

UDK: 630*45:582.746.56(497.11)=111

DOI: 10.5937/SustFor2693111M

Original scientific paper

THE FIRST RECORD OF TETRANYCHIDAE AND PHYTOSEIIDAE (ACARI) ON *AESCULUS HIPPOCASTANUM* (SAPINDACEAE) IN SERBIA

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Abstract: Three species of spider mites from two genera one subfamily: *Eotetranychus pruni*, *Eotetranychus tiliarium* and *Schizotetranychus garmani* as well as two species of predatory mites *Euseius finlandicus* and *Phytoseius echinus* from two genera two subfamilies were recorded for the first time on the horse-chestnut in Serbia. The species *S. garmani* is the first record in the world found on *Aesculus hippocastanum*. The research was carried out on a large number of urban and semi-urban sites in central Serbia and Vojvodina. The collecting of samples encompassed the period of six growing seasons.

Keywords: biodiversity, spider mites, predatory mites, horse-chestnut tree.

PRVI NALAZ TETRANYCHIDAE I PHYTOSEIIDAE (ACARI) NA *AESCULUS HIPPOCASTANUM* (SAPINDACEAE) U SRBIJI

Sažetak: Na divljem kestenu u Srbiji su prvi put zabeležene tri vrste grinja paučinara iz dva roda jedne potfamilije *Eotetranychus pruni*, *Eotetranychus tiliarium* i *Schizotetranychus garmani* kao i dve vrste predatorskih grinja *Euseius finlandicus* i *Phytoseius echinus* iz dva roda dve potfamilije. Vrsta *S. garmani* je prvi nalaz u svetu zabeležen na *Aesculus hippocastanum*. Istraživanja su obavljena na većem broju urbanih i semiurbanih lokalita u centralnoj Srbiji i Vojvodini. Sakupljanje uzoraka je obuhvatilo period šest vegetacijskih sezona.

Ključne reči: biodiverzitet, grinje paučinari, predatorske grinje, divlji kesten.

1. INTRODUCTION

The species *Aesculus hippocastanum* L. (Sapindales: Sapindaceae) is a tertiary relict, present in Central Europe before the Ice Age (Jovanović 2000). It is an endemic species for a limited area of the Balkan Peninsula: North Macedonia, Greece, Albania and Bulgaria (Aas and Riedmiller 1992; Ball 1968; Boratynski et al. 1992; Greuter et al. 1986; Heldreich 1980; Polunin 1997; Strid and Tan 2000). In Serbia, the horse-chestnut is an allochthonous species to which the growing

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conditions of the oak and warmer beech forest belt are suitable, and it reaches the height up to 30 m with diameter at breast height of 1m. It is resistant to frost down to -30°C , and it is mesophilic, mesotrophic, mesothermal and sciophilous species for which deep humus soils are suitable (Cvjetićanin et al. 2016; Vukićević 1996). Nowadays, it is widely cultivated in the temperate climate zone as an ornamental and landscape tree due to its appearance and strong resistance to environmental conditions (Walas et al. 2019; Wilczynski and Podlaski 2007). The horse-chestnut is significant for pollinators (Somme et al. 2016). *Aesculus hippocastanum* seeds have been used since ancient times as a medicine for horses which is where its folk name horse-chestnut comes from (Jovanović 2000). Medical significance of horse-chestnut is reflected in treatment of venous insufficiency, coronary disease, diarrhea and hemorrhoids (Busia 2016). The horse-chestnut research in recent years has been focused more and more on chemical properties and to characterize different compounds in specific parts of fruits and assessment of their bioactivity and to test the stability in food, cosmetic, and pharmaceutical formulations (Dridi et al. 2023).

City parks and urban forests include diverse bushy and woody autochthonous and allochthonous vegetation that serves as nourishment, shelter and substrate for a large number of organisms among which arthropods are dominant (Brown and Freitas 2002; Ebeling et al. 2018). Phytophagous species such as insects and mites can lead to significant physiological, biochemical and anatomical changes on ornamental woody plants which directly influences the condition and decorative value (Hrubik et al. 2008). Herbivorous arthropods, i.e. their density and composition on woody and bushy species are regulated by the presence of carnivores and omnivores (Ebeling et al. 2018) both in natural and in anthropogenic ecosystems. Beneficial arthropods among which are many phytoseiid mites are important predators to numerous small arthropods, especially to tetranychid mites where their importance is manifested in preventing outbreaks (McMurtry et al. 2013).

Spider mites (Acari: Tetranychidae) are the most significant harmful mites in agriculture, forestry and horticulture. 1364 valid species on 4139 different plants have been recorded worldwide to date, while 13 tetranychid mites from six genera have been found on *A. hippocastanum*, of which in Europe two species each were recorded in Hungary and Poland, and one species each in Lithuania and Georgia (Migeon and Dorkeld 2026). Numerous papers indicate that tetranychid mites lead to significant economic damage on the ornamental plants (Jeppson et al. 1975, Ripka et al. 2005; Yesilayer and Cobanoglu 2015 etc.). So far, 47 species of tetranychid mites have been recorded in Serbia (Stojnić et al. 2026) of which a smaller number was determined on horticultural woody plant species.

Predatory mites (Acari: Phytoseiidae) represent an important group of predatory mites which inhabit herbaceous, bushy and woody plant species. To date, 2707 valid species have been recorded worldwide (Demite et al. 2026). According to Kopačka and Zemek (2023) horse-chestnut is an important reservoir of phytoseiid mites in city parks and urban forests. In the Czech Republic, 8 species of phytoseiid mites were found on *A. hippocastanum*, 4 species in Greece, 3 in Finland, 8 in Slovenia (Kopačka and Zemek 2023; Kopačka et al. 2018, Kreiter et al. 2020; Tuovinen 1994; Tuovinen and Rokx 1991), and in Nearctic two species (de Moraes et al. 1986; Prasad 2012). So far, 51 species of phytoseiids have been determined in Serbia (Stojnić et al. 2023).

Our research provides the first overview of the species diversity of epiphilic species of two groups of phytophagous and predatory mites on horse-chestnut in Serbia.

2. MATERIAL AND METHOD

Plant material was collected on eight sites on urban and semi-urban areas in Serbia (Belgrade and surroundings, Goč, Vršac, Bečej and surroundings) during 6 vegetation seasons from 2019 to 2024. Plant samples contained 50 horse-chestnut leaves each, which were packed in plastic bags. The samples were exposed to the effect of ethyl acetate for 30 minutes (Stojnić et al 2021; Mladenović et al. 2025). The selection of adult individuals for the purposes of determination was carried out using Leica Wild M3Z stereo microscope. The selected individuals were illuminated in fixative 1:5 of lactic acid and ethanol after which permanent preparations were made in Hoyer medium (Baker and Wharton 1964; Evans and Browing 1955; Krantz and Walter 2009).

The determination of mite species was carried out using phase-contrast microscope, Olympus BX53 with the use of appropriate keys, catalogues and databases relevant for both researched groups of mites (Baker and Tuttle 1994; Begljarov 1981; Bolland et al. 1998; Chant and McMurtry 2007; De Moraes et al. 2004; Demite et al. 2026; Karg 1993; Migeon and Dorkeld 2026; Mitrofanov et al. 1987; Prasad 2012; Pritchard and Baker 1955; Tixier et al. 2012).

Permanent preparations are stored at Institute of Forestry, Department of Forest Protection, Belgrade and in the University of Belgrade, Faculty of Agriculture, Institute of Phytomedicine, Department of Entomology and Agricultural Zoology.

3. RESULTS AND DISCUSSION

Our research represents the first record of mites from two families: Tetranychidae Donnadieu, 1875 and Phytoseiidae Berlese 1916 on *Aesculus hippocastanum* L. in Serbia.

Three species of phytophagous mites have been determined *Eotetranychus pruni* (Oudemans, 1931), *Eotetranychus tiliarium* (Hermann, 1804) and *Schizotetranychus garmani* Pritchard & Baker, 1955 from two genera *Eotetranychus* Oudemans, 1931 and *Schizotetranychus* Trägårdh, 1915 one subfamily *Tetranychinae* Berlese, 1913, as well as two species of predatory mites *Euseius finlandicus* (Oudemans, 1915a) and *Phytoseius echinus* Wainstein & Arutunjan, 1970 from two genera *Euseius* Wainstein 1962 and *Phytoseius ribaga* 1902 two Subfamilies Amblyseiinae Muma 1961 and Phytoseiinae Berlese 1916.

Aesculus hippocastanum was recorded for the first time as host plant for spider mite *S. garmani*.

Family	Tetranychidae Donnadieu, 1875
Subfamily	Tetranychinae Berlese, 1913
Tribe	Tetranychini Reck, 1950
Genus	<i>Eotetranychus</i> Oudemans, 1931
Species	<i>Eotetranychus pruni</i> (Oudemans, 1931 <i>Eotetranychus tiliarium</i> (Hermann, 1804)
Genus	<i>Schizotetranychus</i> Trägårdh, 1915
Species	<i>Schizotetranychus garmani</i> Pritchard & Baker, 1955

Three species of tetranychidae were determined on horse-chestnut in Serbia of which one species was recorded for the first time in the world on horse-chestnut as a new host plant (Table 1).

Table 1. *Three species of spider mites recorded on horse-chestnut in Serbia and their distribution in Europe*

Tetranychid Species	Distribution on horse-chestnut in Europe	Reference
<i>Eotetranychus pruni</i>	Serbia*	
	Georgia Poland Hungary	Reck 1950. Soika and Łabanowski 2003. Gyenis et al. 2005.
<i>Eotetranychus tiliarium</i>	Serbia*	
	Latvia	Petrov 1971
<i>Schizotetranychus garmani</i>	Serbia*	

* new data

With our finding the total number of recorded spider mite species on horse-chestnut in the world increased to 14 and in Europe to 5.

During the research, species *E. pruni* and *E. tiliarium* were recorded on urban habitats, while *S. garmani* was recorded on semi-urban habitat in the immediate vicinity of the forest ecosystem.

Eotetranychus pruni commonly named apple yellow spider mites and *E. tiliarium* commonly named lime spider mites are polyphagous harmful species on numerous deciduous forest or horticultural woody and bushy species such as European hornbeam, linden, oak, willow, hazel, chestnut, ash, maple, elm and others, widely distributed in Europe (Anonymus 2026).

Schizotetranychus garmani is one of the key pests on cultivated willows (Puchalska et al. 2014; Soika and Łabanowski 2003; Tomczyk 2004) found on 13 woody forest species of 4 genera *Quercus*, *Populus*, *Salix* and *Acer*, tetranychid which is present in Europe in Hungary, Poland, Serbia and Switzerland (Migeon and Dorkeld 2026).

During our research we did not determine larger damages occurred due to nutrition of phytophagous mites on horse-chestnut leaves which corresponds to previously recorded findings (Soika and Labanowski 2003). Rarely present damage can be the result of a small number of determined individuals on researched leaf samples.

Family	Phytoseiidae Berlese 1916
Subfamily	Amblyseiinae Muma 1961
Genus	<i>Euseius</i> Wainstein 1962
Species	<i>Euseius finlandicus</i> (Oudemans, 1915a)
Subfamily	Phytoseiinae Berlese 1916
Genus	<i>Phytoseius</i> Ribaga 1902
Species	<i>Phytoseius echinus</i> Wainstein & Arutunjan, 1970

Euseius finlandicus is a predatory cosmopolitan species recorded on a large number of host plants (Demite et al. 2026; De Moraes et al. 1986; Prasead 2012) most commonly present on smooth leaves while it hides in domatia (Kabiček 2005, 2008). McMurtry and Croff (1979) and McMurtry et al. (2013) classified this species in Type IV generalist predator which prefer pollen but also are significant regulators of number of harmful mite species.

Phytoseius echinus predatory species is widely present in Europe and recorded on forest species (oaks, willows, wild cherry, etc.) (Demite et al. 2026; De Moraes et al. 1986, 2004; Prasead 2012).

Juvenile stages of *S. garmani* are adequate prey for *E. finlandicus* in laboratory conditions (Puchalska and Kozak 2016) so this phytoseiid is suitable as biocontrol agent for spider mite control.

During our research prey-predator complex was not determined which is probably the consequence of low number of species of spider mites found on horse-chestnut. In one sample, the cohabitation of two predatory species, *E. finlandicus* and *P. echinus*, was recorded.

5. CONCLUSION

The first record of epiphyllous mites tetranychid and phytoseiid on *A. hippocastanum* in Serbia was presented.

Phytophagous species confirmed on horse-chestnut in Serbia are *E. pruni*, *E. tiliarium* and *S. garmani*.

Predatory species recorded on horse-chestnut in Serbia are *E. finlandicus* and *P. echinus*.

Spider mite *S. garmani* was recorded for the first time in the world on a new host plant, *A. hippocastanum*.

During our research on horse-chestnut prey-predator complex was not determined, while cohabitation of two predatory species *E. finlandicus* and *P. echinus* was recorded only on one sample.

Considering our findings, the number of species of spider mites determined on horse-chestnut for the world's acarofauna increased to 14 and for European acarofauna to 5 species.

It is necessary to continue the research of diversity of horse-chestnut mites in order to determine, on the one hand, the potential harmfulness of phytophagous spider mites and on the other hand, to record the presence of predatory mites on horse-chestnut which is an important reservoir of these species in city parks and urban forests.

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FIRST RECORD OF TETRANYCHIDAE AND PHYTOSEIIDAE (ACARI) ON *AESCULUS HIPPOCASTANUM* (SAPINDACEAE) IN SERBIA

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Summary

Three species of spider mites *Eotetranychus pruni* (Oudemans, 1931), *Eotetranychus tiliarium* (Hermann, 1804) and *Schizotetranychus garmani* Pritchard & Baker, 1955 as well as two species of predatory mites *Euseius finlandicus* (Oudemans, 1915a) and *Phytoseius echinus* Wainstein & Arutunjan, 1970 are recorded for the first time on horse-chestnut in Serbia. Phytophagous species *S. garmani* was recorded for the first time in the world on horse-chestnut as the host plant. All three species of spider mites are present in Europe. Considering our findings, the number of species of spider mites determined on horse-chestnut for the world's acarofauna increased to 14, and for European to 5 species. During the research, species *E. pruni* and *E. tiliarium* were recorded on urban habitats while *S. garmani* was recorded on semi-urban habitat in the immediate vicinity of forest ecosystem. Predatory species *E. finlandicus* is cosmopolitan, while *P. echinus* is present in Europe. Prey-predator complex was not determined during our research on horse-chestnut, while cohabitation of two predatory species was recorded only in one sample. The research was carried out on a large number of urban and semi-urban sites in central Serbia and Vojvodina. The collecting of samples encompassed the period of six growing seasons. During the research, we did not find any significant damage as a result of the feeding of the recorded species of spider mites. Horse-chestnut is an important reservoir of phytoseiid mites in city parks and urban forests, so it is necessary to continue further research of mite diversity on this frequently present horticultural species in our parks and urban greenery.

PRVI NALAZ TETRANYCHIDAE I PHYTOSEIIDAE (ACARI) NA *AESCULUS HIPPOCASTANUM* (SAPINDACEAE) U SRBIJI

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Rezime

Na horse-chestnut u Srbiji su prvi put zabeležene tri vrste spider mites *Eotetranychus pruni* (Oudemans, 1931), *Eotetranychus tiliarium* (Hermann, 1804) i *Schizotetranychus garmani* Pritchard & Baker, 1955 kao i dve vrste predatorskih grinja *Euseius finlandicus* (Oudemans, 1915a) i *Phytoseius echinus* Wainstein & Arutunjan, 1970. Fitofagna vrsta *S. garmani* je u svetu prvi put zabeležena na divljem kestenu kao biljci hraniteljki. Sve tri vrste spider mites su prisutne u Evropi. Našim nalazom broj vrsta spider mites utvrđen na divljem kestenu za svetsku acaro faunu je povećan na 14 a za Evropsku na 5 vrsta. Vrste *E. pruni* i *E. tiliarium* tokom istraživanja zabeležene su na urbanim dok je *S. garmani* zabeležen na semiurbanom staništu u neposrednoj blizini šumskog ekosistema. Predatorska vrsta *E. finlandicus* je kosmopolit dok je *P. echinus* prisutan u Evropi. Tokom naših istraživanja, na divljem kestenu, nije utvrđen prey-predator complex dok je kohabitacija dve predatorske vrste zabeležena samo u jednom uzorku. Istraživanja su obavljena na većem broju urbanih i semiurbanih lokalita u centralnoj Srbiji i Vojvodini. Sakupljanje uzoraka je obuhvatilo period šest vegetacijskih sezona. Tokom istraživanja nismo utvrdili značajnija oštećenja kao rezultat ishrane zabeleženih vrsta

spider mites. Horse-chestnut je važan rezervoar fitoseidnih grinja u gradskim parkovima i urbanim šumama tako da je neophodno nastaviti dalja istraživanja diverziteta grinja na ovoj često prisutnoj hortikulturnoj vrsti u našim parkovima i urbanom zelenilu.

