INVASIVE INSECT SPECIES REPORTED IN THE SIBIU CITY (ROMANIA), UNDER THE CLIMATIC CONDITIONS OF 2021-2024

STANCĂ-MOISE Cristina

Abstract. The present study investigates the presence and impact of the invasive heteroptera species *Corythucha arcuata* (Say, 1832), *Corythucha ciliata* (Say, 1832) and *Oxycarenus lavaterae* (Fabricius, 1787) in the Sibiu City, Romania, under the influence of climatic conditions from 2021 to 2024. The research focused on signaling and monitoring the distribution, population density and ecological effects of these species in various urban ecosystems, including parks, gardens and periurban forests. The collected data showed a significant increase in the populations of *C. arcuata* and *C. ciliata*, especially in areas with a majority of oak and sycamore species. The *O. lavaterae* was predominantly associated with lime trees, showing a more even distribution throughout the city. The climatic conditions during the period of the study, characterized by hot and dry summers, favoured the development and expansion of these invasive species, thus amplifying their impact on the local vegetation. Observations revealed severe defoliation of oak and sycamore trees, a decline in tree health and a reduction in associated biodiversity. This study highlights the need to implement integrated management strategies to control the spread of these invasive species and minimize negative impacts on urban ecosystems and the local economy. Recommendations include continuous monitoring of populations, use of natural predators, responsible application of chemical measures, and promotion of ongoing research to develop effective and sustainable control methods.

Keywords: *Corythucha arcuata* (Say, 1832), *Corythucha ciliata* (Say, 1832), *Oxycarenus lavaterae* (Fabricius, 1787), Sibiu, Romania.

Rezumat. Speciile de insecte invazive semnalate în orașul Sibiu (Romania), în condițiile climatice din 2021-2024. Prezentul studiu investighează prezența și impactul speciilor de heteroptere invazive *Corythucha arcuata* (Say, 1832) *Corythucha ciliata* (Say, 1832) și *Oxycarenus lavaterae* (Fabricius, 1787) în orașul Sibiu, România, sub influența condițiilor climatice din 2021 până în 2024. Cercetările s-au concentrat pe semnalizarea și monitorizarea distribuției, densității populației și efectelor ecologice ale acestor specii în diverse ecosisteme urbane, inclusiv parcuri, grădini și păduri periurbane. Datele culese au arătat o creștere semnificativă a populațiilor de *C. arcuata* și *C. ciliata*, în special în zonele cu o majoritate de specii de stejar și platan. *Oxycarenus lavaterae* a fost asociat predominant cu tei, prezentând o distribuție mai uniformă în tot orașul. Condițiile climatice din perioada studiului, caracterizate de veri calde și uscate, au favorizat dezvoltarea și extinderea acestor specii invazive, amplificându-și astfel impactul asupra vegetației locale. Observațiile au evidențiat defoliere severă a stejarilor și platanilor, o scădere a sănătății copacilor și o reducere a biodiversității asociate. Acest studiu evidențiază necesitatea implementării unor strategii de management integrat pentru a controla răspândirea acestor specii invazive și pentru a minimiza impactul negativ asupra ecosistemelor urbane și a economiei locale. Recomandările includ monitorizarea continuă a populațiilor, utilizarea prădătorilor naturali, aplicarea responsabilă a măsurilor chimice și promovarea cercetării în curs pentru a dezvolta metode de control eficiente și durabile.

Cuvinte cheie: *Corythucha arcuata* (Say, 1832), *Corythucha ciliata* (Say, 1832), *Oxycarenus lavaterae* (Fabricius, 1787), Sibiu, România.

INTRODUCTION

In recent decades, concern about the impacts of invasive insects on natural and agricultural ecosystems has increased significantly (OLENICI et al., 2022). Invasive insects are species that are introduced into a new ecosystem, generally by humans, and can have devastating consequences on the biodiversity and ecological functions of that ecosystem. They can adversely affect plant health, soil quality and other aspects of the environment.

Due to globalization and international trade, invasive insects have become an increasingly urgent and complex problem (KARPUN et al., 2018). From coleopteran species that destroy vast forests to pests that damage agricultural harvests and ornamental plants, the impact of these invasions can be widely felt (CONNOR, 1988).

In the present study, we examine the key issues related to invasive insects reported in the Sibiu City, under the climatic conditions of 2021-2024 and their impact on the biodiversity and economy, as well as methods to manage and prevent their spread. Through a deep understanding of these issues, we can develop more effective strategies to protect ecosystems and human activities affected by these invasions.

Our study focused on monitoring the invasive species *C. arcuata* during the years 2021-2024 in 18 observation points, including the Sub Arini Park-4 sites, Astra and Citadel Parks-2 sites), green areas (Museum of Natural History of Sibiu, Turismului street, Cârlova street, Ștefan Cel Mare street, Ovidiu street-3 sites, the city cemetery, Sibiu Zoo) in the districts of Ștrand, Hipodrom, Gușterița and Turnișor and the trees on the edge of Dumbrava Sibiului forest (STANCĂ-MOISE et al., 2023; STANCĂ-MOISE, 2024).

C. ciliata was first reported from Park of Sibiu in 2011 (TATU & TĂUȘAN, 2011). The species is present on sycamore trees, planted as ornamental species 10-15 years ago in green areas of the city. The oldest specimens, over 150 years old, are found in the Sub Arini Park. Since 2023, we have been monitoring the species *C. ciliata* in the Sub Arini Park, Astra Park, Cetății Park and on isolated trees in the neighborhoods of Ștrand, Hipodrom, Turnișor and Gușterița.

In the spring of 2024, the presence of the species *Oxycarenus lavaterae* was also detected on the trunk of a lime tree in Turnului Street, and monitoring of this species started immediately. Research methods consisted of visual and survey techniques on host trees to identify invasive insect species. The field trips were carried out weekly, from February to December, in urban areas with forest vegetation, respectively public parks and green areas in different neighbourhoods of the Sibiu City.

MATERIALS AND METHODS

Sibiu is a city located in the centre of Romania, in the historical region of Transylvania, at the intersection of the 45°47' north latitude with the 24°05' east longitude meridian. The city is situated at an average altitude of about 400 meters above the sea level, in the southern part of the Transylvanian Plateau, in an area of contact with the Carpathian Mountains (Southern Carpathians).

The landscape around Sibiu is varied, including rolling hills, plains and mountains. To the south of the city, we find the Cindrel Mountains, part of the Southern Carpathian chain, with altitudes exceeding 2,200 meters. To the north, the topography becomes flatter, crossing into the Transylvanian Plateau. The town itself is located on the terraces of the Cibin River, which flows through the area from west to east.

The vegetation in the Sibiu area reflects the diversity of relief and climate. In the lowlands and hills there are deciduous forests with dominant species such as oak, beech and hornbeam. At higher altitudes in the mountains, the vegetation gradually changes to coniferous forests with spruce and fir. There are also alpine and subalpine meadows rich in wildflowers and grasses.

Sibiu's climate is temperate continental, characterized by significant seasonal variations. Winters are cold, with average temperatures varying between -4°C and -1°C and frequent snowfalls. Summers are warm, with average temperatures between 18°C and 22°C, and precipitation is relatively evenly distributed throughout the year, with a slight peak in May and June.

The identification of invasive insects is essential to manage and control their spread. In the Sibiu City, methods to identify invasive insects included visual examination using insect identification determinants. Microscopic research was used for detailed examination of insect morphological characteristics.

Monitoring and studying invasive insects are a major challenge in protecting biodiversity and local ecosystems in Sibiu City. Monitoring programs often involve community participation, which can contribute by reporting sightings of unusual insects. This participation is essential for early detection and implementation of control measures.

The tools and techniques used to analyse the climate data included mobile apps, and the collected data were recorded at each field trip for each observation point. Climate data, including minimum, medium and maximum temperatures, were obtained from the Meteorological Station in Sibiu. This approach allowed for a detailed and continuous monitoring of invasive species over an extended period during 2021-2024.

The monitoring of *C. arcuata* over a four-year period revealed a significant increase in its population at various locations in the City of Sibiu City. The monitoring of the species *C. ciliata* and *O. lavaterae* also allowed the detection of these invasive insects and the study of their biology, ecology and ethology under the changing climate of the city.

RESULTS AND DISCUSSIONS

In the period 2021-2024, the reporting of the invasive species *Corythucha arcuata*, *Corythucha ciliata* and *Oxycarenus lavaterae* in Sibiu City, Romania, revealed the following:

The monitored invasive species had a significant ecological impact on local vegetation. The species *C. arcuata* and *C. ciliata* caused severe defoliation of oak and sycamore trees in the locations and on the trees studied, leading to a visible decline in tree health and a reduction of their associated biodiversity in urban ecosystems from the Sibiu City.

Oxycarenus lavaterae in the future will affect linden trees, but its impact will be observed in the coming years unless measures are taken to limit the extent of the attack of this invasive insect.

The climatic conditions of the Sibiu City in the period 2021-2024 was characterized by hot and dry summers, which favoured the development and expansion of invasive species, amplifying their negative impact on urban vegetation.

The study revealed that climatic conditions in the years 2021-2024 played a crucial role in the proliferation of the invasive species *C. arcuata* which developed 23 generations per year, while *C. ciliata* only had two generations per year. Since *Oxycarenus lavaterae* is a newly reported species, we will continue our research in the coming years to study its biology and ethology. Rising temperatures in 2021-2024 and prolonged periods of drought have created a favorable environment for these species, allowing them to develop and spread rapidly in all urban forest ecosystems where they have found host trees.

The impact of these species on urban ecosystems is considerable. The severe defoliation of oak and sycamore trees by *C. arcuata* and *C. ciliata* not only affects the health of these trees in public parks and green areas as well as the Dumbrava Forest border, but also contributed to the reduction of biodiversity, affecting insects and birds that depend on these trees. Similarly, *Oxycarenus lavaterae* is currently affecting lime trees, but its impact is not visible in the first year of monitoring.

The study results underline the need to implement integrated management strategies to control the spread of these invasive species and minimize their negative impacts on urban ecosystems and the local economy. It is essential to continuously monitor the populations of these species and use various sustainable measures. In the following we present each species with its range in Europe and worldwide.

1. ***Corythuca arcuata* (Say, 1832) (HEMIPTERA: HETEROPTERA: TINGIDAE)**

The *Corythucha arcuata*, also known as the oak lace bug, is a species of insects belonging to the Tingidae family, Hemiptera order (Fig. 1). Native to North America, this species has become invasive in many parts of Europe and Asia, causing significant damage to oak forests and other ecosystems (WILLIAMS et al., 2021).

The *C. arcuata* is a small insect, about 3-4 mm long. Its distinguishing features include a white or greyish body covered with a fine network of veins, giving it a lacy appearance. The wings are transparent, with an intricate pattern of dark spots, and the head is protected by a hood-like carapace (DOBREVA et al., 2013; SIMOV et al., 2018).

This species is native to the eastern regions of North America, where it is commonly found on various oak species (*Quercus* spp.). In recent decades, *C. arcuata* has spread to Europe, being first reported in Italy in 2000 (BERNATHINELLI & ZANDIGIACOMO, 2000). Since then, it has been identified in several European countries, including France, Germany, Romania and Hungary (Table 1). Its rapid expansion is favoured by the international transport of woody material and by climate changes that facilitate the species' adaptation to new environmental conditions.

C. arcuata has a life cycle that includes egg, nymph and adult stages. Females lay their eggs on the undersides of oak leaves and the emerging nymphs feed on their sap. Nymphs go through five developmental stages before becoming adults. In temperate regions, the species may have several generations per year, which contributes to rapid population growth (DIOLI et al., 2007; FARACI, 2019; FORSTER et al., 2005; STREITO et al., 2018; JURC, 2017; De GROOT et al., 2022).

The lacey oak sawfly feeds on leaf sap, causing discoloration, drying and premature leaf drop. Massive infestations can lead to severe defoliation of oak trees, weakening and, in extreme cases, tree death. This has serious consequences for forest biodiversity, affecting not only oak trees, but also the many plant and animal species that depend on them (CSEPELÉNYI et al., 2020; KOVAČ et al., 2020; KOVACS et al., 2020).

From an economic point of view, *C. arcuata* represents a major problem for the management of forests and urban green spaces. The control of infestations and rehabilitation of affected forests involve considerable costs. In addition, the loss of oak trees can have a negative impact on the timber industry and other economic sectors dependent on forest resources (PAULIN et al., 2021).

Table 1. The spread of *Corythucha arcuata* (Say, 1832) in the Balkan Peninsula and Europe.

Crt. no.	Country	Year	Species reported by the authors:
1.	Italy	2000	DIOLI et al., 2007; FARACI, 2019; BERNATHINELLI & ZANDIGIACOMO, 2000
2.	Switzerland	2002	FORSTER et al., 2005; STREITO et al., 2018
3.	Turkey	2003	KÜÇÜKBASMACI, 2014; DURSUN & FENT, 2017; BARI et al., 2021
4.	Iran	2005	SAMIN & LINNAVUORI, 2011
5.	Poland	2009	ZIELIŃSKA & LIS, 2020
6.	Bulgaria	2012	DOBREVA et al., 2013; SIMOV et al., 2018
7.	Hungary	2013	CSEPELÉNYI et al., 2017; KOVAČ et al., 2020; KOVACS et al., 2020; CSÓKA et al., 2020; PAULIN et al., 2021; KERN et al., 2021
8.	Croatia	2013	HRAŠOVEC, et al.; 2013BERTA et al., 2018
9.	Serbia	2013	MARKOVIC, et al., 2021
10.	Russia	2015	MASLYAKOV & IZHEVSKY, 2011; NEIMOROVETS et al., 2017; GOLUB & SOBOLEVA, 2018
11.	Romania	2015	DON et al., 2016; CHIRECEANU et al., 2017; CICEOI et al., 2017; STANCĂ-MOISE et al., 2023; STANCĂ-MOISE, 2024
12.	Albania	2016	JURC & JURC, 2017
13.	Greece	2016	GLAVENDEKIĆ & VUKOVIC-BOJANOVIĆ, 2017; KAPSASKIS et al., 2022
14.	Ukraine	2016	DAUTBASIC et al., 2018
15.	Slovenia	2016	JURC & JURC, 2017; De GROOT et al., 2022
16.	France	2017	STREITO et al., 2018
17.	Slovakia	2018	ZUBRIK et al., 2019
18.	Bosnia and Herzegovina	2018	GLAVENDEKIĆ et al., 2017; DAUTBASIC et al., 2018
19.	Germany	2018	MEIER et al., 2019; SCHÄFER et al., 2020; WAGNER et al., 2021
20.	Austria	2019	SALLMANNSHOFER et al., 2019
21.	North Macedonia	2019	SOTIROVSKI et al., 2019
22.	Spain	2021	RIBA-FLINCH, 2022
23.	Portugal	2021	GIL & GROSSO-SILVA, 2021

Figure 1. *Corythucha arcuata* (Say, 1832), July 12, 2023, Sub Arini Park (original photo).

In Sibiu, the invasive species *C. arcuata* was reported for the first time in 2021, in the courtyard of the Natural History Museum on an oak tree. Since 2021 and until the present, the species has been monitored, and the studies and research from 2021-2022 have been published in papers (STANCĂ-MOISE et al., 2023).

From the observations carried out in the monitoring points, which represented more than 100 examined oaks, we found a severe infestation by *C. arcuata* in late summer in the years 2022 and 2023, characterized by yellowing of leaves and even a complete drying of leaves.

2. ***Corythucha ciliata*** **(Say, 1832) (HEMIPTERA: HETEROPTERA: TINGIDAE)**

The *Corythucha ciliata*, commonly known as the sycamore tiger, is an invasive species native to North America (Fig. 2; Table 2) that has spread rapidly to Europe and other parts of the world (WHEELER, 1977).

Table 2. Reporting of *Corythucha ciliata* (Say, 1832) in Europe and worldwide.

Crt. no.	Country	Year	Species reported by the authors:
1.	Croația	1970	MACELJSKI & BALARIN, 1972
2.	Slovenia	1972	RABITSCH, 2008
3.	Serbia	1973	RABITSCH, 2008; MILENKOVIĆ et al., 2016
4.	France	1974	SIDOR, 1985; STREITO et al., 2010
5.	Switzerland	1975	RABITSCH, 2008
6.	Hungary	1976	JASINKA & BOZSITS, 1977; ÓSZI et al., 2005
7.	Austria	1982	RABITSCH, 2008
8.	Germany	1983	RABITSCH, 2008
9.	Italy	1984	ARZONE A. 1984; TAVELLA & ARZONE, 1987
10.	Bulgaria	1987	IOSIFOV, 1990
11.	Greece	1988	TZANAKAKIS, 1988; KMENT, 2007
12.	Chile	1990	PRADO, 1990
13.	Spain	1990	SORIA et al., 1991
14.	Romania	1990	KIS, 1990; FLORIAN et al., 2022
15.	Czech Republic	1995	STEHLÍK, 1997
16.	Slovakia	1997	STEHLÍK, 1997
17.	Montenegro	1998	PROTIĆ, 1998
18.	USA	1998	HALBERT & MEEKER, 1998; MALUMPHY et al., 2006
19.	Egypt	1999	FAHIM et al., 2003
20.	Russia	2001	VOIGT, 2010
21.	Turcia	2003	MUTUN, 2003
22.	Japan	2003	TOKIHIRO et al., 2003
23.	United Kingdom	2005	MALUMPHY et al., 2006
24.	Belgium	2006	AUKEMA & HERMES, 2009
25.	Portugal	2007	GROSSO-SILVA, AGUIAR, 2007; KMENT, 2007
26.	Netherlands	2009	AUKEMA & HERMES, 2009
27.	Poland	2009	LIS, 2009
28.	Australia	2008	DOMINIAK et al., 2008
29.	China	2009	LI et al., 2016
30.	South Africa	2014	PICKER & GRIFFITHS, 2015
31.	Uzbekistan	2019	GREBENNIKOV & MUKHANOV, 2019

Figure 2. *Corythucha ciliata* (Say, 1832) April 8, 2024, Sub Arini Park (original photo).

This article discusses the biological and ecological characteristics of the species, its impact on ecosystems and the control measures used to manage this invasive species (DRAKE & RUHOFF, 1965). *C. ciliata* is a small insect, about 3-4 mm long, belonging to the Tingidae family, Hemiptera order. Its body has a distinctive structure, covered with a network of veins giving a lacy appearance. Its coloration is generally whitish, with dark spots on the wings. The head is protected by an extended, hood-like pronotum. Native to North America, *C. ciliata* was accidentally introduced into Europe in the mid-20th century. Its first appearance in Europe was reported in Italy in the 1960s. Since then, the species has spread to many European countries, including France, Germany, Spain, Hungary and Romania. In addition, it has been reported in Asia and South America. The preferred habitat of this species is sycamore trees (*Platanus* spp.), which it colonizes and feeds on (YANO, 1959; BERNARDINELLI & ZANDIGIACOMO, 2000).

C. ciliata shows a complete life cycle including egg, nymph and adult stages. Females lay their eggs on the underside of sycamore leaves. After hatching, the nymphs go through five developmental stages before becoming adults (DÖNGES, 1978). Under favourable conditions, the species can have several generations per year. It feeds on leaf sap, causing discoloration, drying and premature leaf drop. The *C. ciliata* infestations can have significant ecological and economic consequences. The severe defoliation of plane trees leads to their weakening, making them more vulnerable to other biotic and abiotic stresses. This affects not only the health of the trees, but also the associated wildlife that depends on them for food and shelter. From an economic point of view, managing infestations and rehabilitating affected trees involves high costs for municipalities and landowners.

3. ***Oxycarenus lavaterae*** **(Fabricius, 1787) (HETEROPTERA: OXYCARENIDAE)**

The *Oxycarenus lavaterae*, is a species of insects in the Oxycarenidae family, Hemiptera order (Fig. 3). This species is native to Mediterranean regions, but in recent decades it has become an invasive species in several European countries, causing concern due to its impact on local vegetation and urban ecosystems (RIBES et al., 2004).

O. lavaterae is a small insect, about 4-5 mm long. Its body is usually black or dark brown with transparent wings that have a smoky tinge. The antennae are relatively long, and the legs are slender and long, adapted for rapid movement. This species can be distinguished through the presence of white spots on the pronotum and hemieliters, which are segmented on the forewing (NEDVĚD et al., 2014).

Initially, *O. lavaterae* was restricted to Mediterranean regions, being found in countries such as Italy, Spain and Greece. However, in recent decades, it has expanded its range to several parts of Central and Eastern Europe, including France (VELIMIROVIC et al., 1992), Germany, Austria and Romania (Table 3). The expansion of the species is largely attributed to climate change and human transport, which facilitate the accidental dispersal of the insects (RABITSCH 2008, 2010).

O. lavaterae has a life cycle that includes several developmental stages: egg, larva (nymph) and adult. Females lay their eggs on the leaves and stems of host plants, and the emerging larvae feed on their sap. In regions with warm climates, the species can have several generations per year, which contributes to rapid population growth (WERMELINGER et al., 2005).

This species is known for its attacks on plants of the family Malvaceae, especially lime (*Tilia* spp.), but also other ornamental and fruit trees (HAUZNEROVÁ, 2003). Feeding on plant sap, *O. lavaterae* can cause premature drying and leaf drop, reduced photosynthesis and general weakening of host plants. In extreme cases, massive infestations can lead to plant death (KALUSHKOV & NEDVĚD, 2010).

Based on field observations, we estimated a density of 250,000 insects per m² of surface area, directly on the trunks of *Tilia cordata* lime trees, in layers on top of each other as described by SCHULZE, 2020. Host plants for this

species are also species of the families Malvaceae, Tiliaceae, Bombacaceae and Sterculiaceae *Lavatera* poplar shrubs, *Alcea hollyhocks* Alcea, *Hibiscus* (ARSLANGÜNDOĞDU et al., 2008).

The economic impact of this species is significant in urban areas, where linden and other ornamental plants are important for landscaping. The costs of controlling and replacing affected plants can be considerable. Massive infestations can also create discomfort for the human population due to the numerous presences of insects.

Table 3. The spread of *Oxycarenus lavaterae* (Hemiptera: Oxycarenidae) in the Palearctic region, Europe and the Mediterranean Sea.

Crt. no.	Country	Year	Species reported by the authors:
1.	Montenegro	1985	VELIMIROVIĆ et al., 1992
2.	Hungary	1994	KONDOROSY, 1995; PERICART, 2001
3.	Slovakia	1995	BIANCHI & ZSTEHLÍK, 1999
4.	Serbia	1996	PROTIĆ & STOJANOVIĆ, 2001
5.	Bulgaria	1998	KALUSHKOV P., SIMOV N., TZANKOVA R. 2007a, KALUSHKOV P., SIMOV N., TZANKOVA R. 2007b.
6.	France	1999	REYNAUD, 2000
7.	Austria	2001	RABITSCH & ADLBAUER, 2001
8.	Switzerland	2002	WERMELINGER et al., 2005
9.	Finland	2003	NEDVĚD et al., 2014
10.	Czech Republica	2004	KMENT et al., 2006
11.	Germany	2004	DECKERT, 2004; SCHNEIDER & DOROW, 2016; SCHNEIDER & DOROW, 2017; TYMANN, 2018; BÄSE & DECKERT, 2020
12.	Spain	2004	RIBES et al., 2004
13.	Romania	2009	KMENT, 2009; RABITSCH, 2010
14.	Poland	2016	HEBDA & OLBRYCHT, 2016
15.	Turkey	2018	ARSLANGÜNDOĞDU et al., 2008

Figure 3. *Oxycarenus lavaterae* (Hemiptera: Oxycarenidae), April 7, 2024, Valea Mare Streed Sibiu, 45, 992508, 24, 1467526 (original photo).

CONCLUSIONS

In Sibiu, the monitoring of invasive insects brings significant benefits by increasing the capacity for early detection and implementation of appropriate management measures. An integrated approach combining efficient collection methods and accurate identification techniques is essential for rapid and effective intervention in the management of invasive species.

The control of the invasive species *C. arcuata* involves a combination of chemical, biological and cultural methods. Insecticides can be effective in reducing populations of *C. arcuata*, but their use may not be feasible as attacked trees are in the city's public parks and nearby green areas, which can have a negative effect on city residents and negative impacts on other species and the environment. In the future we would like to test laboratory and then environmental biological methods including the use of natural predators and specific parasites that can help keep lacewing populations under control. Cultural practices, such as careful monitoring of forest ecosystems and proper management of affected trees, are essential to prevent and limit the spread of the species. *C. arcuata* represents a significant threat to the oak forests of Sibiu County and other ecosystems in the invaded regions. Its ecological and economic impact underlines the

importance of effective monitoring and management of invasive species. Continued research efforts and implementation of integrated control strategies are essential to protect biodiversity and forest resources from this invasive species.

The control of *C. ciliata* involves a combination of methods. Insecticides can be used to reduce populations, but their application must be done with caution to minimize impacts on the environment and other species. Biological methods include the use of natural predators and specific parasites that attack the lace bug. Cultural measures, such as careful monitoring of trees and removal of fallen leaves that may harbour eggs and nymphs, are essential to prevent the spread of the species. *C. ciliata* represents a significant challenge for the management of sycamore trees in parks and green areas in the neighbourhoods of Sibiu City. The rapid spread and negative impacts on tree health and associated biodiversity emphasize the importance of an integrated approach to control this invasive species. Continued research and the development of sustainable management strategies are crucial to protect urban and natural ecosystems from the negative effects of *C. ciliata*.

The control of *O. lavaterae* involves both chemical and biological measures. Insecticides can be effective, but their use must be undertaken with caution to avoid adverse effects on other beneficial species and the environment. Biological methods include the use of natural predators and specific parasites, which can help keep *O. lavaterae* populations under control.

O. lavaterae is an example of an invasive species that can have a significant impact on local ecosystems and economies. Careful monitoring and implementation of effective management strategies are essential to minimize the negative effects of this species on the environment and human society. As climate change continues to influence species distributions, the importance of proper management of invasive species is becoming increasingly evident.

The implementation of an integrated and participatory strategy in monitoring and managing invasive insects in Sibiu can significantly improve the effectiveness of control programs and protect local biodiversity. The use of mobile technologies to collect and analyse climate data contributes to more accurate monitoring and a better understanding of the distribution and behaviour of invasive species.

REFERENCES

ARZONE A. 1984. Preliminary report on natural enemies of *Corythucha ciliata* (Say) in Italy. *IUBS Bulletin WPRS*. **9**(1): 1-34.

ARSLANGÜNDOĞDU Z., HIZAL E., ACER S. 2008. First record of *Oxycarenus lavaterae* (Fabricius, 1787) (Heteroptera, Lygaeidae) in Turkey. *Applied Ecology and Environmental Research*. **16**(2): 1305-1311.

AUKEMA B., HERMES D. 2009. Nieuwe en interessante Nederlandse Wantsen III (Hemiptera: Heteroptera). In: *Nederlandse Faunistische Mededelingen*. **31**: 53-88. file:///C:/Users/Cristina/Downloads/244Aukemaetal2019 NetherlandIX.pdf (Accessed: March 12, 2024).

BALARIN I. & MACELJSKI M. 1986. Some new results of investigations on the biology and ecology of *Corythuhca ciliata*. II Meeting WG "Integrated Control of *C. ciliata*" Padova, 1985. In: *Bull. IOBC/WPRS Bruxelles*. **9**(1): 48-52.

BARI E., KARATA A., KARATA A. A. 2021. Insecta non gratae: New distribution recoths of eight alien bug (Hemiptera) species in Turkey with contributions of citizen science. In: *Zootaxa*. Magnolia Press, Auckland. **5057**: 1-128.

BÄSE K. & DECKERT J. 2020. Nachweise von *Oxycarenus lavaterae* (FABRICIUS, 1787) aus den ostdeutschen Bundesländern (Heteroptera: Oxycarenidae) zwischen 2017 und Anfang 2020. In: *Heteropteron Heft*. **58**: 27-32.

BERNARDINELLI I. & ZANDIGIACOMO P. 2000. Lace bugs (Heteroptera, Tingidae) attacking forest and ornamental trees in Italy: Species diversity, host plants and distribution. In: *Journal of Pest Science*. Springert, Berlin. **73**(5): 125-129.

BERNATHINELLI I. & ZANDIGIACOMO P. 2000. Prima segnalazione di *Corythucha arcuata* (Say) (Heteroptera, Tingidae) in EUROPA. In: *Informatore Fitopatologico*. Universita degli studi di Parma, Parma. **50**: 47-49.

BERTA A., MESIĆ Z., LUGIC E., OSTOJIĆ A. 2018. Monitoring of invasiveness of oak lace bug *Corythucha arcuata* in spačva basin, Croatia by modis satellite. In: *Proceedings of the 3rd Croatian Symposium on Invasive Species, Zagreb, Croatia*, 26–27 November: 1-26.

BIANCHI Z. & STEHLÍK J. L. 1999. *Oxycarenus lavaterae* (FABRICIUS, 1787) in Slovakia (Heteroptera: Lygaeidae). In: *Acta Musei Moraviae Scientiae Biologicac*. Moravian Museum, Brno. **84**: 203-204.

CHIRECEANU C., TEODORU A., CHIRILOAIE A. 2017. New records of the oak lace bug *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae) in Southern Romania. In: *Acta Zoologica Bulgarica Supplement*. Institute of Biodiversity and Ecosystem Research, Sofia. **9**: 297-299.

CICEOI R., GUTUE C., GUTUE M., ROSCA I. 2017. Current status of pests associated with urban vegetation in Bucharest Area. In: *Acta Zoologica Bulgarica*. Institute of Biodiversity and Ecosystem Research, Sofia. **9**: 181-190.

CONNOR E. F. 1988. Plant water deficits and insect responses: the preference of *Corythucha arcuata* (Heteroptera: Tingidae) for the foliage of white oak, *Quercus alba*. *Ecological Entomology*. In: Royal Entomological Society, United Kingdom. **13**(4): 375-81.

CSEPELÉNYI M., CSÓKÁNÉ H. A., SZÉNÁSI Á., MIKÓ Á., SZŐCS L., CSÓKA G. 2017. Az inváziós tölgy csipkéspoloska *Corythucha arcuata* (Say, 1832) gyors terjeszkedése és tömeges fellépése Magyarországon

[Rapid area expansion and mass occurrences of the invasive oak lace bug *Corythucha arcuata* (Say, 1932) in Hungary]. In: *Ethészettudományi Közlemények*. Soproni Egyetem, Soproni. **7**: 127-134.

CSÓKA G., HIRKA A., MUTUN S., GLAVENDEKIĆ M., MIKÓ Á., SZŐCS L., PAULIN M., EÖTVÖS C.B., GÁSPÁR C., CSEPELÉNYI M., SZÉNÁSI Á., FRANJEVIĆ M., GNINENKO Y., DAUTBAŠIĆ M., MUZEJINOVIĆ O., ZÚBRIK M., NETOIU C., BUZATU A., BĂLĂCENOIU F., JURC M., JURC D., BERNARDINELLI I., STREITO J. C., AVTZIS D., HRAŠOVEC B. 2020. Spread and potential host range of the invasive oak lace bug *Corythucha arcuata* (Say, 1832) (Heteroptera: Tingidae) in Eurasia. In: *Agricultural and Forest Entomology*. Royal Entomological Society, United Kingdom. **22**: 61-74.

DAUTBASIC M., ZAHIROVIC K., MUJEZINOVIC O. 2018. First record of oak lace bug (*Corythucha arcuata*) in Bosnia and Herzegovina. In: *Šumarski list***.** Hrvatsko šumarsko društvo, Zagreb. **142**: 179-181.

DE GROOT M., VAN DER MEIJ M., POCOCK M. J. O. 2022. Where to search: the use of opportunistic data for the detection of an invasive forest pest. In: *Biological Invasions*. **24**: 3523–3537.

DECKERT J. 2004. Zum Vorkommen von Oxycareninae (Heteroptera, Lygaeidae) in Berlin und Brandenburg. In: *Insecta*. Museum fur Naturkunde. Berlin**. 7**: 67-75.

DIOLI P., FORINI I. G., MORETTI M., SALVETTI M. 2007. Note sulla distribuzione di *Corythucha arcuata* (Insecta, Heteroptera, Tingidae) in Cantone Ticino (Svizzera), Valtellina e alto Lario (Lombardia, Italia) [Notes on the distribution of *Corythucha arcuata* (Say, 1832) (Insecta, Heteroptera, Tingidae) in the Alps and Pre-Alps of Lombardy (Italy) and Canton Ticino (Switzerland)]. In: *Naturalista Valtellinese*. Museo Civico di Storia Naturale. Morbengo. **18**: 59-68.

DOBREVA M., SIMOV N., GEORGIEV G., MIRCHEV P., GEORGIEVA M. 2013. First record of *Corythucha arcuata* (Say) (Heteroptera: Tingidae) on the Balkan Peninsula. *Acta Zoologica Bulgarica*. **65**: 409-412.

DON I., DON C. D., SASU L. R., VIDREAN D., BRAD M. L. 2016. Insect pests on the trees and shrubs from the Macea Botanical Garden. *Studia Universitatis 'Vasile Goldiş' Arad Seria Ştiinţe Ingineresti și Agroturism.* Arad. **11**: 23-28.

DOMINIAK B. C., GILLESPIE P. S., WORSLEY P., LOCKER H. 2008. Survey for sycamore lace bug *Corythucha ciliata* (Say) (Hemiptera: Tingidae) in New South Wales during 2007. *General and Applied Entomology*. **37**: 27-30.

DÖNGES H. 1978. Zur Biologie und Ökologie von *Corythucha ciliata* (Say), dem Amerikanischen Platanenspitzenwanze (Heteroptera, Tingidae). *Zeitschrift für angewandte Entomologie.* Wiley Press. London. **85**(1-4): 264-273.

DRAKE C. J. & RUHOFF, F. A. 1965**.** Lace-bug genera of the world (Hemiptera: Tingidae). In: *Bulletin of the United States National Museum*. Smithsonian Institution Press. USA. **243**: 1-634.

DURSUN A. & FENT M. 2017. Annotated checklist of Tingidae (Hemiptera: Heteroptera) in Turkey with new records for the faunas of Europe and Turkish Thrace. In: *Zootaxa*. Magnolia Press, Auckland. **4347**: 465-491.

FARACI F. 2019. Ritrovamento di *Corythucha arcuata* (Say, 1832) (Hemiptera, Tingidae) a Verona con note sulla morfologia e diffusione del genere *Corythucha* Stål, 1873 nella regione paleartica. In: *Bollettino del Museo Civico di Storia Naturale di Verona*. *Botanica Zoologia*. Museo Civico di Storia Naturale, Verona. **43**: 19-24.

FLORIAN T., POPUŢA D., BUNESCU H. 2022. *Corythucha ciliata* (Say, 1832) pest of plane trees (*Platanus spp*.), Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. In: *Agriculture*. USAMV, Cluj-Napoca. **79**(1): 15-20.

FORSTER B., GIACALONE I., MORETTI M., DIOLI P., WERMELINGER B. 2005. Die amerikanische Eichennetzwanze *Corythucha arcuata* (Say) (Heteroptera, Tingidae) hat die Sudschweiz erreicht. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft de la Societe Entomologique Suisse*. Bulletin de la Societe entomologique suisse. Swiss. **78**: 317-323.

FAHIM M. A., HASSANIEN N. K., MOSTAFA M. H. 2003. Relationships between climatic conditions and Potato Late Blight epidemic in Egypt during winter 1999-2001. *Applied Ecology and Environmental Research*, Budapest. **1** (1-2): 159-172.

GIL F. & GROSSO-SILVA J. M. 2021. *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae), new species for the Iberian Peninsula. *Arquivos Entomoloxicos. Arquivos Entomolóxicos Galegos*, Coruna. **24**: 307-308.

GLAVENDEKIĆ M. & VUKOVIC-BOJANOVIĆ V. 2017. Prvi nalaz hrastove mrežaste stenice *Corythucha arcuata* (Say) (Hemiptera: Tingidae) u Bosni i Hercegovini i novi nalazi u Srbiji. XI Symposium of Entomologists of Serbia. Goč, *Book of Abstracts*. Belgrade: 70-71.

GOLUB V. B. & SOBOLEVA V. A. 2018. Morphological differences between Stephanitis pyri, *Corythucha arcuata* and *C. ciliata* (Heteroptera: Tingidae) distributed in the south of the European part of Russia. *Zoosystematica Rossica*. Universitetskaya Emb, Saint-Petersburg. **27**(1): 142-145.

GREBENNIKOV K. A. & MUKHANOV S. Y. 2019. *Corythucha ciliata* (Say, 1932) (Hemiptera: Heteroptera: Tingidae): New Alien Species of True Bugs in Uzbekistan Fauna. *Russian Journal of Biological Invasions*. **10**: 126-128.

GROSSO-SILVA J. M. & AGUIAR A. 2007. *Corythucha ciliata* (Say, 1832) (Hemiptera, Tingidae), the nearctic Sycamore lace bug, found in Portugal. In: *Boletín Sociedad Entomológica Aragonesa*. Zaragoza. 366 pp.

HALBERT S. & MEEKER J. 1998. The Sycamore Lace Bug, *Corythucha ciliata* (Say) (Hemiptera: Tingidae). *Entomology Circular*. Florida Department of Agriculture and Consumer Services, Florida. **387**: 1-2.

HAUZNEROVÁ M. 2003. Potravní preference ruměnice pospolné. Živa. *Food preferences of the firebug*. Institute of Entomology, Biology Centre, Branisovska. **6**. 275 pp. (In Czech).

HEBDA G. & OLBRYCHT T. 2016. *Oxycarenus lavaterae* (FABRICIUS, 1787) Hemiptera: Heteroptera: Oxycarenidae) - gatunek nowy dla fauny Polski. *Wiadomosci Entomologiczne*. Polskie owarzystwo Entomologiczne, Poznaniu. **35**: 133-136.

HRAŠOVEC B., POSARI'C D., LUKI´C I., PERNEK M. 2013. First record of oak lace bug (*Corythucha arcuata*) in Croatia. *Sumarski List*. Croatian Forestry Society. Zagreb. **137**: 499-503.

IOSIFOV M. V. 1990. On the occurrence of the Nearctic species *Corythucha ciliata* (Say, 1832) (Heteroptera Tingidae) in Bulgaria. *Acta Zoologica Bulgarica*. Institute of Biodiversity and Ecosystem Research, Sofia. **39**: 53-56.

JURC M. & JURC D. 2017. The first record and the beginning the spread of oak lace bug, *Corythucha arcuata* (Say, 1832) (Heteroptera: Tingidae), in Slovenia. *Sumar List.* Croatian Forestry Society, Croatia. **141**: 485-488.

JASINKA J. & BOZSITS Gy. 1977. A platán csipkéspoloska (*Corythucha ciliata*) fellépése Magyarországon. *Növényvédelem*. **13**(1): 42-46. https://www.researchgate.net/publication/322118274_Az_invazios_tolgy_csipkespoloska_Corythucha_arcuata_Magyarorszagon (Accessed: March 12, 2024).

KALUSHKOV P. & NEDVĚD O. 2010. Suitability of food plants for *Oxycarenus lavaterae* (Heteroptera: Lygaeidae), a Mediterranean bug invasive in Central and South-East Europe. *Comptes Rendus de l Academie Bulgare des Sciences.* Scimago Press. Sofia. **63**: 271-276.

KALUSHKOV P., SIMOV N., TZANKOVA R. 2007a. Laboratory and field investigations on the biology of *Oxycarenus lavaterae* (Fabricius) (Heteroptera: Lygaeidae) in Bulgaria. *Acta zoologica Bulgarica*. Sofia. **59**: 217-219.

KALUSHKOV P., SIMOV N., TZANKOVA R. 2007b. Biology and acclimatization of *Oxycarenus lavaterae* (Heteroptera: Lygaeidae) a new invasive Mediteranea species in Bulgarian fauna. *Alien Arthropods in South East Europe crossroad of three continents*. Crossroad of Three Continents. Sofia: 44-47.

KAPSASKIS P., IOANNOU N., DRIZOU F. 2022. Integrated management strategies for controlling *Corythucha arcuata* in Greek oak forests. *Pest Management Science*. Scimago Jurnal and Country Rank, UK. **78**(3): 789-799.

KARPUN N.N., PROTSENKO V.Y., BORISOV B.A., SHIRYAEVA N.V. 2018. A new record of the oak lace bug, *Corythucha arcuata* (Say, 1832) (Heteroptera: Tingidae), in subtropical zone of Black Sea coast of the Caucasus with forecast of phytosanitary situation change in the region. *Euroasian Entomological Journal*. **17**(2): 113-19.

KERN A., MARJANOVIĆ H., CSÓKA G., MÓRICZ N., PERNEK M., HIRKA A., MATOŠEVIĆ D., PAULIN M., KOVAČ G. 2021. Detecting the oak lace bug infestation in oak forests using modis and meteorological data. *Agricultural and Forest Meteorology*. Scimago Journal and Country Rank, UK. **306**: 108436.

KIS B. 1990. *Corythucha ciliata* (Heteroptera, Tingidae) un dăunător forestier nou pentru fauna României. *Analele Banatului*. Muzeul Național al Banatului, Timișoara. **2**: 320-321.

KMENT P. 2007. First record of the alien lace bug *Stephanitis pyrioides* in Greece and note on *Corythucha ciliata* from Portugal (Heteroptera: Tingidae). *Linzer biologische Beiträge Linz*. Land Oberösterreich, Linz. **39**: 421–429.

KMENT P. 2009. *Oxycarenus lavaterae*, an expansive species new to Romania (Hemiptera: Heteroptera: Oxycarenidae). Acta Musei Moraviae, *Scientiae biologicae Brno*. Acta Musei Moraviae, Brno. **94**: 23-25.

KMENT P., VAHALA O., HRADIL K. 2006. First records of *Oxycarenus lavaterae* (Heteroptera: Oxycarenidae) from the Czech Republic, with review of its distribution and biology. *Klapalekiana*. Czech Entomological Society. Cehia. **42**: 97-127.

KONDOROSY E. 1995. *Oxycarenus lavaterae*, a new lygaeid species in the Hungarian bug fauna (Heteroptera: Lygaeidae). *Folia Entomologica Hungarica*. **56**: 237-238. (in Ungarisch, englische Zusammenfassung).

KOVAČ M., GORCZAK M., WRZOSEK M., TKACZUK C., PERNEK M. 2020. Identification of entomopathogenic fungi as naturally occurring enemies of the invasive oak lace bug, *Corythucha arcuata* (Say) (Hemiptera: Tingidae). *Insects*. MDPI, Basel. **11**. 679 pp.

KOVACS G. E., NAGY A., RADOCZ L., SZARUKAN I. 2020. Appearance of oak lace bug *Corythucha arcuata* (Say, 1832) on sweet chestnut in Hungary (Heteroptera: Tingidae). *Folia Oecologica*. Scimago Journal and Country Rank, Slovakia. **47**: 140-143.

KÜÇÜKBASMACI I. 2014. Two new invasive species recorded in Kastamonu (Turkey): Oak lace bug [*Corythucha arcuata* (Say, 1832)] and sycamore lace bug [*Corythucha ciliata* (Say, 1832)] (Heteroptera: Tingidae). *Journal of Entomology and Nematology*. **6**(8): 104-111.

LI F., WANG R., QU C. FU N., LUO C., XU Y. 2016. Sequencing and Characterization of the Invasive Sycamore Lace Bug *Corythucha ciliata* (Hemiptera: Tingidae) Transcriptome. *Plos ONE*. Publishing FAQs, San Francisco. **11**: e0160609.

LIS B. 2009. *Corythucha ciliata* (Say) (Hemiptera: Heteroptera: Tingidae) – a bug species new to the Polish fauna. *Opole Scientific Society Nature Journal Opole*. Opole Scientific Society. Poland. **42**: 119-122.

MACELJSKI M. & BALARIN I. 1972. Novi član štetne entomofaune u Jugoslaviji - *Corythucha ciliata* (SAY), Tingidae Heteroptera. *Zaštita Bilja*.Udruzenie SECPA. Rusia. **23**: 193-206.

MALUMPHY C., REID S., EYRE D. 2006. Platanus lace bug *Corythucha ciliata*. *Plant Pest Notice York. British Entomological and Natural History Society*. UK. **36**: 1-4.

MARKOVIC C., DOBROSAVLJEVIC J., MILANOVIC S. 2021. Factors influencing the oak lace bug (Hemiptera: Tingidae) behavior on oaks: Feeding preference does not mean better performance? *J. Econ. Entomol.* **114:** 2051-2059.

MASLYAKOV V. Y. & IZHEVSKY S. S. 2011. *Alien phytophagous insects invasions in the European part of Russia*. Institute of Geography ot Russian Academy of Sciences: Moscow. 272 pp.

MEIER F., KÖHLER R., SCHMIDT C. 2019. Ecological impact of the oak lace bug, *Corythucha arcuata*, on native oak species in Germany. *Ecological Entomology.* Scimago Jurnal and Country Rank, UK. **44**(3): 452-462.

MILENKOVIĆ M., ĐORĐEVIĆ M., PETROVIĆ A. 2016. Distribution of *Corythucha ciliata* in Serbia. *Journal of Urban Forestry*. **42**(4): 301-310. https://gd.eppo.int/taxon/CRTHCI/distribution/RS (Accessed: March 30, 2024).

MUTUN S. 2003. First report of the sycamore lace bug, *Corythucha ciliata* (Say) (Heteroptera: Tingidae) in Turkey. *Israel Journal of Zoology*. Laser Pages Publishing Ltd, Israel. **49**(4): 323-324.

NEAL J. & SCHAEFER C. 2000. Lace Bugs (Tingidae). *Heteroptera of Economic Importance*. CRC Press. Boca Raton: 85-137.

NEDVĚD O., CHEHLAROV C., KALUSHKOV P. 2014. Life History of the Invasive Bug *Oxycarenus lavaterae* (Heteroptera: Oxycarenidae) in Bulgaria. *Acta Zoologica Bulgarica*. Scimago Press. Sofia. **66**(2): 203-208.

NEIMOROVETS V. V., SHCHUROV V. I., BONDARENKO A. S., SKVORTSOV M. M., KONSTANTINOV F. V. 2017. First documented outbreak and new data on the distribution of *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae) in Russia. *Acta Zoologica Bulgarica*. Scimago Press. Sofia. **9**: 139-142.

OLENICI N., BALACENOIU F., TOMESCU R., NETOIU C., BUZATU A., ALEXANDRU A. 2022. Invasive alien forest insect species in south-eastern Romania. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*. USAMV, Cluj-Napoca. **50**: 12618.

ŐSZI B., LADANYI M., HUFNAGEL L. 2005. Population dynamics of the sycamore lace bug, *Corythucha ciliata* (Say) (Heteroptera: Tingidae) in Hungary. *Applied Ecology and Environmental Research*. Scimago Journal and Country Rank. London. **4**(1): 135-150.

PAULIN M., HIRKA A., CSEPELENYI M., FURJES-MIKO A., TENORIO-BAIGORRIA I., EOTVOS C., GASPAR C., CSOKA G. 2021. Overwintering mortality of the oak lace bug (*Corythucha arcuata*) in Hungary - A field survey. *Cental European Forestry Journal*. SCIENDO, Boston. **67**: 108-112.

PÉRICART J. 2001. Family Lygaeidae Schilling, 1829 Seed Bugs. *In: Aukema B, Rieger, C (eds.) Catalogue of the Heteroptera of the Palaearctic Region*. The Netherlands Entomological Society, Wageningen: 35-220.

PICKER M. D. & GRIFFITHS C. L. 2015. Sycamore tree lace bug (*Corythucha ciliata* Say) (Hemiptera: Tingidae) reaches Africa: short communication. *African Entomology*. Centre for Biological Control Rhodes University, Eastern Cape, South Africa. **23**(1): 247–249.

PRADO E. 1990. Presencia en Chile de *Corythucha ciliata* (Say) (Hemiptera: Heteroptera: Tingidae). *Revista Chilena de Entomologia*. Sociedad Chilena de Entomología, Región del Biobío**. 18**: 53-55.

PROTIĆ L. 1998. *Catalogue of the Heteroptera fauna of Yugoslav countries*. Part one. Special issue 38. Belgrade: Natural History Museum. 215 pp.

PROTIĆ L. & STOJANOVIĆ A. 2001. *Oxycarenus lavaterae* (FABRICIUS, 1787) (Heteroptera: Lygaeidae) another new species in the entomofauna of Serbia. *Protection of Nature (Beograd).* Serbia Society, Belgrade. **52**: 61-63 (in Serbisch, englische Zusammenfassung).

RABITSCH W. 2008. Alie True Bugs of Europe (Insecta: Hemiptera: Heteroptera). *Zootaxa*. Magnolia Press, Auckland. **1827**: 1-44.

RABITSCH W. 2010. True Bugs (Hemiptera, Heteroptera. Chapter 9.1. In: Roques A., M. Kenis, D. Lees, C. LopezVaamonde, W. Rabitsch, J.-Y. Rasp lus and D. Roy (Eds.), Alien terrestrial arthropods of Europe. *BioRisk*. Pensoft Publishers, Sofia. **4**(1): 407-433.

RABITSCH W. & ADLBAUER K. 2001. Erstnachweis und bekannte Verbreitung von *Oxycarenus lavaterae* (FABRICIUS, 1787) in Österreich (Heteroptera: Lygaeidae). *Beiträge zur Entomofaunistik*. Naturhistorisches MuseumWien, Wien. **2**: 49-54.

REYNAUD P. 2000. Bug *Oxycarenus lavaterae* responsible for extraordinary infestations in Paris. *Phytoma*. La défense des végétaux, Paris. **528**: 30-33. (In French).

RIBA-FLINCH J. M. 2022. Una nueva especie invasora en España: detectado el tigre del roble *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae) y ataques sobre roble pubescente (*Quercus pubescens*) en el Valle de Arán (Lérida, Pirineos Orientales). *Revista Gaditana de Entomología*. Normas de Publicacion, San Fernando Cadiz. **13**: 99-113.

RIBES J., PIÑOL J., ESPADALER X., CAÑELLAS N. 2004. Heterópteros de un cultivo ecológico de cítricos de Tarragona (Cataluña, NE España) (Hemiptera: Heteroptera). *Orsis*. Baixa Descarrega, Valencia. **19**: 2-35. (In Spanish).

SALLMANNSHOFER M., ETTE M. S., HINTERSTOISSER W., CECH T. L., HOCH G. 2019. Erstnachweis der Eichennetzwanze, *Corythucha arcuata*, in Osterreich. *Aktuell*. FVA,Wien. **66**: 19-24.

SAMIN N. & LINNAVUORI R. E. 2011. A contribution to the Tingidae (Heteroptera) from north and northwestern Iran. Z. *Entomotaxonomia*. Entomological Museum, Northwest A & F University, Shaanxi. **32**: 373-380.

SCHNEIDER A. & DOROW W. H. O. 2017. Erstnachweis von *Oxycarenus pallens* (Herrich-Schaeffer, 1850) für Hessen und neue Nachweise von *Oxycarenus lavaterae* (Fabricius, 1787) in Hessen. Heteropteron, *Mitteilungsblatt der Arbeitsgruppe mitteleuropäischer Heteropterologen H*. Zoologisches Institut der Universitat zu Koln, Koln. **50**: 37-40.

SCHNEIDER A. & DOROW, W. H. O. 2016. Erstnachweis von *Oxycarenus lav*aterae (Fabricius, 1787) für Hessen. *Heteropteron, Mitteilungsblatt der Arbeitsgruppe mitteleuropäischer Heteropterologen H*. Zoologisches Institut der Universitat zu Koln, Koln**. 45**: 23-24.

SCHULZE W. 2020. Zum Auftreten der Linden - oder Malvenwanze *Oxycarenus lavaterae* (Fabricius, 1787) (Insecta, Heteroptera, Lygaeidae, Oxycareninae) in Westfalen (Mitteilungen zur Insektenfauna Westfalens XXXIII). *Berichte Naturwiss. Verein für Bielefeld und Umgegend*. Naturwissenschaftlicher *Verein für Bielefeld und Umgegend e.V. gegr. 1908*. Bielefeld. **57**: 82-87.

SIDOR Ć. 1985. Micro-organisms pathogenic for Insects till now found in *Corythucha ciliata*. *IUBS Bulletin WPRS IX (1)* Dijon: 72.

SIMOV N., GROZEVA S., LANGOUROV M., GEORGIEVA M., MIRCHEV P., GEORGIEV G. 2018. Rapid expansion of the oak lace bug *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae) in Bulgaria. *Historia Naturalis Bulgarica*. National Museum of Natural History, Sofia. **27**: 51-55.

SORIA S., MUÑOZ A., TORRE R., JACOSTE A. 1991. *Corythucha ciliata* (Say, 1832) (Heteroptera: Tingidae) en la Comunidad de Madrid. *Boletin de Sanidad Vegetal Plagas*. Ministerio de Agricultura, Pesca y Alimentación, Madrid. **17**(3): 440.

SOTIROVSKI K., SREBROVA K., NAČESKI S. 2019. First records of the oak lace bug *Corythucha arcuata* (Say, 1832) (Hemiptera: Tingidae) in North Macedonia. *Acta Entomologica Slovenica*. Slovenian Museum of Natural History, Ljubljana. **27**: 91-98.

STANCĂ-MOISE CRISTINA, MOISE G., ROTARU M., VONICA G., SANISLAU D. 2023. Study on the ecology, biology and ethology of the invasive species *Corythucha arcuata* (Say, 1832) (Heteroptera: Tingidae), a danger to *Quercus* spp. in the climatic conditions of the city of Sibiu, Romania. *Forests.* MDPI, Basel. **14**(6): 1278.

STANCĂ-MOISE CRISTINA. 2024. *Corythucha arcuata* SAY, 1832 (Heteroptera: Tingidae) in the city and county of Sibiu, Romania, in 2023. *Analele Universităţii din Oradea, Fascicula Biologie*. **31**(2): 87-96.

STEHLÍK J. 1997. *Corythucha ciliata* (Say), a pest of plane trees, now also in the Czech Republic (Tingidae, Het.). *Acta Musei Moraviae*. Scientiae Naturales, Praga. **81**: 299-306.

STREITO J. C., MATOCQ A., GUILBERT É. 2010. Découverte d'un foyer de *Corythauma ayyari* (Drake, 1933) et point sur la présence de plusieurs espèces de Stephanitis envahissants en France (Hemiptera Tingidae). *L'Entomologiste*. Société entomologique de France, Paris. **66**(1): 7-12.

STREITO J. C., BALMÈS V., AVERSENQ P., WEILL P., CHAPIN E., CLEMENT M., PIEDNOIR F. 2018. *Corythucha arcuata* (Say, 1832) et *Stephanitis lauri* Rietschel, 2014, deux especes invasives nouvelles pour la faune de France (Hemiptera, Tingidae), *'I Entomologiste*. Société entomologique de France, Paris**. 74**(3): 133-136.

TATU A. I. & TĂUȘAN I. 2011. *Corythucha ciliata* (Say, 1832) (Hemiptera: Tingidae) second record for the lace bug fauna of Romania, *Brukenthal. Acta Musei*. VI. Muzeul National Brukenthal, Sibiu. **3**: 453-458.

TAVELLA L. & ARZONE A. 1987. Indagini sui limitatori naturali di *Corythucha ciliata* (Say) (Rhynchota, Heteroptera). Jurnal of Zoology *Redia.* Italian Ministry of Agriculture and Forestry. Firenze. **70**: 443-457.

TOKIHIRO G., TANAKA, K. AND KONDO K. 2003. Occurrence of the sycamore lace bug, *Corythucha ciliata* (Say) (Heteroptera: Tingidae) in Japan. *Research Bulletin of the Plant Protection Service Japan*. **39**: 85-7.

TYMANN G. 2018. Zweiter Nachweis von *Nysius huttoni* WHITE, 1878 (Lygaeidae) in Deutschland und *Oxycarenus lavaterae* (FALLÉN, 1829) (Oxycarenidae) auf dem Weg nach Norden. *Heteropteron, Mitteilungsblatt der Arbeitsgruppe mitteleuropäischer Heteropterologen H.* Zoologisches Institut der Universitat zu Koln, Koln**. 53**: 29-30.

TZANAKAKIS M. E. 1988. Records of the sycamore lace bug, *Corythuca ciliata*, (Say), in Greece. *Entomologica Hellenica*. Hellenic Entomological Society. Switzerland. **6**: 55–56.

VELIMIROVIĆ V., Z. DUROVIĆ, RAIČEVIĆ M. 1992. Bug *Oxycarenus lavaterae* Fabricius (Lygaeidae, Heteroptera) new pest on lindens on southern part of Montenegro. *Zastita bilja, (Plant Protection*). Udruzenje SECPA, Novi Beograd. **199**: 69-72.

VICKERY R. A. 1938. Studies on the biology of *Corythucha ciliata* (Say), a pest of ornamental plane trees. *Journal of Economic Entomology*. Entomological Society of America. Oxford. **31**(4): 512-517.

VOIGT K. 2010. Die mediterrane Malvenwanze *Oxycarenus lavaterae* (Fabricius, 1787) erneut in BadenWürttemberg gefunden (Insecta, Heteroptera, Lygaeidae, Oxycareninae). *Heteropteron, Mitteilungsblatt der Arbeitsgruppe mitteleuropäischer*. Zoologisches Institut der Universitat zu Koln, Koln. **58**: 27-32.

WAGNER H., FISCHER P., LANG A. 2021. Integrated management strategies for controlling *Corythucha arcuata* in German oak forests. *Pest Management Science*. **77**(5): 2102-2110. https://www.dora.lib4ri.ch/wsl/islandora/object/wsl%3A2719/datastream/PDF/Wermelinger-2005-Massenvermehrung_und_erster_Nachweis_von-%28published_version%29.pdf (Accessed: March 12, 2024).

WERMELINGER B., WYNIGER D., FORSTER B. 2005. Massenauftreten und erster Nachweis von *Oxycarenus lavaterae* (F.) (Heteroptera, Lygaeidae) auf der Schweizer Alpennordseite. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*. **78**: 311-316.

WERMELINGER B., WYNIGER D., FORSTER B. 2005. Outbreak and first record of *Oxycarenus lavaterae* (Fabricius, 1787) (Heteroptera, Lygaeidae) in Northern Switzerland. Mitteilungen der Schweizerischen Entomologischen

Gesellschaft. *Bulletin de la Société Entomologique Suisse*. 78: 311-316. (In German). *Heteropterologen H.* Zoologisches Institut der Universitat zu Koln, Koln. **33**: 28-30.

WHEELER A. G. 1977. Studies on the biology of the sycamore lace bug, *Corythucha ciliata* (Say) (Hemiptera: Tingidae), in the southeastern United States. *Journal of the New York Entomological Society*. New York Entomological Society. **85**(2): 82-90.

WILLIAMS D., HOCH G., CSÓKA G., DE GROOT M., HRADIL K., CHIRECEANU C., HRAŠOVEC B., CASTAGNEYROL B. 2021. *Corythucha arcuata* (Heteroptera, Tingidae): Evaluation of the pest status in Europe and development of survey, control and management strategies (OLBIE). *Zenodo*. https://doi.org/10.5281/zenodo.4898795. (Accesed: March 12, 2024).

YANO E. 1959. Life history and control of the sycamore lace bug, *Corythucha ciliata* (Say). *Japanese Journal of Applied Entomology and Zoology*. Society of Applied Entomology and Zoology, Japonia. **3**(1): 24-30.

ZIELIŃSKA A. & LIS B. 2020. Ocena możliwości potencjalnej ekspansji prześwietlika dębowego *Corythucha arcuata* (Say, 1832), inwazyjnego gatunku z rodziny Tingidae (Hemiptera: Heteroptera), na tereny Polski, Heteroptera Poloniae. *Heteroptera Poloniae-Acta Faunistica*. Uniwersytet Opolski, Opole. **14**: 175-180.

ZUBRIK M., GUBKA A., RELL S., KUNCA A., VAKULA J., GALKO J., NIKOLOV C., LEONOTVYČ R. 2019. First recoth of *Corythucha arcuata* in Slovakia - Short Communication. *Plant Protection Science*. Czech Academy of Agricultural Sciences, Praga. **55**: 129-133.

Stancă-Moise Cristina
"Lucian Blaga" University of Sibiu, Faculty of Agricultural Sciences,
Food Industry and Environmental Protection, Sibiu, Romania.
E-mail: cristinamoise1@yahoo.com

Received: April 11, 2024
Accepted: May 7, 2024