FIRST RECORD OF THE NEARCTIC LEAFHOPPER *Erasmoneura vulnerata* (Fitch, 1851) (HEMIPTERA: CICADELLIDAE) IN THE REPUBLIC OF MOLDOVA

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Abstract. The North American cicada of grapevine *Erasmoneura vulnerata* (Fitch, 1851) is reported as a new adventive species to the fauna of the Republic of Moldova. The cicada is widely distributed in the USA and Canada where it has been reported as a pest of wild and cultivated grapes, and other host plants. The presence of this species in Europe was detected in 2004 for the first time on *Vitis vinifera* in north-eastern Italy. The species was recorded soon in several European countries, such as Slovenia (2010), Romania (2018), Switzerland and Serbia (2019). In 2022, *E. vulnerata* was collected for the first time in southwest of the Republic of Moldova, the specimens of cicada were caught on ultraviolet light traps.

Keywords: adventive species, Typhlocybinae, grapevine, description, biology.

Rezumat. Prima înregistrare a Cicadei Nearctice *Erasmoneura vulnerata* (Fitch, 1851) (Hemiptera: Cicadellidae) în Republica Moldova. Cicada viței de vie *Erasmoneura vulnerata* (Fitch, 1851) originară din America de Nord, este menționată ca o specie nouă adventivă pentru fauna Republicii Moldova. În SUA și Canada specia este distribuită pe scară largă, avînd statutul de specie dăunătoare pe vița de vie cultivată și sălbatică, inclusiv alte plante gazdă. Pentru prima dată prezența acestei specii de cicadă în Europa a fost semnalată în anul 2004 pe *Vitis vinifera* în partea de nord - est a Italiei. Specia s-a extins rapid în Europa fiind înregistrată în Slovenia (2010), România (2018), Elveția și Serbia (2019). În anul 2022, *E. vulnerata* pentru prima dată a fost înregistrată în partea de sud-vest a Republicii Moldova, fiind colectată la capcana cu lumină ultravioletă.

Cuvinte cheie: specie advetitivă, Typhlocybinae, vița de vie, descriere, biologie.

INTRODUCTION

Erasmoneura vulnerata (Fitch, 1851) (Hemiptera: Auchenorrhyncha: Cicadellidae) is a Nearctic leafhopper, widely distributed in the USA and Canada, where it has been reported as a pest of wild (*Parthenocissus quinquefolia*) and cultivated grapes (*Vitis vinifera*), and other host plants.

In July 2004, cicada was recorded for the first time in Europe, in a locality of the Veneto region, in north-eastern Italy (Castefranco Veneto, Treviso district). Later, the species was detected in two regions, in particular Veneto (districts of Treviso, Vicenza and Padova) and Friuli-Venezia Giulia (district of Pordenone). The distance between the western and eastern limits of this area is approximately 90 km (DUSO et al., 2005). In autumn 2010, specimens of the North American leafhopper *E. vulnerata* were accidentally swept from a Judas tree (*Cercis siliquastrum*) in Slovenia, in the locality of Pristava near Nova Gorica just some hundred meters away from the Italian border. Subsequent surveys confirmed the presence of a few specimens of *E. vulnerata* on *Vitis labrusca*, which were most likely not treated with insecticides. The species spreads fast enough, since it moves very easily by flying. Occasionally it may also spread as a stowaway by cars (SELJAK, 2011). In the Moldavia region located in north-eastern Romania, the presence of the leafhopper was confirmed in 2018 in 13 vine plantations located in the vineyards of Odobești, Panciu, Cotești and Huși. In addition, adults, larvae as well as symptoms of their feeding on the leaves of the *Parthenocissus quinquefolia* were observed in a residential building yard in the southern part of Bucharest (CHIRECEANU et al., 2020, 2022). Specimens of cicadas in Ticino (Southern Switzerland) were collected in 2019 using yellow sticky traps (RIZZOLLI et al., 2020). In Serbia, *E. vulnerata* was detected in vegetation along a motorway in the vicinity of the Belgrade Customs Office Terminal. Specimens were collected by sweeping *Vitis* sp. plants permeating bushy vegetation, in September, 2019. Grapevine plants from which *E. vulnerata* was collected in Belgrade did not show any of the characteristic damage symptoms which can be due the low abundance of the observed population (SCIBAN & KOSOVAC, 2020).

In the southwestern part of the Republic of Moldova, the cicada was recorded for the first time in 2022, on the territory of the Biosphere Reserve “Prutul de Jos”, along the lower course of the Prut River, located between the Slobozia Mare and Valeni localities.

The aim of this study was focused on the species diversity of the Auchenorrhyncha suborder on the territory of the reserve, their biology and ecology under changing climatic conditions. The diversity of cicadas on the territory of the reserve is greatly affected by mosaic of water, meadow and forest ecosystems, as well as located near the reserve of various agricultural lands, including vineyards. The detection of cicada *E vulnerata* in the collected material indicates the proximity of the locality, where different grape varieties are grown.

MATERIAL AND METHODS

The material was collected using ultraviolet light trap, placed on the territory of the “Prutul de Jos” Biosphere Reserve in the Slobozia Mare village (45°36′27″N 28°09′10″E). The light trap was placed at the height of 1.5 m and turned on 15 times in the evening at sunset starting from the end of May until the beginning of September. The

collected specimens were laid out on cotton pads. Later, the material was studied in the laboratory. Morphological identification of species was performed using the well-known keys as well as some of papers, which contain detailed description of the species DIETRICH & DMITRIEV (2007), SELJAK (2011). Male genitalia were dissected and examined under microscope MBS-10 to accurately identify the species. The collected material was stored in the Museum of Entomology, Institute of Zoology, USM.

Figure 1. Sampling sites (colored circles as given in legend) of species *E. vulnerata* in vineyard plantations of Romania (CHIRECEANU et al., 2020) and the Republic of Moldova.

RESULTS AND DISCUSSION

Erasmoneura vulnerata (Fitch, 1851) belongs to the order of Hemiptera, suborder Auchenorrhyncha, infraorder Cicadomorpha, family Cicadellidae, subfamily Typhlocybinae, tribe Erythroneurini, genus *Erasmoneura* Young, 1952.

Synonyms: *Erythroneura vulnerata* (Fitch, 1851), *Erythroneura gradate* (Robinson, 1924).

Examined material. The first specimens of *E. vulnerata* in the Republic of Moldova were found in samples caught on light traps in June and July 2022 in the Slobozia Mare village, Cahul district. The result of the ultraviolet light was as below: 30.06.2022 – 4 ♂, 18.07.2022 – 2 ♂, 23.07.2022 – 3 ♂. In total, only 9 (male) specimens were collected.

Description: adults of *E. vulnerata* have a body size length of 2.7-3.2 mm and are particularly identified by characteristic transversal red veins at the base of the first apical cell on the forewings (Figs. 2 A, B). This species is characterized by the presence of a seasonal color dimorphism. According to the morphological description, anterior wings show brown and light mottles, with a typical red R1 vein in the summer forms. The autumn forms generally had whitish R1, and also differed by greenish brown anterior wings and whitish mottles. All found specimens have typical red R1 vein. Newly hatched nymphs are whitish, whereas later nymphs become yellow-brown to brown with red shades. Legs are light green (DUSO et al., 2005).

Male genitalia (Fig. 2 C)**:** the pygofer lobe is rounded; there is a dorsal appendage, which is bifurcated apically. Styles are free, with three-pointed apex. Aedeagus in the dorsal view is symmetrical, distally trilobite with prominent hornlike lateral processes; in lateral view bent dorsally, bearing a dorsa-caudally directed, apically rounded process; dorsal apodeme of aedeagus with ligaments connected to pygofer appendages; anal tube without processes. A modern diagnostic key of Erythroneurini, including some basic characters and a good description of *E. vulnerata* with drawings of male genital details, is given by DIETRICH & DMITRIEV (2007) and SELJAK (2011).

Life cycle. According to the phenological data, *E.vulnerata* completes two generations a year in south-western Colorado. However, some recent observations suggest that in favorable conditions three generations would also be possible. The species overwinters as imago under leaf litter or plant debris. Buildings and hedgerows near vineyards may also become attractive for the wintering of this species. Specimens appear in vineyards in spring at the time of bud burst surfaces (DUSO et al., 2005; RIZZOLLI et al., 2020).

In contrast to the other species, distinctive feature of *E. vulnerata* females are oviposit in the tissue of the large and midrib leaves and in the vascular bundles. Leafhoppers pass through five nymphal instars. The egg-laying of the first

generation does not appear before June, the peak of second generation is in August. Larvae and adults mainly populate the upper leaf surface, while exuviae were mainly found on lower leaf surfaces (DUSO et al., 2005; SELJAK, 2011).

It is too early to say how many generations the species develops in the conditions of the Republic of Moldova. According to the results of our study, the first imago was caught at the end of June and the last at the end of July, 2022. A small number of specimens caught in the trap may indicate that species has recently penetrated and not adapted yet in our country. In addition, the summer of 2022 was hot and dry, especially its second half (Fig. 3).

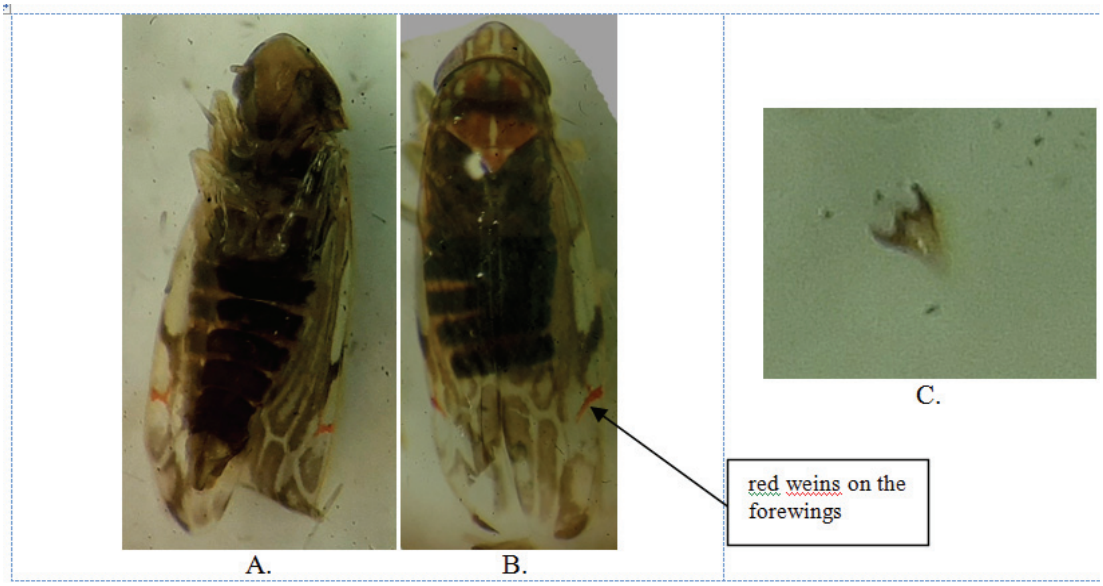

Figure 2. *Erasmoneura vulnerata*: A, B – imago (dorsal and ventral view), C – aedeagus (original).

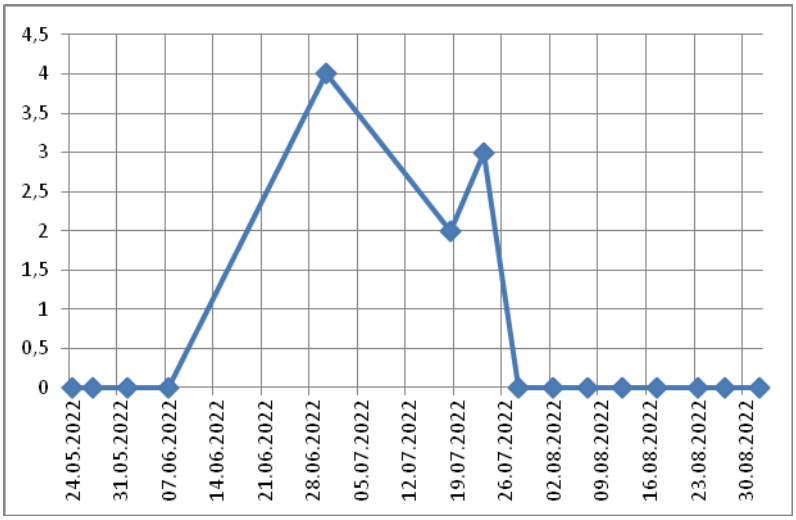

Figure 3. Number of adults of *E. vulnerata* collected on light traps in 2022.

Distribution: Central and eastern USA, southern Canada, northern Mexico, (introduced, Italy, Slovenia, Romania, Switzerland and Serbia).

Host plants and damages: In early literature, leafhopper was reported as common on grapes and sometimes its serious pest. *Vitis vinifera* is recorded as the most suitable host plant, but sometimes the number of specimens of the leafhoppers can be strongly lower than on other host plants. *E.vulnerata* could also be attracted by the plants like *Vitis labrusca*, *Cercis siliquastrum* (SELJAK, 2011). Additionally, *E. vulnerata* was observed on *Parthenocessus quinquefolia* in Romania (CHIRECEANU et al., 2020). It was recorded on many other host plants such as *Ilex decidua*, *Cersis canadensis*, *Aesculus* sp. (3I INTERACTIVE KEYS AND TAXONOMIC DATABASES).

Larvae and adults feed on leaf mesophyll causing speckled whitish lesions on leaves. In case of heavy infestation, many small lesions fuse together forming larger speckles of discoloured tissue. Such leaves sometimes curl down and may fall prematurely. The active feeding of the pest is also associated with the production of black excrements (DIETRICH & DMITRIEV, 2007; SELJAK, 2011).

The cicada *E.vulnerata* together with other main vineyard leafhoppers spends a part of its life cycle in the vineyards. The application of insecticides is the important means to control leafhopper populations in vineyards. The presence of wild and abandoned vineyards can become the factor of maintenance and spread of cicada populations (DUSO et al., 2005; SELJAK, 2011). At the moment, it is difficult to say if the introduction of the *E.vulnerata* on the territory of the Republic of Moldova was accidental or it was an active migration from neighboring Romanian vineyards. Therefore, it is necessary to continue monitoring of this species for better knowledge of its biology and its ability to colonize the vineyards of our country.

CONCLUSIONS

Erasmoneura vulnerata is a new adventive species of cicada for the fauna of the Republic of Moldova. The abundance of the species is still minor. The "Prutul de Jos" Biosphere Reserve is the only place where the species was detected. At the moment, it is too difficult to say if the species was well adapted to the climate conditions of this area and could be considered an established species in the Republic of Moldova, since the peculiarities of the behaviour of the species on the territory of the Republic of Moldova have not been studied yet. The species probably crossed the Romanian border and there is also a high probability that it overcame this distance naturally. The cicada was not detected during the study in commercial vineyards in 2022. The low presence of the species is due to the use of insecticides during the summer as well as its recent colonization. The study of biology, ecology and occurrence of newly identified species should be continued, because of the danger of its spread. The consequences may be as in case of other adventive cicada species native from North America: *Metcalfa pruinosa* and *Scaphoideus titanus,* which became serious pests in Europe despite their minor harmfulness in their native regions. In addition, in association with other leafhoppers, *E. vulnerata* can cause significant damage to the quality and quantity of the grapes.

The early detection and monitoring are essential to prevent the spread of the pest cicada species, as well as adopting the most appropriate management measures to establish the spreading of its populations.

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