**Acta Entomologica Serbica, 2021, 26(1): 9-15**

UDC: 595.752(497.11)
DOI: 10.5281/zenodo.4551426

# PRESENCE OF NORTH AMERICAN APHID *DREPANAPHIS ACERIFOLIAE* (THOMAS, 1878) (HEMIPTERA: APHIDIDAE: DREPANOSIPHINAE) IN SERBIA

OLIVERA PETROVIĆ-OBRADOVIĆ[1]*, MARKO ŠĆIBAN[2] and MIHAJLO TOMIĆ[1]

1 University of Belgrade – Faculty of Agriculture, Nemanjina 6, 11080 Belgrade-Zemun, Serbia
*E-mail: petrovic@agrif.bg.ac.rs (corresponding author)
2 Bird Protection and Study Society of Serbia, Partizanskih baza 6/43, 21000 Novi Sad, Serbia

## Abstract

The painted maple aphid, *Drepanaphis acerifoliae* (Thomas, 1878), is present on *Acer saccharinum* L. (silver maple) in Serbia. It was found for the first time in 2019 in parks in Novi Sad, and in 2020 it was registered in Belgrade. It is a North American species that has been extending its distribution in Europe since 1992. Serbia is the fourth European country in which it has been found, following Italy, Spain and Hungary. *Drepanaphis acerifoliae* was found to be present on all examined *A. saccharinum* L. trees where it is usually very numerous. It was not found on *A. platanoides* L., *A. campestre* L., *A. pseudoplatanus* L. or *A. negundo* L. The morphology of viviparous parthenogenetic females, oviparous females and males is presented, with original drawings and photos.

Key words: invasive species, Serbia, fauna, *Acer*, silver maple

## Introduction

Among the more than 5,000 species of aphids (Hemiptera: Aphididae) described worldwide, about 39 are from the subfamily Drepanosiphinae (Remaudière & Remaudière, 1997; Favret, 2020). Drepanosiphinae is a relatively small subfamily, comprising 5 genera of living species: *Drepanaphis* del Guercio, 1909 (16 North American species); *Drepanosiphoniella* Davatchi, Hille Ris Lambers & Remaudière, 1957 (3 species from the Mediterranean and southwest Asia); *Drepanosiphum* Koch, 1855 (9 species from Europe, Asia and North America); *Shenahweum*, Hottes & Frison, 1931 (1 North American species) and *Yamatocallis* Matsumura, 1917 (10 Asian species). They are mainly monoecious on Aceraceae (Sapindaceae), and very often all viviparous females are alatae, but in some species apterae are also present.

The genus *Acer* comprises about 150 species of trees worldwide, mainly distributed in the Northern Hemisphere (Vukićević, 1987). *Acer saccharinum* L. or silver maple is a North American species that is very often planted in Europe, including Serbia, as an ornamental tree in parks and alleys.

The painted maple aphid, *Drepanaphis acerifoliae* has been detected in Italy, Spain and Hungary (Pérez Hidalgo, 2008; Coeur d'acier *et al*., 2010; Ripka, 2010). Globalization and climate change favor the transport and establishment of alien species. Aphids are especially easily transmitted by live host plants or plant parts. Alien and/or invasive species of aphids are more and more often found in Serbia in recent years (Petrović-Obradović *et al*., 2010; Vučetić *et al*., 2014; Petrović-Obradović *et al*., 2018).

## Materials and methods

This research was conducted in 2019-2020 in Serbia, mainly in the north (the city of Novi Sad) and in Belgrade and its surroundings. Aphids were collected from terminal shoots and leaves of different *Acer* species. Upon collection, the aphids, along with parts of the host plants, were transferred alive to the laboratory. Most of the collected samples were preserved in 70% alcohol, while some were mounted on microscope slides using standard methods (Eastop & van Emden, 1972). The second author of this article (Marko Šćiban) photographed the species in May 2019 in Novi Sad (Serbia), the third author (Mihajlo Tomić) identified it and the photo was sent to the website: www.InfluentialPoints.com, where it was published.

Specimens were identified using a stereomicroscope (Leica, Type: DMLS2) and identification keys (Blackman & Eastop, 2020). The classification of Remaudière & Remaudière (1997) was followed.

Samples stored in alcohol-filled tubes and also microscopic slides were deposited in the collection of the Faculty of Agriculture, University of Belgrade.

## Results and Discussion

Material examined: many alatae viviparous females found on *Acer saccharinum*: Novi Sad, Bistrica, 15.05.2019; Novi Sad, Novo Naselje, 23.06.2020; Belgrade, New Belgrade, 13. 06. 2020, Belgrade – Zemun near Danube, 15.06.2020; Belgrade – Zemun, Prvomajska street 17. 06. 2020; Belgrade – Vrčin 20.06.2020; Belgrade, Banjica 28. 06. 2020 and Belgrade – Zemun near the Danube River 23.10.2020. Four oviparous females found on *Acer saccharinum*: Belgrade – Zemun near the Danube, 20.10.2020. Five males and about 20 oviparous females found on *Acer saccharinum*: Belgrade – Zemun downtown 28.10.2020 and 04.11.2020.

Morphology: All viviparous parthenogenetic females are alatae, relatively large (2-3mm) with very long antennae and well-developed dorsal tubercles (Fig. 1, Fig. 2). Head is sclerotized. Antennae are very long, mostly pale with darkened joints, except segments I and II, which are dark. Secondary rhinaria (about 9-11) are present only on III antennal segment, and usually arranged in line. Processus terminalis is long, about 6-11 times longer than the base of VI antennal segment. Fore femora are enlarged and dark dorsally. Wing veins are dark with pigmented spots near the ends. Dorsal spinal tubercles on abdomen are well developed and they are very characteristic: pared tubercles are present on I-IV abdominal segments, those on the III being the largest (Fig. 1b, Fig. 2). Tubercles on abdominal segments I and II are pale at the bases and dark at the tips. Tubercles on abdominal segment III are completely dark and widest at the base. Tubercles on abdominal segment IV are similar to those on the second abdominal segment. Large marginal sclerites are present on I-V abdominal segments. Siphunculi are dark, narrow at tips, with well-developed flange. Cauda is

knobbed and pale. Body color is greenish to pale brown; wax is unevenly present with white spots on head, thorax and abdomen, being the most abundant at the end of the abdomen.

Morphology of the larvae is presented on Fig. 3.

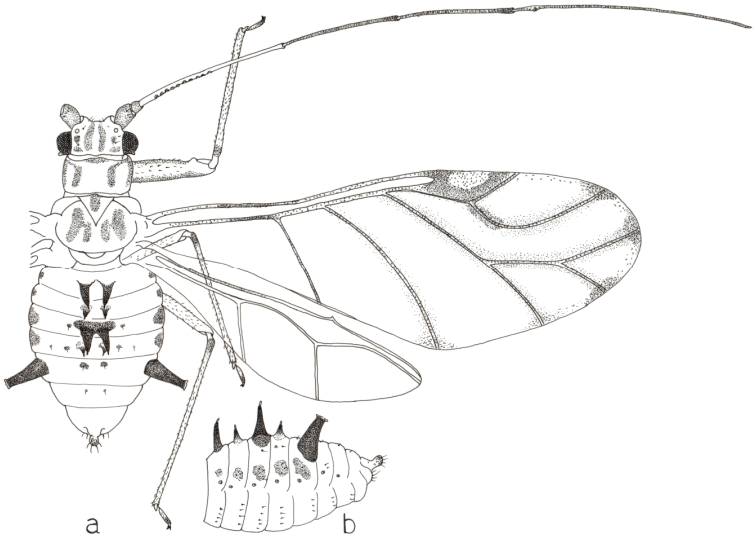


Figure 1: *Drepanaphis acerifoliae* (Thomas): a – alatae viviparous female, dorsal side; b – lateral view of the abdomen.

Figure 2. *Drepanaphis acerifoliae* (Thomas): alatae viviparous female, *on Acer saccharinum* in June 2020, Belgrade (photo by M. Tomić).

Figure 3. *Drepanaphis acerifoliae* (Thomas): larvae of viviparous females, *on Acer saccharinum* in June 2020, Belgrade (photo by M. Tomić).

Oviparous females (Fig. 4) are apterous, with a very elongated end of the abdomen resembling an ovipositor. Dorsal tubercles and wax are absent. Dorsal hairs are large, situated on dark tuberculate bases. Hind tibiae are slightly enlarged and dark, with some pseudorhinaria. Large marginal sclerites are present on abdominal segments 1-5. Siphunculi are pale with a yellowish patch around their bases. Body color is light to dark brown with a reddish tinge.

Figure 4. *Drepanaphis acerifoliae* (Thomas): oviparous female, *on Acer saccharinum* in October 2020, Belgrade (photo by M. Tomić).

Males (Fig. 5) are alatae, smaller than females, they have dark antennae with a large number of secondary rhinaria (90-100 on III antennal segment, 40-50 on IV and about 30 on V). Dorsal spinal tubercles are present, on the III abdominal segment they are well developed and dark; on the first, second and fourth segments they are present but reduced. Dorsal abdomen sclerites are better developed than in alatae females. Wax is more abundant than in viviparous females.

Figure 5. *Drepanaphis acerifoliae* (Thomas): alatae male, *on Acer saccharinum* in October 2020, Belgrade (photo by M. Tomić).

Biology: *D. acerifoliae* is a monoecious species, it does not alternate with other hosts. Development is holocyclic, sexual forms in Serbia occur in October and at the beginning of November. Copulation was observed. For the time being, *D. acerifoliae* has been found on *A. saccharinum* L. trees where it is usually very numerous. It has not been found on *A. platanoides* L., *A. campestre* L., *A. pseudoplatanus* L. or *A. negundo* L. This aphid is not visited by ants. Parasitoids have not been found.

It is not easy to say how *D. acerifoliae* arrived in Serbia. It probably came with silver maple seedlings, or by flying here, or it may have been carried by the wind from Hungary.

There are now 5 species of Drepanosiphinae present in Serbia (*Drepanosiphum aceris* Koch,1855; *D. dixoni* Hille Ris Lambers, 1971; *D. platanoidis* (Schrank, 1801); *D. oregonensis* Granovsky,1939 (Petrović-Obradović *et al*., 2020) and *Drepanaphis acerifoliae* (Thomas, 1878). Together with this finding there is a total of 384 known aphid species in Serbia (Petrović-Obradović *et al*., 2020).

## Conclusion

*Drepanaphis acerifoliae* is present on *Acer saccharinum* in Serbia, at least since 2019. It is found in parks and alleys in Novi Sad and Belgrade. It is present on many *A. saccharinum* alley trees in Belgrade and Novi Sad. Alatae viviparous parthenogenetic females, oviparous females and alatae males have been found.

There is a total of 384 known aphid species in Serbia, 5 of them belonging to the subfamily Drepanosiphinae. A study of this introduced species will be carried out in the coming period.

## Acknowledgements

The research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, through a contract with the Faculty of Agriculture, University of Belgrade, number 451-03-68/2020-14/200116. This article is also based on work from COST Action CA17122 Alien CSI, supported by COST (European Cooperation in Science and Technology) www.cost.eu. The authors are very grateful to D. Smiljanić (University of Belgrade, Faculty of Agriculture, Belgrade, Serbia), who made the drawings.

## References

Blackman, R. L., & Eastop, V. F. (2020). Aphids on the World's Plants: An online identification and information guide. Retrieved from: http://www.aphidsonworldsplants.info/ [Accessed on: 15.06.2020].

Coeur d'acier A., Perez Hidalgo, N., & Petrovic-Obradović, O. (2010). Aphids (Hemiptera, Aphididae). In A. Roques, J.Y. Rasplus, C. Lopez-Vaamonde, W. Rabitsch, M. Kenis & W. Nentwig (Eds.) *Terrestrial invertebrate invasions in Europe*. Chapter 9.2. *BioRisk 4*(1): 435-474. doi: 10.3897/biorisk.4.57.

Eastop, V. F., & van Emden, H. F. (1972). The Insect Material. In *Aphid Technology*. Academic Press, London & New York, 1-45.

Favret, C. (2020). Aphid Species File. Version 5.0/5.0. Retrieved from: http://Aphid.SpeciesFile.org.

Pérez Hidalgo N., Pons X., & Mier Durante M. (2008). Detection of *Drepanaphis acerifoliae* (Thomas) [Hemiptera: Aphididae: Drepanosiphinae] on sugar maple trees, *Acer saccharinum*, in Spain. *Boletin Sociedad Entomologica Aragonesa, 43*: 441-444.

Petrović-Obradović, O., Tomanović, Ž., Poljaković-Pajnik, L., Hrnčić,S., Vučetić, A., & Radonjić, S. (2010). New invasive species of aphids (Hemiptera, Aphididae) in Serbia and Montenegro. *Archives of Biological Sciences*, *62*(3), 775-780.

Petrović-Obradović, O., Radonjić, A., Jovičić, I., Petrović, A., Kocić, K., & Tomanović, Ž. (2018). Alien species of aphids (Hemiptera: Aphididae) found in Serbia, new to the Balkan Peninsula. *Phytoparasitica*, *46*: 653-660.

Petrović Obradović, O., Ilić Milošević, M., Stanković, S., & Žikić, V. (2020). Nine species of aphids (Hemiptera: Aphididae) new to the fauna of Serbia. *Acta Entomologica Serbica*, *25*(1) 13-19. https://doi.org/10.5281/zenodo.3699562

Remaudière, G., & Remaudière, M. (1997). *Catalogue of the world's Aphididae*. *INRA,* Paris, 473 pp.

Ripka, G. (2010). Occurrence of a new alien aphid species, *Drepanaphis acerifoliae* in Hungary [in Hungarian]. *Növényvédelem Övényvédelem*, *46*(9), 413-415.

Vukićević, E. (1987). *Decorative dendrology.* Naučna knjiga. Belgrade. 580pp. [in Serbian].

Vučetić, A., Jovičić, I., & Petrović-Obradović, O. (2014). Several new and one invasive aphid species (Aphididae, Hemiptera) caught by yellow water traps in Serbia. *Phytoparasitica 42*(2), 247-257.

Webpage: www.InfluentialPoints.com

# ПРИСУСТВО АМЕРИЧКЕ ВРСТЕ БИЉНЕ ВАШИ *DREPANAPHIS ACERIFOLIAE* (THOMAS, 1878) (HEMIPTERA: APHIDIDAE: DREPANOSIPHINAE) У СРБИЈИ

Оливера Петровић-Обрадовић, Марко Шћибан, и Михајло Томић

## Извод

Обојена ваш јавора, *Drepanaphis acerifoliae* (Thomas, 1878) је однедавно присутна у Србији на сребрнолисном јавору, *Acer saccharinum* L. Нађена је 2019. на декоративном дрвећу у парковима Новог Сада а 2020. године и у парковима и дрворедима Београда. То је северноамеричка врста чији се ареал распрострањења у Европи повећава од 1992. године. Србија је четврта европска земља у којој је нађена (после Италије, Шпаније и Мађарске). *Drepanaphis acerifoliae* је била присутна на сваком прегледаном дрвету сребрнолисног јавора и то у великој бројности. На другим врстама јавора (*A. platanoides* L., *A. campestre* L., *A. pseudoplatanus* L. и *A. negundo* L) није нађена. У раду је приказана морфологија вивипарних партеногенетских женки, овипарних женки и мужјака, са оригиналним цртежима и фотографијама.

Received: November 6th, 2020
Accepted: January 21st, 2021