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***Scolothrips longicornis* Priesner, 1926 – A NEW THRIPS SPECIES FOR CROATIA**

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Prihvaćeno: 29-4-2019

SUMMARY

Scolothrips longicornis Priesner, 1926 (Thysanoptera: Thripidae: Thripinae) is a predaceous thrips species originating from Western-Palaearctic zoogeographical region. It is a predator of all stages of spider mites from the family Tetranychidae. *S. longicornis* has been recorded in many European countries: Poland, Czech Republic, Slovakia, Hungary, Romania, Austria, France, Spain, Italy, United Kingdom and Finland. In Europe, findings of six species from the genus *Scolothrips* Hinds, 1902, have been recorded, *S. longicornis* including. *S. longicornis* was found for the first time in Croatia in 2017 on leaves of soybean and ornamental plants *Hydrangea* sp. and *Datura* sp. in greenhouses. In 2018, the species was also recorded on indoor *Alocasia* sp. Predatory thrips species was present on leaves of plants in association with polyphagous spider mite *Tetranychus urticae* Koch, 1889. Thrips and spider mites present in collected samples were identified to the species level on the basis of microscopic morphological characters, using classical identification method according to relevant morphological keys. Since, *S. longicornis* is a new thrips species for the fauna of Croatia and one of the numerous newly discovered, the last published national check list of thrips fauna should be updated.

Ključne riječi: Croatia, first record, predaceous thrips, *Scolothrips longicornis*, Thysanoptera

***Scolothrips longicornis* Priesner, 1926 – NOVA VRSTA TRIPSA ZA HRVATSKU**

SAŽETAK

Scolothrips longicornis Priesner, 1926 (Thysanoptera: Thripidae: Thripinae) je predatorska vrsta tripsa podrijetlom iz Zapadno-Palearktičke zoogeografske regije. Predator je svih razvojnih stadija grinja iz porodice Tetranychidae. *S.*

longicornis je zabilježen u mnogim europskim državama, između ostalih i u: Poljskoj, Češkoj, Slovačkoj, Mađarskoj, Rumunjskoj, Austriji, Francuskoj, Španjolskoj, Italiji, Ujedinjenom Kraljevstvu i Finskoj. U Europi je zabilježeno šest vrsta iz roda *Scolothrips* Hinds, 1902, uključivo i *S. longicornis*. Vrsta *S. longicornis* je u Hrvatskoj prvi puta nađena 2017. na listovima soje i ukrasnih biljaka *Hydrangea* sp. i *Datura* sp. u zaštićenom prostoru. Također je zabilježena i 2018. na vrsti *Alocasia* sp. u zaštićenom prostoru. Predatorska vrsta tripsa je na listovima biljaka bila prisutna u zajednici s polifagnom grinjom *Tetranychus urticae* Koch, 1889. Tripsi i grinje prikupljeni u uzorcima identificirani su klasičnom metodom do razine vrste na osnovi mikroskopskih morfoloških karakteristika, uz pomoć relevantnih ključeva za determinaciju. Budući da je *S. longicornis* nova vrsta tripsa za faunu Hrvatske i jedna od mnogih nedavno novootkrivenih, trebalo bi ažurirati posljednje objavljeni nacionalni popis vrsta.

Ključne riječi: Hrvatska, prvi nalaz, grabežljivi trips, *Scolothrips longicornis*, Thysanoptera

INTRODUCTION

Thrips can be phytophagous, pollenophagous, mycetophagous, predaceous or general feeders (Lewis, 1973). *Scolothrips longicornis* Priesner, 1926 (Thysanoptera: Thripidae: Thripinae) is a Western-Palearctic predaceous thrips species (zur Strassen, 2003). It is native to Iran (Pakyari, 2012). Currently, genus *Scolothrips* Hinds, 1902 comprises 16 worldwide distributed species (ThripsWiki, 2019). In Europe, the species *S. longicornis* is known from many countries (Mound et al., 1976; Marullo, 2003; Mirab-balou et al., 2011; Masarović et al., 2013; Marullo & De Grazia, 2013). In addition to *S. longicornis*, Zur Strassen (2003) cites 5 more species from this genus recorded in Europe. The latest check-list of thrips recorded in Croatia contains 119 species, but none from the genus *Scolothrips* (Raspudić et al., 2003). Species of the thripid genus *Scolothrips* are well known as predators of leaf-feeding mites (Mirab-balou et al., 2013). Under the name “six-spotted thrips”, these insects are sometimes marketed as biocontrol agents (Mound, 2011). *S. longicornis* is a native beneficial thrips species in the Mediterranean and Middle East areas. It is common in crops suffering from infestation with spider mites such as bean, cucumber and eggplant and it can be used in combination with phytoseiid mites in management programs (Fathipour & Maleknia, 2016). This acarophagous thrips is an important predator of numerous pest spider mites species (Acari: Tetranychidae) such as *Tetranychus urticae* Koch, 1836, *Tetranychus turkestanii* Ugarov & Nikolskii, 1937 and *Tetranychus cinnabarinus* Boisduval, 1867 (Selhorst et al., 1991; Pakyari et al., 2009; Gheibi & Hesami, 2011). Spider mites of all stages appear to be its prey (Lewis, 1973).

MATERIALS AND METHODS

Thrips were collected in 2017 and 2018, during visual inspections of plants with symptoms of feeding, with a help of a magnifying lens of 10 times magnification, while performing a survey on *Thrips setosus* Moulton, 1928 in Croatia. Thrips were sampled by beating of plants on a white paper surface for subsequent laboratory analysis. Several adult thrips specimens were collected from plant leaves with fine brush and immersed into Eppendorf vials containing AGA solution (10 units of 60 % ethyl-alcohol, 1 unit of glycerol and 1 unit of glacial acetic acid). All sampled thrips specimens were slide mounted in Canada balsam according to the standard method (Mound & Kibby, 1998) and examined using an Olympus BX 51 high power microscope (magnification 100-400x), equipped with a DP 25 Digital Camera. Thrips were identified to the species level on the basis of microscopic morphological characters of adult females, using classical identification method according to morphological key by Zur Strassen (2003). Verification of identification of thrips species was done by G. Seljak from Nova Gorica, Slovenia. Slide-mounted specimens were labelled with all data relevant for faunistic entry and deposited in the collection of Laboratory for zoology of Centre for Plant Protection. Additionally, spider mites and thrips associated with *S. longicornis* found on inspected plants were also identified microscopically on the basis of slide mounted specimens according to morphological keys for spider mites by Zhang et al. (2002), Zhang (2003) and for thrips by zur Strassen (2003).

RESULTS AND DISCUSSION

S. longicornis was found in Croatia on soybean leaves in Ilovski Klokočevac and on ornamental plants *Hydrangea* sp. and *Datura* sp. in greenhouses in Turanj and Dubrava Šibenska in 2017. This species was recorded again in 2018 on *Alocasia* sp. plants in a greenhouse in Umag (Table 1).

Table 1 Findings of *S. longicornis* in Croatia in 2017 and 2018.

Tablica 1. Nalazi tripsa *S. longicornis* u Hrvatskoj 2017. i 2018.

County Županija	Locality and GPS coordinate Lokalitet i GPS koordinata	Plant family Porodica biljke	Plant species Vrsta biljke	Date Datum	Associated thrips species Prateće vrste tripsa	Associated spider mite species Prateće vrste grinja
Bjelovar Bilogora	Ilovski Klokočevac N 45°37'17.61" E 17°1'45.85"	Fabaceae	<i>Glycine max</i> (L.) Merr.	2017 July, 7 th	<i>Thrips tabaci</i> Lindeman, 1889	<i>Tetranychus</i> <i>urticae</i> Koch, 1836
Zadar	Turanj N 43°58'13.6" E 15°24'55.39"	Hydrangeaceae	<i>Hydrangea</i> sp.	2017 July, 20 th	-	<i>Tetranychus</i> <i>urticae</i> Koch, 1836
Šibenik Knin	Dubrava Šibenska N 43°44'8.4" E 15°56'49.47"	Solanaceae	<i>Datura</i> sp.	2017 July, 24 th	<i>Thrips tabaci</i> Lindeman, 1889	<i>Tetranychus</i> <i>urticae</i> Koch, 1836
Istria	Umag N 45°25'34.09" E 13°33'1.12"	Araceae	<i>Alocasia</i> sp.	2018 October, 4 th	-	<i>Tetranychus</i> <i>urticae</i> Koch, 1836

Based on recently published literature (Zur Strassen, 2003; Šimala & Masten Milek, 2008; Raspudić & al., 2009; Šimala & al., 2017) and comparison to the latest check-list of Thysanoptera in Croatia (Raspudić & al., 2003), *S. longicornis* is a newly recorded species for the thrips fauna in Croatia. Both adults and larvae of the predatory thrips *S. longicornis* were present on leaves of all inspected plant species in association with high population density of the polyphagous plant-feeding two spotted spider mite *T. urticae*, especially in indoor conditions. In addition to *T. urticae* in soybean crop and on *Datura* sp. plants, *S. longicornis* was recorded in mixed population with *Thrips tabaci* Lindeman, 1889, a widespread, serious agricultural thrips pest to various crops in Croatia.

The most important morphological characters for microscopic identification of an adult thrips belonging to the genus *Scolothrips* are six (rarely five) pairs of exceptionally long setae on the pronotum as well as a similar pair arising between the ocelli (Mound, 2011). This genus from the subfamily Thripinae is also easily recognizable by the presence of dark bands on forewings (Masumoto, 2010). Adult female specimens obtained from collected samples fully coincide with all morphological characters in listed descriptions and illustrations for the genus *Scolothrips* by Mound (2011) and Masumoto (2010). According to zur Strassen (2003), adult female of *S. longicornis* may be distinguished morphologically from five other species of the genus *Scolothrips* recorded in Europe by the number of dark bands on forewings, colour of the antennal segment II and the presence or absence of darker patterns on thorax and abdomen. Species *S. longicornis*, *Scolothrips uzeli* (Schille, 1911), *Scolothrips latipennis* Priesner, 1950 and *Scolothrips lanzarotensis* Priesner, 1933 have three dark bands on forewings, including clavus, while *Scolothrips quadrimaculatus* Priesner, 1933 has two dark bands on each forewing, while in *Scolothrips tenuipennis* zur Strassen, 1965 they lack completely. *S. longicornis* differs from the other species with three dark bands on forewings by white or whitish-yellow colour of the antennal segment II (dark in other species) and by absence of darker patterns on thorax and abdomen (present in other three species).

Females of *S. longicornis* are all macropterous with body length 1,14-1,38 mm, while males are hemi-macropterous and slightly smaller with body length 0,8-1,06 mm. Body, legs and antennae are yellowish white. Forewings are pale with three narrow dark cross-bands of which the basal one is confined to clavus and the distal one is slightly paler than the sub-basal one (Figure 1).



Figure 1 Microscopic slide of *S. longicornis* female (photo: M. Šimala)
Slika 1. Mikroskopski preparat ženke *S. longicornis* (snimio: M. Šimala)

Head is wider than it is long. Antennae are 8-segmented with a long forked sense cone on third and fourth segment (Figure 2). First two antennal segments are white, while others are pale yellow. Three pairs of ocellar setae are present on the head, of which the third pair is very long and arises on the anterior margin of the ocellar triangle (Figure 3). Postocular setae are small and the first pair behind the hind ocelli are close together. Pronotum has six pairs of very long setae (Figure 3). Paired postero-median discal setae are absent.



Figure 2 Sense cone on antennae segment IV (photo: M. Šimala)
Slika 2. Osjetilni konus na četvrtom članku ticala (snimio: M. Šimala)



Figure 3 *S. longicornis*: pair III of ocellar setae (red arrows) and very long setae on pronotum (red circles) (photo: M. Šimala)

Slika 3. *S. longicornis*: treći par ocelarnih čekinja (crvene strelice) i vrlo duge čekinje na pronotumu (crvene kružnice) (snimio: M. Šimala)

Matanotum is weakly reticulated, without campaniform sensilla. Median pair of setae on metanotum arises at anterior margin. Mesosternal and metasternal furca are with spinula. Seven long setae are present on the forewing's first and second vein respectively (Figure 4).

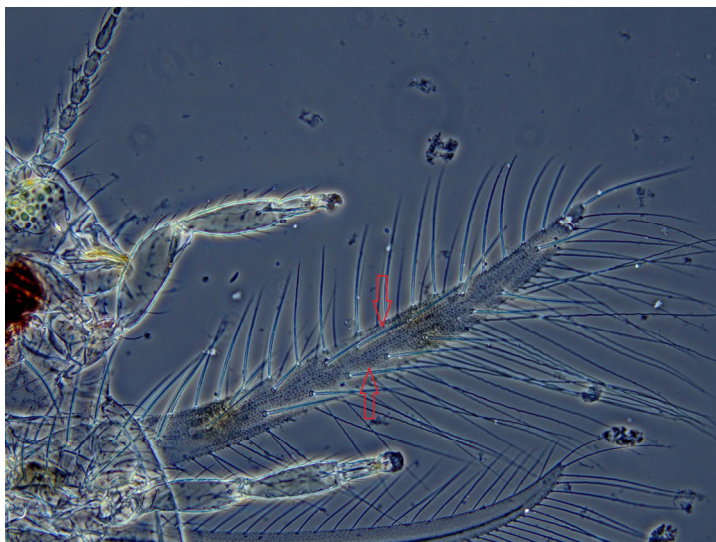


Figure 4 Forewing of *S. longicornis* (first and second vein are marked with red arrows) (photo: M. Šimala)

Slika 4. Prednje krilo *S. longicornis* (prva i druga žila označene su crvenim strelicama) (snimio: M. Šimala)

Abdominal tergites have no sculpture medially, with median pair of small setae far apart. Postero-marginal comb on tergite VIII is absent. Tergite IX has only one pair of campaniform sensilla. Tergite X lacks median split. Sternites have no discal setae. Pair of setae S1 is arising in front of margin of sternite VII.

CONCLUSIONS

First record of species *S. longicornis* is not valuable only for faunistics and systematics of thrips in Croatia, but also for the practical agriculture. After the last check-list of thrips fauna was published in 2003, numerous new species have been discovered in Croatia, including *S. longicornis*. Therefore, the list should be amended and complemented. Although thrips are generally considered to be agricultural pests, *S. longiconis* is a beneficial species, and as a predator of phytophagous spider mites presents a suitable biological control agent.

ACKNOWLEDGEMENT

Thanks are due to retired colleague, M.Sc. Gabrijel Seljak for the positive identification confirmation of *Scolothrips longicornis*.

REFERENCES

- FATHIPOUR, Y., MALEKNIA, B. (2016). Mite Predators. In: Eco friendly Pest Management for Food Security. Chapter 11: 329-366.
- GHEIBI, M., HESAMI, S. (2011). Life Table and Reproductive Table Parameters of *Scolothrips Longicornis* (Thysanoptera: Thripidae) as a Predator of Two-Spotted Spider Mite, *Teranychus Turkestanii* (Acari: Tetranychidae). World Academy of Science, Engineering and Technology International Journal of Bioengineering and Life Sciences, 5, 12: 866-868.
- LEWIS, T. (1973). Thrips as crop pests. CAB International. Wallingford, UK: 740 pp.
- MARULLO, R. (2003). Conoscere i Tisanotteri. Guida al riconoscimento delle specie dannose alle colture agrarie. Edagricole. Bologna, Italy: 75 pp.
- MARULLO, R., DE GRAZIA, A. (2013). Territorial distribution, classification and relationships amongst Italian Thysanoptera. Bulletin of Insectology, 66, 1: 127-134.
- MASAROVIĆ, R., DORIČOVA, M., FEDOR, P. (2013). The first record of predaceous *Scolothrips longicornis* Priesner 1926 (Thysanoptera: Thripidae) in Slovakia. Journal of Central European Agriculture, 2013, 14, 2: 721-728.
- MASUMOTO, M. (2010). Key to Genera of the Subfamily Thripinae (Thysanoptera: Thripidae) Associated with Japanese Plant Quarantine. Res. Bull. Pl. Prot. Japan, 46: 25-59.
- MIRAB-BALOU, M., TONG, X. L., FENG, J. N., CHEN, X. X. (2011). Thrips (Insecta: Thysanoptera) of China. Check List. Journal of species lists and distribution, 7, 6: 720-744.
- MIRAB-BALOU, M., MINAEI, K., CHEN, X. X. (2013). An illustrated key to the genera of Thripinae (Thysanoptera, Thripidae) from Iran. ZooKeys, 317: 27-52.

MOUND, L. A., MORISON, G. D., PITKIN, B. R., PALMER, J. M. (1976). Thysanoptera. Handbooks for the Identification of British Insects. Vol. 1, 11, Royal Entomological Society of London, London: 79 pp.

MOUND, L. A., KIBBY, G. (1998). Thysanoptera. An Identification Guide. 2nd edition. Wallingford, UK, CAB International: 70 pp.

MOUND, L. A. (2011). Species recognition in the genus *Scolothrips* (Thysanoptera, Thripidae), predators of leaf-feeding mites. *Zootaxa*, 2797: 45-53.

PAKYARI, H., FATHIPOUR, Y., REZAPANAH, M., KAMALI, K. (2009). Temperature-dependent functional response of *Scolothrips longicornis* (Thysanoptera: Thripidae) preying on *Tetranychus urticae*. *Journal of Asia-Pacific Entomology*, 12: 23-26.

PAKYARI, H. (2012). Spatial distribution pattern of *Tetranychus urticae* and its egg predator *Scolothrips longicornis* on different bean cultivars. *Mum. Ent. Zool.*, Vol. 7, 1: 243-254.

RASPUDIĆ, E., IVEZIĆ, M., JENSER, G. (2003). Check list on Thysanoptera in Croatia. *Entomol. Croat.*, 7, 1-2: 35-41.

RASPUDIĆ, E., IVEZIĆ, M., BRMEŽ, M., TRDAN, S. (2009). Distribution of Thysanoptera species and their host plants in Croatia. *Acta agriculturae Slovenica* 93: 275-283.

SELHORST, T., SÖNDGERATH, D., WEIGAND, S. (1991). A model describing the predator-prey interaction between *Scolothrips longicornis* and *Tetranychus cinnabarinus* based upon the Leslie theory. *Ecological Modelling* 59: 123-138.

ŠIMALA, M., MASTEN MILEK, T. (2008). Thysanoptera species recorded in greenhouses in Croatia from 2003-2006. *Acta Phytopathologica et Entomologica Hungarica* 43, 2: 373-383.

ŠIMALA, M., PINTAR, M., MASTEN MILEK, T., MARKOTIĆ, V., BJELJA, Ž. (2017). Rezultati programa posebnog nadzora karantenskih vrsta tripsa iz roda *Scirtothrips* Shull, 1909 na agrumima u Hrvatskoj. *Glasilo biljne zaštite* Vol. 17, 6: 523-538.

THRIPSWIKI (2019). ThripsWiki - providing information on the World's thrips. (<http://thrips.info/wiki/>), accessed 21st March 2019.

ZHANG, Z. Q., HENDERSON, R., FLYNN, A., MARTIN, N.A. (2002). Key to Tetranychidae of New Zealand. *Landcare Research*, Auckland: 62 pp.

ZHANG, Z. Q. (2003). Mites of greenhouses. Identification, biology and control. CABI Publishing, Wallingford; 244 pp.

ZUR STRASSEN, R. (2003). Die terebranten Thysanopteren Europas und des Mittelmeer-Gebietes. *Die Tierwelt Deutschlands* 74, Verlag Goecke & Evers, Keltern: 277 pp.