

Türkiye Afıt (Hemiptera, Aphidoidea) Faunası ve İşgalci Elemanlarının Zoocoğrafik Yapısının Değerlendirilmesi

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Özet

Afitlerin küçük olmaları, döngüsel partenogenez, konak seçimleri, yüksek adaptasyon kabiliyetleri ve bitkilerle yakın birliktelikleri yeni alanlara gitmelerine olanak sağlar. Artan ticari faaliyetler ve iklim değişiklikleri işgalci afıt türlerinin farklı bölgelere gelmelerine ve yerleşmelerine neden olmuştur. Türkiye farklı türlerin geçiş yaptığı, Asya ve Avrupa kıtaları arasında bir köprü olarak düşünülebilir. Florasının %31'i endemik olan Türkiye coğrafi olarak büyük bir ülkedir. Bu çalışmada Türkiye afıt faunasının kompozisyonunun açıklanması ve işgalci türler hakkındaki bazı bilgilerle desteklenmesi amaçlanmaktadır. Türkiye Palearktik bölgesinin Akdeniz havzasında kabul edilebilir. 491 afıt türü hakkındaki bütün dökümanlar değerlendirildiğinde; türlerin %48.4'ünün Avrupa'dan, %17.3'nün Asya'dan, %15.7'sinin Palearktik'ten, %7.7'sinin Akdeniz'den, %6.5'inin Nearktik'ten, %0.8'inin Etiyopya'dan, %0.8'inin Oryantal'den kökenlendiği görülmüştür. Türkiye afıt faunasının %2.4'ü ise Türkiye kökenlidir

Anahtar Kelime: Anadolu, İşgalci tür, Coğrafya, Afıt, Türkiye

Evaluation of the Zoogeographical Contents of Turkey aphid (Hemiptera, Aphidoidea) fauna and Invasive components

Abstract

Aphid's small size, cyclical parthenogenesis, host preferences, higher adaptive ability and close association with plants let aphids to invade new areas. Increased global trade and climatic changes resulted in introduction and establishment of invasive aphid species into different regions of the world. Turkey is considered a bridge between Asia and Europe and thus it is the passageway of different species. Turkey is a geographically large country, 31% of Turkish flora is endemic. This study aimed to clarify the geographical composition of Turkey aphid fauna and provide some information about invasive components. Turkey was considered Mediterranean Basin of Palearctic region. After evaluating all the documents related to about 491 aphid species, it was shown that 48.4 % of the species originated from Europe, 17.3% of Asia, 15.7% of Palearctic, 7.7 % of Mediterranean, 6.5 % of Nearctic, 0.8 % of Ethiopian and 0.8 % of Oriental respectively. 2.4 % of Turkey aphid fauna originated from Turkey.

Key words: Anatolia, Alien species, Geography, Aphid, Turkey.

INTRODUCTION

The aphids (Hemiptera, Aphidoidea) are a group of phloem sap-sucking small insects. There are about 4,700 described aphid species worldwide in about 500 presently accepted genera on about 87,000 plant species. The aphids are a predominantly northern temperate taxa; most of the species are found in North America, Europe, Central and Eastern Asia [1, 2, 3]. Aphid's relatively small size, rapid asexual reproduction, diverse host-plant preferences, higher adaptive capacity and close association with imported horticultural and agricultural products let aphids to invade new areas [4]. Turkey is considered a bridge between Asia and Europe and thus it is a passageway of different species. Furthermore, it has very rich flora, specific geographical features, various types of climates and the agricultural landscape of the country is very large. Turkey is a geographically large country, 31% of the Turkish flora is endemic [5] and aphid fauna in some regions has not been adequately studied yet. By 1975, only about 275 aphid species had been listed as Turkey aphid fauna [6]. Many aphid species have been added to the Turkey aphid fauna during the last 40 years and now there are about 494 species [7]. This happened due to the limited number of studies carried out to determine aphid fauna of Turkey before the 1980's and the increased rate of adventive species emerged because of the tremendous global trade and climate changes having occurred during the last decades. Considering the ecological, geographical, climatic, floristic and agricultural characteristics of Turkey, it possible to mention that the number of species do not sufficiently reflect a real situation. Increased global trade and recent climatic changes resulted in introduction and establishment of invasive aphid species into the different regions of the world as well as in Turkey.

It was shown that the mean rate of introduction into the Europe since 1800 was 0.5 species per year. As a result of the higher introduction rate, it has been shown that 102 alien species of Aphididae established in Europe, meaning that 7.4 % of the European aphid fauna is of alien origin [8]. Most of the alien aphid species in Europe originate from Asia (43.1 %) and North America (43.1 %) respectively. There are a lot of aphid species being alien around the world [9, 10], (Argentine), (Hawaii); [11] (Malta); [12] (South America) and the introduction rate has been getting higher during last two decades. In this aspect, this study aimed to clarify geographical composition of Turkey aphid fauna and provide some information about alien components. The main difficulties regarding this study is to decide on the exact geographical location of Turkey as it is a very large country and located in the passageway of different zoogeographical areas.

MATERIAL AND METHODS

The present study based on the evaluation of all the current published studies related to Turkey aphid fauna and other publications about world aphid fauna aims to have an idea about the original distribution of the aphid species [2, 3, 6, 7, 13, 14, 15, 16 17, 18]. Turkey is located between the Eastern and Western Palearctic and therefore Turkey was considered the Mediterranean Basin of the Palearctic region when evaluating the aphid species of Turkey aphid fauna.

RESULTS and DISCUSSIONS

After evaluating the 491 species belonging to Turkey aphid fauna, it was shown that almost half of the species were originated from Europe (238 species) (Fig. 1) and

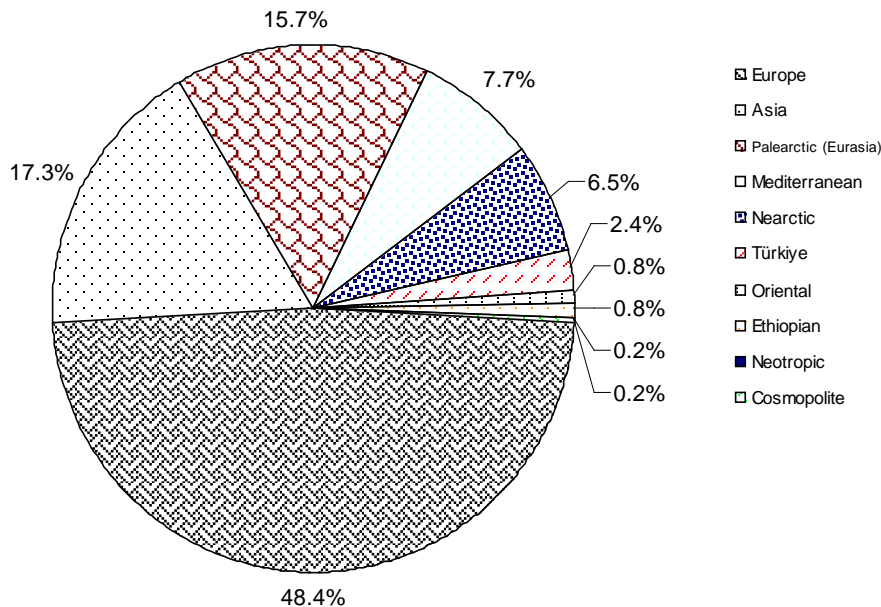


Figure 1. Zoogeographical composition of Turkey

followed by Asia, Eurasia (species originated from both Europe and Asia) and Mediterranean respectively. It was expected to have a higher number of the European and Asian species in Turkey aphid fauna as Turkey belongs to two continents and also has a function as a bridge between them. Therefore, it is not very much surprising to record any aphid species in Turkey which was recorded in Palearctic region. If any species come to the new regions where they normally do not distribute they can be accepted as alien species. During the evaluation of the composition of Turkey aphid fauna, it was seen that nonignorable number of species from Nearctic (32 species) were also recorded in Turkey. There are also some species from Ethiopian, Oriental and Neotropical regions (4, 4 and 1 species respectively) which are very low in number when compared to Nearctic species. Species determined in Turkey aphid fauna that is originated from Nearctic,

Ethiopian, Oriental and Neotropical regions are considered an alien aphid species for Turkey aphid fauna. In this respect, it was shown that there are about 41 alien aphid species in Turkey (Table 1).

Results of the current study showed that about 8.3 % of Turkey aphid fauna are composed of alien species and interestingly most of these species have Nearctic origin. This pattern is parallel with the alien aphid species determined in Europe [3]. Turkey is a geographically large country, 31% of Turkish flora is endemic [5] and aphid fauna in some regions has not been adequately studied yet. By studying aphid fauna of all the regions might clarify alien components in Turkey aphid fauna and our team believe that there will be more alien species from different regions due to specific features of the country and the global reasons.

Table 1. List of the alien aphid species in Turkey

Species+Author [First reference from Turkey]	Subfamily	First Record from Turkey	Origin	World Distribution	References
<i>Adelges cooleyi</i> (Gilette, 1907) [19]	---	Artvin	Nearctic	Palearctic-Nearctic	[17]
<i>Aphis forbesi</i> Weed, 1889 [20]	Aphidinae	İzmir	Nearctic	Palearctic, Nearctic, Neotropical	[8]
<i>Aphis helianthii</i> Riley & Monell, 1879. [21]	Aphidinae	Samsun	Nearctic	Nearctic-Neotropical (USA,Canada)	[22]
<i>Aphis illinoisensis</i> Shimer, 1866 [23]	Aphidinae	Hatay	Nearctic	Nearctic-Neotropical (USA,Canada)	[3,24]
<i>Aphis impatientis</i> Thomas, 1878 [19]	Aphidinae	Artvin	Nearctic	Nearctic-Neotropical-Canada	[3]
<i>Aphis maculatae</i> Oestlund, 1887 [25]	Aphidinae	Karabük	Nearctic	Nearctic	[3,17]
<i>Aphis middletoni</i> Thomas, 1879 [21]	Aphidinae	Samsun	Nearctic	USA, Brazil, Australia, South Africa	[3]
<i>Cavariella digitata</i> Hille Ris Lambers, 1969 [26]	Aphidinae	Trabzon	Nearctic	USA, UTAH	[17]
<i>Chaetosiphon (Pentatrachopus) fragaefolii</i> (Cockerell, 1901) [13]	Aphidinae	Ankara	Nearctic	Nearctic, Australia, Africa, Neo Tropic, Palearctic	[8]
<i>Chaitophorus neglectus</i> Hottes and Frisson, 1931 [27]	Chaitophorinae	Niğde	Nearctic	Nearctic	[17]
<i>Chaitophorus saliciniger</i> (Knowlton, 1927) [28]	Chaitophorinae	İzmir	Nearctic	USA, Colorado, UTAH	[17]
<i>Cinara cedri</i> Mimeur, 1936 [29]	Lachninae	Gaziantep	Ethiopian	Palearctic, Africa, Neotropical	[8]
<i>Cinara (Cedrobium) laportei</i> (Remaudiere, 1954) [30]	Lachninae	Adana	Ethiopian	East Palearktik	[8]
<i>Cinara pinivora</i> (Wilson, 1919) [26]	Lachninae	Artvin	Nearctic	Neotropical USA, Canada	[17]
<i>Cinara wahlua</i> Hottes, 1952 [21]	Lachninae	Samsun	Nearctic	USA (Colorado)	[17]
<i>Eriosoma lanigerum</i> (Hausmann, 1802) [31]	Eriosomatinae	Trabzon	Nearctic	Cosmopolit	[8]
<i>Hysteronera setariae</i> (Thomas, 1878) [27]	Aphidinae	Niğde	Nearctic	Cosmopolit	[8]
<i>Illinoia lambersi</i> (MacGivray, 1960) [26]	Aphidinae	Rize, Trabzon	Nearctic	Nearctic, Neotropical and Europe	[32]
<i>Macrosiphoniella tapuskae</i> (Hottes & Frison, 1931) [29]	Aphidinae	Bitlis	Nearctic	Palearctic, Africa, Nearctic	[22]
<i>Macrosiphum euphorbiae</i> (Thomas, 1878) [29]	Aphidinae	İstanbul	Nearctic	Cosmopolit	[8]
<i>Macrosiphum impatientis</i> Williams, 1911 [21]	Aphidinae	Samsun	Nearctic	Nearctic	[3]
<i>Macrosiphum pallidum</i> (Oestlund, 1887) [21]	Aphidinae	Samsun	Nearctic	Nearctic	[3]

<i>Melanaphis sacchari</i> (Zehntner, 1897) [33]	Aphidinae	Adana	Oriental	Palaearctic, Australia, Africa, Neotropic,	[3]
<i>Monellia caryella</i> (Fitch, 1855) [34]	Calaphidinae	Antalya, İçel	Nearctic	Palaearctic, Nearctic, Neotropic, Africa	[8]
<i>Mordwilkoja vagabunda</i> (Walsh, 1863) [35]	Erisomatinae	Bartın	Nearctic	North America Germany, Japan	[18]
<i>Nearctaphis bakeri</i> (Cowen ex Gillette & Baker, 1895) [33]	Aphidinae	Adana	Nearctic	Cosmopolit (except Australia)	[8]
<i>Neobetulaphis pusilla</i> Basu, 1964 [26]	Calaphidinae	Rize, Artvin, Trabzon	Oriental	Palaearctic	[17]
<i>Phylloxera quercus</i> Boyer de Fonscolombe, 1841 [6]	---	Artvin	Nearctic	Palaearctic	[17]
<i>Rhodobium porosum</i> (Sanderson, 1900) [36]	Aphidinae	Isparta	Nearctic	Cosmopolit	[3]
<i>Rhopalosiphoninus latsiphon</i> (Davidson, 1912) [37]	Aphidinae	Sakarya	Nearctic	Cosmopolit	[8]
<i>Rhopalosiphum insertum</i> (Walker, 1849) [29]	Aphidinae	Ankara	Nearctic	Cosmopolit (except Australia and Neotropic)	[8]
<i>Sipha arenarii</i> Mordvilko, 1921 [38]	Aphidinae	Samsun-Ladik	Nearctic	Europe and Asia	[3,15]
<i>Thecabius affinis</i> (Kaltenbach, 1843) [39]	Eriosomatinae	Widespread in Turkey	Nearctic	Worldwide	[15,17]
<i>Thelaxes californica</i> (Davidson, 1919) [26]	Thelaxinae	Trabzon	Nearctic	Nearctic	[17]
<i>Thorocaphis flava</i> (Takahashi, 1950) [40]	Hormaphidinae	Uşak, Kütahya, Afyonkarahisar	Oriental	Malaya	[17]
<i>Uroleucon ambrosiae</i> (Thomas, 1878) [41]	Aphidinae	Trabzon	Neotropic	Palaearctic	[3]
<i>Uroleucon compositae</i> (Theobald, 1915) [41]	Aphidinae	Trabzon	Oriental	Cosmopolit (except Australia)	[42]
<i>Uroleucon (Lambersius) erigeronense</i> (Thomas, 1878) [43]	Aphidinae	Kırıkkale	Nearctic	Cosmopolit (except Australia)	[8]
<i>Uroleucon pseudambrosiae</i> (Olive, 1963) [21]	Aphidinae	Samsun	Nearctic	Palaearctic	[8]
<i>Wahlgreniella arbuti</i> (Davidson, 1910) [29]	Aphidinae	Burdur	Nearctic	Palaearctic, Nearctic, Africa	[8]
<i>Wahlgreniella nervata</i> Gillette, 1908 [44]	Aphidinae	Denizli	Nearctic	Africa, Nearctic, Neotropic, Oriental	[8]

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