

Heteroptera species detected in agricultural and non-agricultural areas of Samsun Province in Türkiye

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ABSTRACT: As a result of surveys carried out in agricultural and non-agricultural lands in Samsun province and its 17 districts, 12 species belonging to the Heteroptera suborder were found. 7 of them are predators, and 5 are harmful species. Species found; *Deraeocoris serenus*, *Geocoris megacephalus*, *Liorhyssus hyalinus*, *Lygus pratensis*, *Macrolophus costalis*, *Macrolophus melanotoma*, *Macrolophus pygmaeus*, *Nabis ferus*, *Orius niger*, *Oxycarenus hyalinipennis*, *Rhopalus parumpunctatus*, *Stictopleurus abutilon*. 5 of them are from the Miridae family, 3 from the Rhopalidae family, 2 from the Lygaeidae family, 1 from the Nabidae and 1 from the Anthocoridae family.

KEY WORDS: Heteroptera, Samsun, Türkiye

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INTRODUCTION

The order Hemiptera was previously considered as two suborders, Heteroptera and Homoptera, in the taxonomic classification. With recent studies, the order Hemiptera has been considered as three suborders: Auchenorrhyncha (Cicadidae and Cicadellidae etc.), Heteroptera (Miridae, Reduviidae, Pentatomidae) and Sternorrhyncha (Aleyrodidae, Coccoidea, Psylloidea and Aphidoidea) (Gullan and Cranston 2014).

The Hemiptera order, designated by Linnaeus in 1758, holds the fifth position globally in terms of species diversity, with a count of 104165 species, following the orders Coleoptera, Diptera, Lepidoptera, and Hymenoptera (Zhang, 2011).

Heteroptera is one of the largest suborders of the Hemiptera order with its aquatic, semi-aquatic and terrestrial species, and there are over 45000 species/subspecies in the world and 9365 species/subspecies in the Palaearctic Region (Aukema, 2013; Henry, 2017).

Studies on the Heteroptera fauna of Türkiye date back to the 1880s, and many local and foreign researchers have presented numerous records from both the Anatolian and Thracian parts of this region. Latest data show that the 1526 species found naturally in Türkiye belong to 40 different families (Önder et al., 2006).

In studies conducted on Heteroptera in Türkiye, researchers have documented over 1,500 Heteropteran species, accounting for approximately 5% of the country's total insect fauna. Among these, the following have been identified: Anthocoridae, Berytidae, Coreidae, Cydnidae, Lygaeidae, Nabidae, Piesmatidae, Reduviidae, Rhopalidae, Scutelleridae, and Tingidae (Tezcan, 2020).

Samsun province has two large plains, Bafra and Çarşamba, which are

especially important for Turkish agriculture. Therefore, the Heteroptera fauna in this region continues to be identified.

As a result of the study, 12 species belonging to 5 different families were identified.

The entomological data of Samsun province, which has a very important position in terms of agriculture, has been increased. This situation, which was seen as a deficiency, was resolved with our study.

MATERIALS AND METHODS

The Heteroptera materials were collected from different localities in Samsun province 2020-2022.

Insects were generally collected from cultivated plants, weeds, fruit trees, vegetable greenhouses and fields, meadows and pastures. Field studies were collected during daylight hours, which were suitable for the activity of adults.

All districts were scanned and in this way, information was collected from many places within the research area. Material has been collected.

Working coordinates GPS device. Measured using information about the place where the samples were collected, ministry coordinates and altitude information were used.

Samples were collected using a hand net and a Japanese umbrella. The collected samples were killed by taking them into pre-prepared killing bottles containing 70% alcohol and were made ready for diagnosis.

The samples were sent to Dr. Gülten Yazıcı from Ankara Agricultural Control Central Research Institute for identification and the identification was made by her.

RESULTS**Family ANTHOCORIDAE Fieber, 1836****Subfamily Anthocorinae Fieber, 1836****Genus Orius Wolff, 1811****Subgenus Orius Wolff, 1811*****Orius (Orius) niger (Wolff, 1811)***

Material examined: Samsun, Alaçam (15 m), 41° 35' 33.96" N, 35° 42' 19.38" E, 31.08.2022, 8 ♂♂, 3 ♀♀; Bafra (18 m), 41° 23' 54.69" N, 35° 51' 32.90" E, 11.09.2022, 2 ♂♂, 1 ♀; Çarşamba (16 m), 41° 4' 47.39" N, 36° 33' 39.56" E, 07.09.2022, 2 ♂♂, 2 ♀♀.

Distribution in Türkiye: Adana, Adıyaman, Ankara, Antalya, Artvin, Bayburt, Batman, Diyarbakır, Edirne, Elazığ, Erzincan, Erzurum, Gaziantep, Iğdır, Karaman, Kars, Kastamonu, Konya, Mardin, Niğde, Siirt, Şanlıurfa It operates widely in every region of our country. (Hoberlandt, 1956; Önder et al., 1984; Yıldırım et al., 2013a; Kaplan, 2014; Matocq et al., 2014; Yazıcı, 2019; Bolu, 2020; Pehlivan & Atakan, 2020; Yazıcı, 2022c).

Distribution in Palaearctic Region: Europe: Albania Andorra Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Crete Croatia Czech Republic Denmark European Kazakhstan Estonia European Türkiye Finland France Great Britain Germany Greece Hungary Ireland Italy Latvia Liechtenstein Lithuania Luxembourg Malta Macedonia Moldavia Netherlands Norway Poland Portugal Romania Russia (CT NT ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Azores Canary Islands Egypt Libya Morocco Madeira Tunisia. Asia: Asian Kazakhstan Asian Türkiye Armenia Azerbaijan China (SW WP) Georgia Iran Iraq Israel Jordan Kirgizia Mongolia Russia (ES WS) Saudi Arabia Syria Tadjikistan Turkmenistan Uzbekistan Yemen. Extralimital: S India, USA (Aukema, 2020).

Family GEOCORIDAE Baerensprung, 1860**Subfamily Geocorinae Dahlbom, 1851****Genus Geocoris Fallen, 1814****Subgenus Geocoris Fallen, 1814*****Geocoris megacephalus (Rossi, 1790)***

Material examined: Bafra (18 m), 41° 36' 4.85" N, 35° 58' 17.0"E, 09.09.2021, 1 ♂, 2 ♀♀; Çarşamba (15 m), 41° 18' 4.46" N 36° 41' 5.98" E, 30.06.2022, 2 ♂♂, 2 ♀♀; Havza (675 m), 41° 0' 36.87" N, 35° 47' 31.28" E, 15.08.2021, 2 ♀♀; Tekkeköy (4 m), 41° 12' 18.66" N, 36° 34' 4.34" E, 14.07.2022, 1 ♂; Ondokuzmayıs (10 m), 41° 29' 38.14" N, 36° 2' 0.43" E, 19.08.2021, 1 ♂, 2 ♀♀.

Distribution in Türkiye: Elazığ (Çerçi & Özgen., 2021)

Distribution in Palaearctic Region: Europe: Albania Belgium Bosnia Hercegovina Bulgaria Crete Croatia France Germany Greece Hungary Italy Malta Macedonia Montenegro Netherlands Portugal Romania Russia (ST) Serbia Slovenia Spain Switzerland. North Africa: Algeria Canary Islands Egypt Libya Morocco Tunisia. Asia: Azerbaijan Afghanistan Armenia Asian Türkiye Cyprus Georgia Iran Iraq Israel Jordan Kirgizia Sinai Syria Tadjikistan Turkmenistan Uzbekistan (Aukema, 2020).

Family MIRIDAE Hahn, 1833**Subfamily Bryocorinae Baerensprung, 1860.****Genus *Macrolophus* Fieber, 1858*****Macrolophus costalis* Fieber**

Material examined: Çarşamba (16 m), 41° 4' 13.79" N, 36° 41' 37.24" E, 15.08.2022, 5 ♂♂, 2 ♀♀; Bafra (18 m), 41° 32' 16.47" N, 36° 1' 37.44" E, 17.08.2022, 6 ♂♂, 4 ♀♀.

Distribution in Türkiye: Marmara, Antalya, Eastern Mediterranean, Central Anatolia, Western and Eastern Black Sea in Türkiye; It has been reported that it is located in Ankara, İzmir, Erzurum provinces and Diyarbakır, Şanlıurfa, Mardin, Şırnak and Batman provinces. (Önder, 1976; Önder et al.; Lodos et al. 2003; Önder et al. 2006; Tezcan et al. 2010; Yazıcı, 2015, Demircioğlu, 2022).

Distribution in Palaearctic Region: Europe: Albania Bulgaria Crete Croatia European Türkiye France Greece Italy Macedonia Portugal Romania Serbia Spain Switzerland Ukraine. North Africa: Tunisia. Asia: Armenia Asian Türkiye Cyprus Georgia Israel Jordan Lebanon (Aukema, 2020).

***Macrolophus melanotoma* (A. Costa, 1853)**

Material examined: Bafra (18 m), 26.08.2021, 41° 31' 27.02" N, 35° 50' 17.71" E, 1 ♂, 2 ♀♀; Atakum (4 m), 41° 21' 22.27" N, 36° 11' 50.13" E, 15.08.2021, 2 ♂♂, 2 ♀♀; Alaçam (18 m), 41° 34' 50.23" N, 35° 39' 24.33" E, 12.08.2021, 2 ♀♀; Ayvacık (50 m), 40° 58' 33.27" N, 36° 39' 51.54" E, 21.07.2022, 1 ♂; Havza (675 m), 40° 54' 30.04" N, 35° 41' 33.88" E, 24.08.2022, 1 ♂, 2 ♀♀; Çarşamba (16 m), 41° 15' 36.03" N, 36° 36' 58.26" E, 01.07.2021, 3 ♂♂, 1 ♀; Yakakent (5 m), 41° 38' 12.89" N, 35° 29' 17.16" E, 31.08.2022, 1 ♂, 2 ♀♀; Terme (12 m), 41° 12' 22.14" N, 36° 55' 47.28" E, 22.08.2022, 2 ♂♂, 2 ♀♀; Tekkeköy (23 m), 41° 5' 36.90" N, 36° 28' 37.58" E, 19.08.2022, 1 ♂; Ondokuzmayıs (4 m), 41° 28' 54.95" N, 36° 2' 55.31" E, 19.08.2021, 1 ♂, 2 ♀♀.

Distribution in Türkiye: It has natural distribution in the Mediterranean, Aegean and Southeastern Anatolia Regions (Başpınar et al., 2013; Karut et al., 2017).

Distribution in Palaearctic Region: Europe: Crete Croatia European Türkiye France Greece Hungary Italy Malta Macedonia Portugal Slovenia Spain Switzerland. North Africa: Algeria Canary Islands Libya Morocco Tunisia. Asia: Asian Türkiye Cyprus Iraq Iran Israel Jordan Lebanon Yemen (Aukema, 2020).

***Macrolophus pygmaeus* (Rambur, 1839)**

Material examined: Alaçam (15 m), 41° 34' 39.46" N, 35° 38' 38.57" E, 22.07.2021, 1 ♂, 2 ♀♀; Ayvacık (50 m), 40° 58' 33.27" N, 36° 39' 51.54" E, 21.07.2022, 1 ♀; Bafra (18 m), 41° 23' 31.52" N, 35° 49' 17.63" E, 18.08.2022, 3 ♂♂, 3 ♀♀; Çarşamba (15 m), 41° 13' 45.47" N, 36° 48' 55.87" E, 31.08.2022, 4 ♂♂, 2 ♀♀; Ondokuzmayıs (5 m), 41° 29' 31.92" N, 36° 2' 2.19" E, 12.08.2021, 1 ♂, 1 ♀; Tekkeköy (16 m), 41° 5' 36.90" N, 36° 28' 37.58" E, 19.08.2022, 2 ♂♂, 2 ♀♀; Terme (12 m), 41° 20' 2.82" N, 36° 50' 58.89" E, 14.07.2022, 1 ♀; Yakakent (5 m), 41° 33' 58.02" N, 35° 25' 27.97" E, 31.08.2022, 1 ♂, 1 ♀.

Distribution in Türkiye: It has been found to be densely found in regions with a Mediterranean climate.

Distribution in Palaearctic Region: Europe: Albania Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Crete Croatia Czech Republic Denmark European Türkiye Finland France Great Britain Germany Greece Hungary Ireland Italy

Luxembourg Malta Macedonia Moldavia Netherlands Norway Poland Portugal Romania Russia (CT ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Azores Canary Islands Morocco Madeira Tunisia. Asia: Asian Kazakhstan! Asian Türkiye Armenia Azerbaijan Georgia Iran Iraq Israel! Sinai Tadjikistan Turkmenistan. Extralimital: New Zealand (introduced) (Aukema, 2020).

Subfamily Deraeocorinae Douglas & Scott, 1865

Tribe Deraeocorini Douglas & Scott, 1865

Genus *Deraeocoris* Kirschbaum, 1855

Subgenus *Camptobrochis* Fieber, 1858

***Deraeocoris serenus* Do. & Sc., 1868**

Material examined: Alaçam (15 m), 41° 34' 50.23" N, 35° 39' 24.33" E, 12.08.2021, 1 ♂, 1 ♀; Atakum (4 m), 41° 21' 22.27" N, 36° 11' 50.13" E, 05.08.2021, 2 ♀♀; Bafra (18 m), 41° 37' 37.4" N, 35° 55' 11.5" E, 12.08.2021, 2 ♂♂, 2 ♀♀; Bafra (19 m), 41° 35' 43.6" N, 35° 53' 47.3" E, 19.10.2021, 2 ♂♂, 2 ♀♀; Çarşamba (15 m), 41° 15' 36.03" N, 36° 36' 58.26" E, 01.07.2021, 1 ♂, 3 ♀♀; Ondokuzmayıs (4 m), 41° 28' 54.95" N, 36° 2' 55.31" E, 19.08.2021, 1 ♂; Tekkeköy (12 m), 41° 7' 9.09" N, 36° 32' 12.42" E, 30.06.2022, 2 ♀♀.

Distribution in Palaearctic Region: Europe: Albania Andorra Austria Bosnia Hercegovina Bulgaria Crete Croatia Czech Republic European Kazakhstan Türkiye France Germany Greece Hungary Italy Malta Macedonia Moldavia Montenegro Portugal Romania Russia (CT ST) Serbia Slovakia Slovenia Spain Switzerland Ukraine. North Africa: Algeria Canary Islands Egypt Libya Morocco Madeira Tunisia. Asia: Asian Kazakhstan Asian Türkiye Armenia Azerbaijan China (NO NW) Cyprus Iran Iraq Israel Jordan Kirgizia Lebanon Mongolia! Saudi Arabia Syria Tadjikistan Turkmenistan Uzbekistan (Aukema, 2020).

Subfamily Mirinae Hahn, 1833.

Genus *Lygus* Hahn, 1833

***Lygus pratensis* (Linnaeus, 1758)**

Material examined: Alaçam (15 m) 41° 35' 59.75" N, 35° 38' 24.76" E, 23.06.2021, 2 ♀♀; Bafra (18 m), 41° 31' 19.9" N, 35° 56' 41.69" E, 12.08.2021, 1 ♀; Çarşamba (18 m), 41° 64' 41" N, 36° 38' 14.5" E, 14.06.2021, 3 ♂♂, 2 ♀♀; Tekkeköy (13 m), 41° 7' 15.92" N, 36° 30' 35.58" E, 30.06.2022, 1 ♂, 2 ♀♀.

Distribution in Türkiye: Adana, Ankara, Ardahan, Bayburt, Bursa, Çanakkale, Diyarbakır, Edirne, Erzincan, Erzurum, Gaziantep, Hatay, Iğdır, Kahramanmaraş, Kars, Mardin (Hoberlandt, 1955; Fent, 2011; Matocq et al., 2014; Kaçar & Dursun, 2015; Yazıcı & Yıldırım, 2016).

Distribution in Palaearctic Region: Europe: Albania Andorra! Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Crete Croatia Czech Republic Denmark European Kazakhstan Estonia European Türkiye Finland France Great Britain Germany Greece Hungary Ireland? Italy Latvia Liechtenstein Lithuania Luxembourg Malta Macedonia Moldavia Montenegro Netherlands Norway Poland Portugal Romania Russia (CT NT ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Canary Islands Morocco. Asia: Azerbaijan Afghanistan Asian Kazakhstan Asian Türkiye Armenia China (NO NW) Cyprus Georgia Iran Iraq Israel Kirgizia Mongolia Russia (ES WS) Syria Tadjikistan Turkmenistan Uzbekistan. Extralimital: India (Aukema, 2020).

Family NABIDAE A. Costa, 1853**Subfamily Nabinae A. Costa, 1853****Genus *Nabis* Latreille, 1802****Subgenus *Nabis* Latreille, 1802*****Nabis ferus* (Linnaeus, 1758)**

Material examined: Bafra (16 m), 41° 35' 40.62" N, 35° 48' 51.94" E, 11.09.2022, 1 ♀.

Distribution in Türkiye: It has been detected in the Mediterranean, Southeastern Anatolia and many regions (Lodos, 1986).

Distribution in Palaearctic Region: Europe: Albania Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Crete? Croatia Czech Republic Denmark European Kazakhstan Estonia Finland France Great Britain Germany Greece Hungary Ireland Italy Latvia Lithuania Luxembourg Macedonia Moldavia Montenegro Netherlands Norway Poland Romania Russia (CT NT ST) Serbia Slovakia Slovenia Sweden Switzerland Ukraine. Asia: Afghanistan Asian Kazakhstan Armenia Azerbaijan China (NE NO NW WP) Georgia Japan Kirgizia Mongolia Russia (ES FE WS) Tadzhiistan Turkmenistan Uzbekistan (Aukema, 2020).

Family OXYCARENIDAE Stål, 1862**Genus *Oxycarenus* Fieber, 1837****Subgenus *Oxycarenus* Fieber, 1837*****Oxycarenus hyalinipennis* (A. Costa, 1843)**

Material examined: Samsun, Alaçam (15 m), 41° 35' 33.96" N 35° 42' 19.38" E, 31.08.2022, 2 ♂♂, 1 ♀; Asarcık (780 m), 41° 0' 12.43" N 36° 24' 44.63" E, 03.08.2022, 2 ♂♂; Bafra (18 m), 41° 23' 54.69" N, 35° 51' 32.90" E, 11.09.2022; Ladik (950 m), 40° 54' 4.08" N 35° 47' 55.21" E, 11.08.2022, 2 ♂♂, 2 ♀♀; Terme (25 m), 41° 20' 2.82" N 36° 50' 58.89" E, 14.07.2022, 1 ♂, 2 ♀; Vezirköprü (340 m), 41° 28' 57.68" N 36° 2' 24.63" E, 12.08.2022, 1 ♂, 2 ♀♀.

Distribution in Türkiye: Adana, Ankara, Antalya, Çanakkale, Gaziantep, Hatay, İstanbul, İzmir, Karaman, Kastamonu, Kilis, Konya, Mersin, Muğla, Niğde, Osmaniye, Sinop (Aysev, 1974; Lodos et al., 1999; Şerban, 2010; Yazıcı et al., 2015a; Yazıcı, 2022b).

Distribution in Palaearctic Region: Europe: Bosnia Hercegovina Bulgaria Crete Croatia France Greece Italy Malta Portugal Serbia Spain. North Africa: Algeria Canary Islands Egypt Libya Madeira Morocco Tunisia. Asia: Azerbaijan? Afghanistan Arab Emirates Armenia Asian Türkiye Cyprus Iran Iraq Israel Jordan Lebanon Saudi Arabia Sinai Syria Yemen. Extralimital: Oriental Region, tropical and S Africa, and introduced in S America (Aukema, 2020).

Family RHOPALIDAE Amyot & Serville, 1843**Subfamily Rhopalinae Amyot & Serville, 1843****Genus *Liorhyssus* Stål, 1870*****Liorhyssus hyalinus* (Fabricius, 1794)**

Material examined: Bafra (18 m), 41° 35' 40.62" N, 35° 48' 51.94" E, 11.09.2022, 3 ♂♂, 1 ♀.

Distribution in Türkiye: Adana, Ankara, Amasya, Çanakkale, Diyarbakır, Elazığ, Erzincan, Erzurum, Giresun, Mardin, Nevşehir, Samsun, Sivas, Tokat, Tunceli

(Hoberlandt, 1955; Kiyak et al., 2004; Dursun, 2009; Fent, 2011; Yıldırım et al., 2013a; Matocq et al., 2014; Çerçi, et al., 2018; Zengin & Dursun, 2019; Çerçi & Özgen, 2021).

Distribution in Palaearctic Region: Europe: Albania Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Croatia Crete Czech Republic Denmark European Kazakhstan European Türkiye Finland France Great Britain Germany Greece Hungary Ireland Italy Liechtenstein Luxembourg Malta Macedonia Moldavia Montenegro Netherlands Poland Portugal Romania Russia (NT? ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Azores Canary Islands Egypt Libya Morocco Madeira Tunisia. Asia: Arab Emirates Afghanistan Asian Kazakhstan Asian Türkiye Armenia Azerbaijan China (CE NE NO NW SE SW WP) Cyprus Georgia Iran Iraq Israel Japan Jordan Kirgizia Korea Kuwait Lebanon Mongolia Oman Russia (ES FE WS) Saudi Arabia Sinai Syria Tadzhikistan Turkmenistan Uzbekistan Yemen. Extralimital: all Regions (Aukema, 2020).

Genus *Rhopalus* Schilling, 1827

***Rhopalus parumpunctatus* Schilling, 1829**

Material examined: Çarşamba (17 m), 41°13'45.47"N, 36°48'55.87" E, 31.08.2022, 1 ♂, 1 ♀; Yakakent (5 m), 41° 33' 58.02" N, 35° 25' 27.97" E, 31.08.2022, 2 ♀♀.

Distribution in Türkiye: It is a common species and is available in almost all regions of Türkiye (Önder et al, 2006).

Distribution in Palaearctic Region: Europe: Albania Andorra Austria Belgium Bosnia Hercegovina Bulgaria Byelorussia Crete Croatia Czech Republic Denmark European Kazakhstan Estonia European Türkiye Finland France Great Britain Germany Greece Hungary Ireland? Italy Latvia Liechtenstein Lithuania Luxembourg Macedonia Moldavia Montenegro Netherlands Norway Poland Portugal Romania Russia (CT NT ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Canary Islands Morocco Tunisia. Asia: Afghanistan Asian Kazakhstan Asian Türkiye Armenia Azerbaijan China (NE NO NW) Cyprus Georgia Iran Iraq Jordan Kirgizia Korea Mongolia Russia (ES FE WS) Syria Tadzhikistan Uzbekistan (Aukema, 2020).

***Stictopleurus* Stål, 1872**

***Stictopleurus abutilon* (Rossi, 1790)**

Material examined: Bafra (16 m), 41° 23' 31.52" N, 35° 49' 17.63" E, 18.08.2021, 1 ♂, 1 ♀; Çarşamba (15 m), 41°13'45.47"N, 36°48'55.87" E, 31.08.2022, 1 ♀; Terme (17 m), 41° 12' 22.14" N, 36° 55' 47.28" E, 22.08.2022, 2 ♂♂, 1 ♀.

Distribution in Türkiye: Adana, Amasya, Ankara, Çanakkale, Diyarbakır, Edirne, Elazığ, Erzincan, Erzurum, Mardin, Tokat (Hoberlandt, 1955; Dursun, 2009; Fent, 2011; Yıldırım et al., 2013a; Matocq et al., 2014; Çerçi et al., 2018; Zengin & Dursun, 2019).

Distribution in Palaearctic Region: Europe: Albania Andorra Austria Belgium Bulgaria Byelorussia Crete Croatia Czech Republic Denmark European Kazakhstan Estonia European Türkiye Finland France Great Britain Germany Greece Hungary Italy Kosovo Latvia Liechtenstein Lithuania Luxembourg Malta Macedonia Moldavia Montenegro Netherlands Norway Poland Portugal Romania Russia (CT NT ST) Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine. North Africa: Algeria Morocco Madeira Tunisia. Asia: Afghanistan Asian Kazakhstan Asian Türkiye Armenia Azerbaijan China (NW) Cyprus Georgia Iran Iraq Israel Kirgizia Lebanon Mongolia Russia (ES WS) Syria Tadzhikistan Turkmenistan Uzbekistan (Aukema, 2020).

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