011).

Fieberiella florii (Stal, 1864)

Material examined: 18/06/2016: 42° 00' 50.5" 34° 56' 906" Sinop, Abalı, (2♂♂); 06/08/2017: 41° 49' 54.0" 35° 05' 21.1" Sinop, Boyabat (2♂♂, 6♀♀); 12/08/2017: 41° 25' 13.1" 34° 58' 44.2" Sinop, Durağan (3♂♂).

Distribution in Turkey: Amasya, Ankara, Aydın, Diyarbakır, Elazığ, Giresun, İzmir, Kocaeli, Manisa, Mardin, Ordu, Rize, Samsun, Sinop, Tokat, Trabzon (Zeybekoğlu, 1998; Özgen and Karsavuran, 2009; Zeybekoğlu et al., 2015).

Goniagnathus brevis (Herrich-Schäffer, 1835)

Material examined: 07/06/2016: 42° 03' 22.8" 34° 59' 03.7" Sinop, İnceburun, (7♂♂, 5♀♀).

Distribution in Turkey: Adana, Amasya, Ankara, Antalya, Burdur, Diyarbakır, Edirne, Erzican, Manisa, Mardin, Niğde, Samsun, Sinop, Tokat (Zeybekoğlu, 1998; Önder et al., 2011; Demir, 2006c; Demir and Demirsoy, 2016).

***Grypotes puncticollis* (Herrich-Schäffer, 1834)**

Material examined: 17/08/2017: 41° 46' 17.8' 35° 12' 20.4' Sinop, Gerze (3♂♂, 2♀♀).

Distribution in Turkey: Amasya, Ankara, Aydın, Balıkesir, Çankırı, İstanbul, Ordu, Samsun, Sinop, Ordu (Zeybekoğlu, 1998; Önder et al., 2011; Zeybekoğlu et al., 2015).

***Handianus ignoscus* (Melichar, 1896)**

Material examined: 12/08/2017: 41° 36' 03.5' 34° 51' 28.3' Sinop, Boyabat (4♂♂, 2♀♀).

Distribution in Turkey: Ankara, Erzincan (Önder et al., 2011; Demir and Demirsoy, 2008). New record of Cicadellidae fauna for Sinop and Black Sea Region.

***Idiodonus cruentatus* (Panzer, 1799)**

Material examined: 30/07/2017: 41° 41' 58.1" 34° 35' 42.1" Sinop, Akgöl (8♂♂, 6♀♀).

Distribution in Turkey: Amasya, Manisa, Mardin, Ordu, Samsun (Önder et al., 2011). New record of Cicadellidae fauna for Sinop.

***Macrosteles sexnotatus* (Fallen, 1806)**

Material examined: 18/06/2016: 42° 00' 50.5' 34° 56' 906" Sinop, Abalı, (24♂♂, 21♀♀).

Distribution in Turkey: Adana, Adıyaman, Ağrı, Amasya, Ankara, Artvin, Aydın, Bolu, Bursa, Çankırı, Diyarbakır, Düzce, Erzurum, Erzincan, Giresun, Hakkari, İçel, İzmir, Karaman, Kocaeli, Konya, Nevşehir, Ordu, Rize, Samsun, Sinop, Trabzon, Tokat, Van (Önder et al., 2011; Zeybekoğlu et al., 2015; Demir and Demirsoy, 2016).

***Platymetopius (Platymetopius) major* (Kirschbaum, 1868)**

Material examined: 12/08/2017: 41° 25' 13.1" 34° 58' 44.2" Sinop, Durağan (4♂♂).

Distribution in Turkey: Amasya, Bursa, İzmit, Sakarya, Samsun, Sinop, Giresun (Zeybekoğlu, 1998; Önder et al., 2011).

***Selenocephalus griseus* (Germar, 1833)**

Material examined: 30/07/2017: 41° 38' 30.8' 34° 36' 42.7' Sinop, Boyabat (12♂♂, 5♀♀); 01/08/2017: 42° 01' 21.8' 35° 12' 06.7' Sinop, Boztepe (8♂♂, 6♀♀); 01/08/2017: 41° 52' 23.8' 34° 51' 57.0' Sinop, Erfelek (7♂♂, 6♀♀).

Distribution in Turkey: Adana, Amasya, Ankara, Balıkesir, Bilecik, Bolu, Bursa, Çanakkale, Çankırı, Edirne, Eskişehir, Elazığ, İstanbul, İzmir, Kırklareli, Kocaeli, Kütahya, Malatya, Ordu, Samsun, Sinop, Sivas, Tekirdağ, Tokat, Zonguldak (Lodos and Kalkandelen, 1987; Zeybekoğlu, 1998; Özgen and

Karsavuran 2009).

***Selenocephalus stenopterus* Signoret, 1880**

Material examined: 14/07/2017: 42° 03' 04.8' 35° 02' 25.6' Sinop, Hamsilos (6♂♂, 6♀♀);

12/08/2017: 41° 36' 03.5' 34° 51' 28.3' Sinop, Boyabat (14♂♂, 6♀♀); 17/08/2017: 41° 25' 13.1" 34° 58' 44.2' Sinop, Durağan (7♂♂).

Distribution in Turkey: Adana, Amasya, Ankara, Antalya, Aydın, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Çorum, Denizli, Giresun, Isparta, İzmir, Kayseri, Kırşehir, Konya, Manisa, Ordu, Rize, Samsun, Sinop, Tokat, Yozgat (Demir, 2006b; Zeybekoğlu et al., 2015).

***Speudotettix subfuscus* (Fallen, 1806)**

Material examined: 31/05/2017: 41° 53' 07.9' 34° 33' 52.6' Sinop, Tevfikiye (5♂♂, 1♀).

Distribution in Turkey: Bolu, Samsun, Sinop (Zeybekoğlu, 1998; Önder et al., 2011).

***Synophropsis lauri* (Horvath, 1897)**

Material examined: 06/08/2017: 41° 49' 54.0' 35° 05' 21.1" Sinop, Boyabat, (6♂♂, 5♀♀); 01/08/2017: 42° 01' 21.5" 35° 12' 06.7' Sinop, Boztepe (4♂♂, 6♀♀); 17/08/2017: 41° 46' 17.8' 35° 12' 20.4' Sinop, Gerze (3♂♂, 2♀♀); 17/08/2017: 41° 46' 02.5' 35° 12' 11.0' Sinop, Gerze (3♂♂).

Distribution in Turkey: Amasya, Ankara, Antalya, Aydın, Hatay, İstanbul, İçel, Rize, Samsun, Sinop, Tokat, Trabzon, Yalova (Zeybekoğlu, 1998; Önder et al., 2011; Zeybekoğlu et al., 2015).

***Thamnotettix (Thamnotettix) creticus* Dlabola, 1974**

Material examined: 27/05/2017, 41° 50' 22.0' 35° 03' 02.2' Sinop, Kabalı (10♂♂, 6♀♀); 08/06/2017: 41° 46' 18' 35° 11' 12", Sinop, Taşmanlı (3♂♂, 2♀♀).

Distribution in Turkey: Adana, Amasya, Hatay, Mersin, Samsun, Sinop, Tokat and Osmaniye (Demir, 2006a).

***Thamnotettix (Loepotettix) dilutior* (Kirschbaum, 1868)**

Material examined: 06/06/2016: 42° 03' 04.8' 35° 02' 25.6' Sinop, Hamsilos (1♂); 07/06/2016: 44° 04' 44.3' 34° 58' 17.1" Sinop, İnceburun, (2♂♂).

Distribution in Turkey: Amasya, Çorum, Ordu, Samsun, Sinop, Tokat and Zonguldak (Demir 2006a).

***Thamnotettix (Loepotettix) exemptus* Melichar, 1896**

Material examined: 18/06/2016: 42° 00' 50.5' 34° 56' 906" Sinop, Abalı (7♂♂, 6♀♀).

Distribution in Turkey: Amasya, Hatay, Kastamonu, Ordu, Samsun, Sinop, Tokat and Osmaniye (Demir, 2006a).

***Thamnotettix (Thamnotettix) thrax* Dlabola, 1965**

Material examined: 18/06/2016: 42° 00' 50.5' 34° 56' 906" Sinop, Abalı (14♂♂, 6♀♀); 27/05/2017: 41° 50'

22.0° 35° 03' 02.2" Sinop, Kabalı (4♂♂, 6♀♀); 08/06/2017: 41° 46' 18' 35" 11' 12", Sinop, Taşmanlı (4♂♂, 2♀♀).

Distribution in Turkey: Amasya, Bursa, Izmir, Mardin, Ordu, Samsun, Sinop and Tokat (Demir, 2006a; Özgen and Karsavuran, 2009).

***Verdanus bekiri* (Kalkandelen, 1972)**

Material examined: 12/08/2017: 41° 36' 03.5" 34° 51' 28.3" Sinop, Boyabat (2♂♂).

Distribution in Turkey: Ankara, Çorum, Erzincan, Erzurum, Samsun, Sivas (Önder et al., 2011; Güçlü, 2010; Dede et al., 2017; Demir and Demirsoy, 2016) New record of Cicadellidae fauna for Sinop.

Subfamily: Hecalinae Distabt, 1908

***Hecalus glaucescens* (Fieber, 1866)**

Material examined: 12/08/2016: 41° 28' 48.9" 34° 46' 07.5" Sinop, Boyabat (3♂♂, 5♀♀).

Distribution in Turkey: Adana, Adıyaman, Ankara, Antalya, Diyarbakır, Hatay, İçel, Konya, Malatya, Manisa, Muğla, Siirt (Önder et al., 2011; Demir, 2006c, Demir, 2019). New record of Cicadellidae fauna for Sinop and Black Sea Region.

Subfamily: Idiocerinae Baker, 1915

***Populicerus populi* (Linnaeus, 1761)**

Material examined: 30/07/2017: 41° 41' 58.1" 34° 35' 42" Sinop, Akgöl (7♂♂, 5♀♀).

Distribution in Turkey: Ankara, İzmir, Manisa, Rize (Önder et al., 2011;) New record of Cicadellidae fauna for Sinop.

Subfamily: Macropsinae Evans, 1915

***Oncopsis flavicollis* (Linnaeus, 1761)**

Material examined: 01/06/2016: 41° 47' 11.1" 34° 59' 54" Sinop, Kabalı Mevkii (7♂♂, 5♀♀).

Distribution in Turkey: Adapazarı, Artvin, Bolu, Samsun, Sivas (Önder et al., 2011) New record of Cicadellidae fauna for Sinop.

DISCUSSION

There is no comprehensive study on Cicadellidae fauna of Sinop province. Zeybekoğlu (1998) reported 57 species belonging to subfamily Deltocephalinae from Sinop in his study in which he evaluated Deltocephalinae (Cicadellidae) species distributed in the Middle and Black Sea Region of Turkey. Önder et al. (2011) reported 23 species in addition to these 57 species. In the light of this information, it can be said that Sinop Cicadellidae fauna contains 80 species.

In this study, 19 species from Deltocephalinae subfamily were identified. 2 species from Agallinae subfamily, 2 species from Aphrodinae; 1 species each from the Cicadellinae, Hecalinae, Idiocerinae and

Macropsinae subfamilies has been identified. 11 of the identified species; *Anaceratagallia venosa*, *Dryodurgades anaticus*, *Aphrodes makarovi*, *Cicadella viridis*, *Artianus interstitialis*, *Handianus ignoscus*, *Idiodonus cruentatus*, *Verdanus bekiri*, *Hecalus glaucescens*, *Populicerus populi*, *Oncopsis flavicollis* are the first record for the Sinop Cicadellidae fauna. *V. bekiri* is endemic to Turkey. Also, *A. venosa*, *D. anaticus*, *A. interstitialis*, *H. ignoscus* and *H. glaucescens* are the first records for the Black Sea Region of Turkey.

Contribution of the Authors as Summary

Authors declares the contribution of the authors is equal.

Statement of Conflict of Interest

There is no conflict of interest between the article authors.

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