

FIRST RECORD OF ALIEN BULB-AND-POTATO APHID *RHOPALOSIPHONINUS LATYSIPHON* (HEMIPTERA: APHIDIDAE) IN SERBIA

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Abstract

The North American aphid *Rhopalosiphoninus latysiphon* (Davidson, 1912) (Hemiptera: Aphididae) was found in Serbia for the first time. It is a polyphagous species, mainly feeding on roots, bulbs and tubers. This cryptic living species was detected in yellow water traps on fields of the Institute of Field and Vegetable Crops, Novi Sad (Rimski Šančevi) during the monitoring of aphid flight activity in sugar beet. In total, three specimens were trapped in 2019 and 2020. The main morphological and biological characteristics of the species are given in the text.

KEY WORDS: yellow water traps, sugar beet, entomofauna, vectors

Introduction

Aphids (Hemiptera: Aphididae) are small insects living in colonies and producing many highly mobile winged forms. Alatae aphids are very efficient vectors of many plant viruses. They can cover long distances by wind and thereby spread viruses. Monitoring of aphid flight activity using different kinds of traps was conducted on many different crops (Vučetić *et al.*, 2013; Vučurović *et al.*, 2018). This is also a good way for recording new species (Coceano & Petrović-Obradović, 2006; Vučetić *et al.*, 2014), invasive species and, in particular, species that are hidden and therefore difficult to register by inspection of the plants.

Aphids are significant pests in sugar beet production due to their direct feeding and ability to transmit viruses. Yellow water traps are attractive for most aphid species and are often used.

Materials and methods

Alatae aphids were caught in yellow water traps placed in sugar beet fields on two experimental fields of the Institute of Field and Vegetable Crops, Novi Sad, Serbia (Rimski Šančevi) during 2019 and 2020, and on one field in Temerin (near Novi Sad) in 2019. Two yellow water traps (30 x 30 cm) (Fig. 1) were set up at each locality, from mid-April until the end of vegetation (mid-November). Samples with aphids were taken once per week and kept in tubes with 70% ethanol. Aphids were identified using a stereoscopic microscope and identification keys for winged aphids (Taylor, 1984; Jacky & Bouchery, 1988; Remaudière & Seco Fernandes 1990; Rongai & Cerato, 2001). Over 5,500 specimens of aphids (Hemiptera: Aphididae) were collected and identified during the two-year study (Petrović-Obradović *et al.*, in press). Some specimens of all the caught species were mounted on slides following Eastop & van Emden (1972).



Figure 1. Yellow water trap at sugar beet crop.

Results

Among the specimens collected in yellow water traps, three were identified as winged viviparous parthenogenetic females of *Rhopalosiphoninus latysiphon* (Davidson, 1912) (Fig. 2). This is the first record of the species for the fauna of Serbia. The specimens were caught on 24 October 2019, 22 November 2019 and 21 May 2020 on fields of the Institute of Field and Vegetable Crops (Rimski Šančevi).

Genus *Rhopalosiphoninus* Baker

The genus *Rhopalosiphoninus* Baker comprises about 20 species, of which six are European, ten are from Asia, three are from North America and *R. latysiphon* is cosmopolitan (Blackman & Eastop, 2022). They feed on plants from many families, such as Caprifoliaceae, Hydrangeaceae, Staphyleaceae. Some species are heteroecious and some are monoecious; they usually live in cryptic habitats and are not easily detected. The main morphological characteristics of the genus are very strongly swollen siphunculi and short triangular cauda, well-developed lateral frontal tubercles, antennae of aptera without secondary rhinaria and antennae of alatae with secondary rhinaria on the III antennal segment.

Rhopalosiphoninus latysiphon (Davidson, 1912) – Bulb-and-Potato Aphid

Morphology: Alatae viviparous females (Fig. 2, based on 3 specimens) – head is black, sclerotized, antennal tubercles are well developed. Antennae are rather dark, I and II antennal segments are black, III segment has 20 to 22 secondary rhinaria, arranged in a line on the whole segment, IV and V segments are without secondary rhinaria, VI segment with processus terminalis 4.1 to 5.3 times longer than the basal part of the segment. Large sclerite (quadrangular patch) present on the dorsal part of the abdomen, marginal sclerites present on many segments. Cauda is short, barely a little longer than wide, with 5 setae. Siphunculi are black, very swollen, the broad central part is about 4 times wider than the narrow apical part, tips of siphunculi are strongly reticulated. Body length is 1.8-2.3 mm.



Figure 2. *Rhopalosiphoninus latysiphon*: winged viviparous parthenogenetic female (left–dorsal side; right–ventral side).

Apterous viviparous females have not been found; according to Heie (1994) and Blackman & Eastop (2022) they are shiny dark green, with antennae longer than the body, the cauda is triangular and short, siphunculi are long strongly swollen, with narrow basal parts and tips. Body length is 1.4-2.5 mm.

Distribution: It is a cosmopolitan species, originating from North America. In Europe, first detection was in 1921 in Italy and it is now present in many countries (Coeur d'Acier *et al.*, 2010; Nieto Nafria 2014).

Biology: It is an anholocyclic species, overwintering as parthenogenetic females; sexual forms have never been found (Blackman & Eastop, 2022). Its host plants are many monocotyledon (*Tulipa*, *Gladiolus* and grasses) and dicotyledon plants (*Beta*, *Solanum tuberosum*, *Convolvulus*, *Potentilla*, *Urtica*) (Blackman & Eastop, 2022). It is found on more than 70 host plants worldwide (Holman, 2009) but it is difficult to be detected because it lives on the subterranean parts of plants or in the darkness of cellars.

Pest status: *R. latysiphon* can be a pest of potato, sugar beet and tulip bulbs but only if present in big colonies. Usually, it is found on the shoots of potato in dark cellars (Blackman & Eastop, 2022). We trapped it in a sugar beet field and it was probably feeding on the roots. Only three winged females were collected during the two years, which means that it is not an important pest of sugar beet in Serbia. *R. latysiphon* is a vector of at least four plant viruses (*Cucumber mosaic virus*, *Beet yellows virus*, *Potato Y virus* and *Potato leaf roll virus*) (Blackman & Eastop, 2022).

Rhopalosiphoninus latysiphon is the second species from the genera *Rhopalosiphoninus* found in Serbia; *Rhopalosiphoninus staphyleae* (Koch, 1854) was found many years ago on *Staphylea pinnata* L. (Petrović-Obradović, 2003). There is now a total of 394 registered species of aphids in Serbia (Tomić & Petrović-Obradović, 2022).

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References

- Blackman, R. L., & Eastop, V. F. (2022). Aphids on the World's Plants: An online identification and information guide. Retrieved from: <http://www.aphidsonworldsplants.info/> [Accessed on: 15.11.2022].
- Coeur d'Acier, A., Perez Hidalgo, N., & Petrović-Obradović, O. (2010). Aphids (Hemiptera, Aphididae). In *Terrestrial invertebrate invasions in Europe*. Chapter 9.2. In A. Roques, J.Y. Rasplus, C. Lopez-Vaamonde, W. Rabitsch, M. Kenis & W. Nentwig (Eds.). *BioRisk* 4(1), 435–474. <https://doi.org/10.3897/biorisk.4.57>
- Coceano, P. G., & Petrović-Obradović, O. (2006). New Aphid Species Caught by Suction Trap. *Phytoparasitica*, 34(1), 63–67. <https://doi.org/10.1007/BF02981340>
- Eastop, V. F., & van Emden, H. F. (1972). The Insect Material. In *Aphid Technology*. Academic Press, London & New York, 1-45.
- Heie, O. E. (1994). The Aphidoidea of Fennoscandia and Denmark. V Family Aphididae: Part 2 of the tribe Macrosiphini of subfamily Aphidinae. *Fauna ent. scand.*, 28, 239 pp.
- Holman, J. (2009). *Host plant catalogue of aphids*, Palearctic region, Springer, 1216 pp.
- Jacky, F., & Bouchery, Y. (1988). *Atlas des formes aillees des especes courantes de pucerons*. INRA, 48 pp.
- Nieto Nafria, J. M. (2014) Fauna Europaea: Hemiptera, Aphidoidea. Fauna Europaea version 2017.06, Retrieved from: <https://fauna-eu.org> [Accessed on: 22.11. 2022].
- Petrović-Obradović, O. (2003). *Biljne vaši (Homoptera: Aphididae) Srbije*. Belgrade, Serbia: Poljoprivredni Fakultet Univerziteta u Beogradu, 152 pp. [in Serbian].

- Remaudière, G., & Seco Fernandez, M. V. (1990). Claves de pulgones alados de la region mediterranea (Hom. Aphidoidea). León, Spain, Universidad De León, 205 pp.
- Rongai, D., & Cerato, C. (2001). Manuale per il riconoscimento degli Afidi, ISCI, Bologna, Italia, 203 pp.
- Taylor, L. R. (1984). A Handbook for Aphid Identification. (A Handbook for the Rapid Identification of the Alate Aphids of Great Britain and Europe). Roth. Exp. Stat., Harpenden, 171 pp.
- Tomić, M., & Petrović-Obradović, O. (2022). *Periphyllus californiensis* (Shinji, 1917) and *Tinocallis saltans* (Nevsky, 1929) (Hemiptera: Aphididae), two alien aphid species new to the fauna of Serbia. *Acta Entomologica Serbica*, 27(2). <https://doi.org/10.5281/zenodo.7271290>
- Vučetić, A., Vukov, T., Jovičić, I., & Petrović-Obradović, O. (2013). Monitoring of aphid flight activities in seed potato crops in Serbia. In Popov, A., Grozeva, S., Simov, N., Tasheva, E. (Eds.) *Advances in Hemipterology. ZooKeys*, 319, 333-346. doi: 10.3897/zookeys.319.4315
- 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. DOI:10.1007/s12600-013-0357-2
- Vučurović, A., Petrović-Obradović, O., Radonjić, A., Nikolić, D., Zečević, K., Stanković, I., & Krstić, B. (2018). Diversity and flight activity of aphid species as potential vectors of oilseed pumpkin viruses in Serbia. *Field and Vegetable Crops Research*, 55, 72-79. doi:10.5937/ratpov55-16608

ПРВИ НАЛАЗ СТРАНЕ БИЉНЕ ВАШИ ЛУКОВИЦА И КРОМПИРА
RHOPALOSIPHONINUS LATYSIPHON (HEMIPTERA: APHIDIDAE)
У СРБИЈИ

ОЛИВЕРА ПЕТРОВИЋ-ОБРАДОВИЋ, ЖИВКО ЂУРЧИЋ, ЖЕЉКО МИЛОВАЦ И АНЂА РАДОЊИЋ

Извод

Северноамеричка врста биљне ваши *Rhopalosiphoninus latysiphon* (Davidson, 1912) (Hemiptera: Aphididae) нађена је у Србији први пут. То је полифагна врста која се углавном храни на корену, луковима и кртолама. Ова криптичка врста откривена је помоћу жутих водених клопки које су коришћене за праћење лета биљних вашију у усевима шећерне репе на пољима Института за ратарство и повртарство Нови Сад (Римски Шанчеви). Укупно три јединке су уловљене током 2019. и 2020. године. Главне морфолошке и биолошке карактеристике врсте приказане су у раду.

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