

FIRST RECORDS OF NEW INSECT PESTS IN CROATIA BETWEEN TWO SLOVENIAN CONFERENCES ON PLANT PROTECTION (2019-2022)

Mladen ŠIMALA¹, Maja PINTAR², Tatjana MASTEN MILEK³

^{1,2} Croatian Agency for Agriculture and Food – Centre for Plant Protection
Zagreb, Republic of Croatia

³ Public institution for the management of protected areas and other protected parts of
nature in the Zagreb County Zeleni prsten, Samobor, Republic of Croatia

ABSTRACT

Three new insect pests were found for the first time in Croatia since the last Slovenian Conference on Plant Protection held in Maribor in 2019. Two of them are invasive, having Eastern Palearctic and Oriental origin, and one is a Palearctic species widely spread in Europe. Rose flea beetle (*Luperomorpha xanthodera* [Fairmaire, 1888]) is an alien species originating from China. In Europe, it was detected for the first time out of its natural habitat in Britain in 2003. Subsequently, the pest has spread rapidly across Europe. Adults are polyphagous, mainly anthophagous, causing damage on plants belonging to 23 genera from 19 botanical families. In Croatia, *L. xanthodera* was found for the first time in August 2019 on flowers of lemon seedlings in nursery in Rovinj. Later during the same year the species was found in additional 14 continental and coastal localities, on nine ornamental plant species from six different families. The ficus whitefly (*Singhiella simplex* [Singh, 1931]) is one of the most important pests of various ornamental *Ficus* species worldwide. It is an alien species originating from India. In Europe, the pest was first recorded in Cyprus in 2014. *S. simplex* was intercepted in Croatia in 2019 on potted plants of *Ficus benjamina* L. and *Ficus microcarpa* L.f., originating from the Netherlands. Privet thrips (*Dendrothrips ornatus* [Jablonowski, 1894]) is a polyphagous pest, living and breeding on leaves of privet, syringa, ash, alder, hazel and lime. It was found in Croatia in privet hedge (*Ligustrum vulgare* L.) in Čazma, in June 2020. Specimens of all newly recorded species were identified in the Laboratory for zoology to the species level on the basis of morphological characters, using classical identification methods according to relevant morphological keys.

Key words: Croatia, *Dendrothrips ornatus*, first records, *Luperomorpha xanthodera*, *Singhiella simplex*

¹ dr. sc., Gorice 68b, HR-10000 Zagreb, Croatia, e-mail: mladen.simala@hapih.hr

² dipl. ing., ibid

³ dr. sc., 151. samoborske brigade HV 1, HR-10430 Samobor

1 INTRODUCTION

Rose flea beetle (*Luperomorpha xanthodera* [Fairmaire, 1888]) belongs to subfamily of flea beetles (Alticinae). This beetle, originating from Far East, appeared in Europe at the beginning of this century and has since extend its range continuously. It was apparently imported to Europe from China with exotic plants. Since its first record in great Britain in 2003 (Johnson & Booth, 2004), the species was recorded in Italy, France, The Netherlands, Germany, Switzerland, Austria, Hungary, Poland, European Russia, Belgium, Spain and Montenegro (Kozłowski & Legutowska, 2014; Radonjić & Hrnčić, 2017; Bienkowski & Orlova-Bienkowskaja, 2018). *L. xanthodera* is a polyphagous species. Adults are predominantly anthophagous and feed on flowers of plants belonging to 23 genera from 19 botanical families, preferring flowers with the most intense scent or richest in pollen. Feeding damage affects only petals, not fruit-setting, and causes destruction of flowers that can be extensive. Larvae are rhizophagous and feed on secondary roots of host plants, without serious impact on normal development of the root system. In climatic conditions of Tuscany, species overwinters in the soil in all postembryonal development stages and completes two generations per year (Del Bene & Conti, 2009).

Ficus whitefly (*Singhiella simplex* [Singh, 1931]) (Hemiptera: Aleyrodidae) was described from India, and was also found in China, Myanmar and Taiwan (Ko & al., 2015). In Europe, this species was first recorded in Cyprus in 2014, resulting in its addition to the EPPO Alert list in the same year (EPPO, 2014). Subsequently, it was found in Turkey in 2016 (Yükselbaba & al., 2017), in France in 2017 (EPPO, 2017) and in Italy in 2019 (Laudani & al., 2019) and was intercepted in Slovenia (Seljak, 2018) and the UK (DEFRA, 2019). *S. simplex* is oligophagous on various species of *Ficus* (Moraceae), and exhibits a preference for weeping fig (*F. benjamina*). It has also been recorded on *Rhododendron indica* (L.) Sweet. (Ericaceae), but this remains to be confirmed (EPPO, 2014). This pest can seriously damage host plants by sucking of nutrients from the leaves, subsequently causing wilting, yellowing, leaf drop or even plant's death. Indirect damage is a consequence of excretion of honeydew, in particular by immature stages, on which the black sooty moulds subsequently develop, reducing the photosynthetic activity of affected leaves and decreasing aesthetic value of ornamental plants. In favourable climatic conditions *S. simplex* breeds through most of the year, producing several overlapping generations. In the Mediterranean countries, it causes serious damage on *Ficus* trees grown for ornamental purposes in urban public greeneries, planted along roads, in parks and gardens.

Privet thrips (*Dendrothrips ornatus* [Jablonowski, 1894]) (Thysanoptera: Thripidae) is a Palearctic species widespread in Europe. It is a leaf-feeding thrips species, common on various Oleaceae plants that causes silvery and distortion to the leaves, in particular of privet (*Ligustrum* spp.) and *Syringa* spp. (Mirab-balou & al., 2011; Wang & al., 2019). It was also recorded on shrubs and trees from families Betulaceae and Malvaceae (Zur Strassen, 2003). *D. ornatus* develops two or more generations each year, occurring on host plants from April to November (Alford, 2012).

2 MATERIALS AND METHODS

400

During visual inspections of various ornamental plants in the open field and in greenhouses of nurseries and garden centres, carried out as a part of a regular national survey on plant pests in Croatia, specimens of two newly recorded alien species (*L. xanthodera* and *S. simplex*) were collected in 2019. Thrips specimens were isolated from an official sample of twigs collected from a privet hedge in 2020 and delivered for the purpose of analysis by a private owner, from a locality in Čazma in Bjelovar-Bilogora County. All samples of insects were processed according to the standard entomological procedures for morphological diagnostics. Adult stages of the flea beetle detected on ornamental plants were collected with mouth aspirator and deposited into a vial with 70 % ethanol for subsequent laboratory analysis. The leaf samples with preimaginal whitefly stages were placed and stored dry in envelopes until preparation in the laboratory (Martin, 1987). The specimens of adult thrips were sampled by shaking of infested privet twigs above white paper surface and collected with a fine brush into a vial with AGA solution (ethyl alcohol + glycerol + acetic acid) (Mound & Kibby, 1988). Collected adult beetles were morphologically identified according to Warchalowski (2003) key for flea beetles and by comparison of microscopic characteristics of their reproductive apparatus with photos and literary description (Del Bene & Conti, 2009; Kozłowski & Legutowska, 2014; Bieńkowski & Orlova-Bienkowskaja, 2018 a). EPPO diagnostic protocol PM 7/109 (2) for *Epitrix* spp. was used for dissection of male genitalia and female spermatheca. Puparia and pupal cases of collected whiteflies were slide-mounted according to modified Watson & Chandler (1999) method for preparation. Whitefly species was identified using diagnostic keys provided by Jensen (2001) and Suh & al. (2008), as well as by comparison of microscopic slides with literary description and photos (Gonzalez-Julian & al., 2013; Ramos & al., 2015). Regarding final decision about identification of whitefly species, colleague G. Seljak was consulted (Šimala, pers. comm). Adult thrips females isolated from a privet' sample were slide-mounted according to modified Mound & Kibby (1988) method for preparation and identified according to Mound & Kibby (1998) and Zur Strassen (2003) morphological keys. For an accurate identification of all collected samples of insects, stereomicroscope Olympus SZX7 and optical microscope Olympus BX 51 were used. Photographs of recorded species were taken under a microscope equipped with a Digital Camera DP 25. Dry and slide-mounted specimens were deposited in the collection of Laboratory for zoology at Centre for Plant Protection – CAAF in Zagreb.

3 RESULTS AND DISCUSSION

Rose flea beetle (*L. xanthodera*) was found for the first time in 2019 in garden centres and nurseries in the open and in greenhouses, in a total of 15 localities in continental and coastal Croatia (Šimala & al., 2020). Ten ornamental plant species from seven botanical families were recorded as host plants of this pest (Table 1).

High populations of *L. xanthodera* adult stages were detected on the flowers and leaves of lemon seedlings in greenhouses and on the flowers of oleander, rose and hibiscus seedlings in the open. Consequently, significant damage to petals was determined on these plant species, which, apart from the aesthetic value of the plants, did not have any negative impact on the quality of seedlings. The pest was not found on already

established ornamental plants planted in the field. *L. xanthodera* larvae were not found at the roots, as the underground parts of the plants were not subject to visual inspection.

Table 1: Findings of species *L. xanthodera* in Croatia in 2019.

County	Locality (geographic position)	Date of finding	Plant species	Plant family
Istra	Rovinj (N 45° 4' 7.92" E 13° 39' 17.32")	21.8.	<i>Citrus limon</i> (L.) Osbeck	Rutaceae
			<i>Nerium oleander</i> L.	Apocynaceae
			<i>Lagerstroemia indica</i> L.	Lythraceae
	Žbandaj (N 45° 12' 35.51" E 13° 41' 32.43")	19.9.	<i>Nerium oleander</i> L.	Apocynaceae
			<i>Rosa</i> spp.	Rosaceae
			<i>Solanum jasminoides</i> Paxton	Solanaceae
	Poreč (N 45° 13' 37.35" E 13° 36' 13.46")	19.9.	<i>Rosa</i> spp.	Rosaceae
<i>Hibiscus rosa sinensis</i> L.			Malvaceae	
Umag (N 45° 25' 33.65" E 13° 33' 1.12")	20.9.	<i>Rosa</i> spp.	Rosaceae	
		<i>Nerium oleander</i> L.	Apocynaceae	
		<i>Citrus limon</i> (L.) Osbeck	Rutaceae	
The City of Zagreb	Zagreb (N 45° 46' 45.73" E 15° 57' 19.37")	31.10.	<i>Nerium oleander</i> L.	Apocynaceae
			<i>Rosa</i> spp.	Rosaceae
Zagreb	Lučko (N 45° 45' 26.24" E 15° 52' 10.25")	31.10.	<i>Nerium oleander</i> L. <i>Hibiscus syriacus</i> L.	Apocynaceae Malvaceae
Primorje-Gorski Kotar	Malinska (N 45° 8' 51.09" E 14° 32' 49.67")	21.8.	<i>Lagerstroemia indica</i> L.	Lythraceae
			<i>Nerium oleander</i> L.	Apocynaceae
			<i>Hibiscus syriacus</i> L.	Malvaceae
Zadar	Murvica (N 44° 8' 28.06" E 15° 18' 48.4")	11.9.	<i>Rosa</i> spp.	Rosaceae
			Bibinje (N 44° 4' 36.12" E 15° 17' 12.86")	11.9.
	<i>Solanum jasminoides</i> Paxton	Solanaceae		
Šibenik-Knin	Šibenska Dubrava (N 43° 44' 7.74" E 15° 56' 49.14")	11.9.	<i>Citrus limon</i> (L.) Osbeck	Rutaceae
			<i>Rosa</i> spp.	Rosaceae
			<i>Hibiscus rosa sinensis</i> L.	Malvaceae
Split-Dalmatia	Split (N 43° 30' 50.32" E 16° 30' 0.51")	13.9.	<i>Rosa</i> spp.	Rosaceae
			<i>Nerium oleander</i> L.	Apocynaceae
	Kaštel Sućurac (N 43° 32' 43.24" E 16° 27' 21.71")	13.9.	<i>Nerium oleander</i> L.	Apocynaceae
Dubrovnik-Neretva	Metković (N 43° 4' 5.2" E 17° 38' 30.6")	24.9.	<i>Citrus limon</i> (L.) Osbeck	Rutaceae
			<i>Nerium oleander</i> L.	Apocynaceae
			<i>Rosa</i> spp.	Rosaceae
			<i>Solanum jasminoides</i> Paxton	Solanaceae
Varaždin	Varaždin (N 46° 18' 39.31" E 16° 19' 36.21")	30.9.	<i>Potentilla fruticosa</i> L.	Rosaceae
			<i>Rosa</i> spp.	Rosaceae
Međimurje	Štefanec (N 46° 21' 45.52" E 16° 29' 38.43")	30.9.	<i>Clematis</i> spp.	Ranunculaceae

Ficus whitefly (*S. simplex*) was intercepted in Croatia in 2019 on potted *Ficus* spp. plants originating from the Netherlands (Šimala & al., 2020 a). It was detected in greenhouses in garden centres in two Croatian coastal counties (Table 2). The whitefly population on infested plants was low, which is why no characteristic symptoms of infestation were observed. In Croatia, planting of *Ficus* plants in the form of alleys or hedges is not a common horticultural practice in coastal areas, as in some Mediterranean countries. Therefore, the phytosanitary importance of this new invasive whitefly species is reduced and damage can be expected only to *Ficus* plants in greenhouses at points of sale and in households.

Table 2: Findings of species *S. simplex* in Croatia in 2019.

County	Locality (geographic position)	Date of finding	Plant species	Plant family
Istra	Poreč (N 45° 13' 37.35" E 13° 36' 13.46")	2.5.	<i>Ficus microcarpa</i> L.f.	Moraceae
	Umag (N 45° 25' 33.65" E 13° 33' 1.12")	2.5.	<i>Ficus microcarpa</i> L.f.	Moraceae
Zadar	Turanj (N 43° 58' 18.5" E 15° 25' 1.5")	30.5.	<i>Ficus benjamina</i> L.	Moraceae

402

Privet thrips (*D. ornatus*) was recorded in Croatia for the first time in June 2020 in a privet hedge (*L. vulgare*) on locality in Čazma (N 45°44'57.8" E 16°35'49.2") in Bjelovar-Bilogora County. The leaves in the submitted sample of privet twigs were severely infested with numerous larvae and adult stages of thrips and consequently covered with silvery spots. Adult thrips specimens isolated from the sample were slide-mounted and morphologically identified as species *D. ornatus*. Faunistic research conducted in Croatia has so far resulted in only two species of thrips from the genus *Dendrothrips* Uzel, 1895, i.e. *Dendrothrips degeeri* Uzel, 1895 (Raspudić & al., 2003; Raspudić & al., 2009) and *Dendrothrips phyllireae* (Bagnall, 1927) (Šimala & al., 2017). Also, in the relevant literature, species *D. ornatus* is not mentioned as a pest of privet in our country.

4 CONCLUSIONS

As a new member of Croatian entomofauna, rose flea beetle (*L. xanthodera*) presents a serious threat to many flowering ornamental species grown in public green spaces, parks and private gardens. In the case of a large population development, *L. xanthodera* could represent a danger for trade and decrease ornamental value of seedlings, especially citrus, oleander, rose and hibiscus. Since ficus whitefly (*S. simplex*) attacks different ornamental plant species of the genus *Ficus*, but not edible fig (*Ficus carica* L.), this species has no phytosanitary significance for the Croatian agriculture. Privet thrips (*D. ornatus*) is a newly recorded member of the thrips fauna in Croatia. The

finding in Čazma gives new knowledge about its harmfulness on privet, which will help the owners of this often cultivated plant species in detecting the symptoms of infestation and understanding the symptomatology, as well as with implementation of control measures.

5 REFERENCES

- Alford, D. V. 2012. Pests of Ornamental Trees, Shrubs and Flowers. A Colour Handbook. Manson Publishing Ltd, London, UK, 480 pp.
- Bienkowski, A. O., Orlova-Bienkowskaja, M. J. 2018. Alien leaf beetles (Coleoptera, Chrysomelidae) of European Russia and some general tendencies of leaf beetle invasions. PLoS ONE 13, 9: 1-23.
- Bienkowski, A. O., Orlova-Bienkowskaja, M. J. 2018 a. Quick spread of the invasive rose flea beetle *Luperomorpha xanthodera* (Fairmaire, 1888) in Europe and its first record from Russia (Coleoptera, Chrysomelidae, Galerucinae, Alticinae). Spixiana 41, 1; 99-104.
- DEFRA 2019. Plant Pest Factsheet. Fig whitefly *Singhiella simplex*. <https://planthealthportal.defra.gov.uk/assets/factsheets/Singhiella-simplex-Defra-fact-sheet-v4.pdf>
- Del Bene, G., Conti, B. 2009. Notes on the biology and ethology of *Luperomorpha xanthodera*, a flea beetle recently introduced into Europe. Bulletin of Insectology 62, 1: 61-68.
- EPPO 2014. First report of *Singhiella simplex* in Cyprus: addition to the EPPO Alert List. EPPO Reporting Service 11. <https://gd.eppo.int/reporting/article-3306>
- EPPO 2017. New data on quarantine pests and pests of the EPPO Alert List. EPPO Reporting Service 07. <https://gd.eppo.int/reporting/article-6097>
- Gonzalez-Julian, P., Carapia-Ruiz, V. E., Munoz-Viveros, A. L., Castaneda-Garcia, C. N. 2013. Registro de la mosca blanca del Ficus *Singhiella simplex* (Singh, 1931) (Hemiptera: Aleyrodidae), en Mexico. Entomologia Mexicana 12, 2: 1488-1493.
- Jensen, A. S. 2001. A cladistics analysis of *Dialeurodes*, *Massilleurodes* and *Singhiella*, with notes and keys to the Nearctic species and descriptions of four new *Massilleurodes* species (Hemiptera: Aleyrodidae). Systematic Entomology 26: 279-310.
- Johnson, C., Booth, R. G. 2004. *Luperomorpha xanthodera* (Fairmaire): a new British flea beetle (Chrysomelidae) on Garden Centre Roses. The Coleopterist 13, 4: 81-86.
- Ko, C. C., Shih, Y., T., Schmidt, S., Polaszek, A. 2015. A new species of *Encarsia* (Hymenoptera, Aphelinidae) developing on ficus whitefly *Singhiella simplex* (Hemiptera, Aleyrodidae) in China and Taiwan. Journal of Hymenoptera Research 46: 85-90.
- Kozłowski, M. W., Legutowska, H. 2014. The invasive flea beetle *Luperomorpha xanthodera* (Coleoptera: Chrysomelidae: Alticinae), potentially noxious to ornamental plants – first record in Poland. Journal of Plant Protection Research 54, 1: 106-107.
- Laudani, F., Giunti, G., Zimbalatti, Campolo, O., Palmeri, V. 2019. *Singhiella simplex* (Singh) (Hemiptera: Aleyrodidae), a new aleyrodid species for Italy causing damage on *Ficus*. Bulletin OEPP/EPPO Bulletin 0, 0: 1-3.
- Martin J. H. 1987. An identification guide to common whitefly pest species of the world (Homoptera, Aleyrodidae). Tropical Pest Management 33, 4: 298-322.
- Mirab-balou, M., Tong, X., Feng, J., Chen, X. 2011. Thrips (Insecta: Thysanoptera) of China. Check List 7, 6: 720-744.
- Mound, L. A., Kibby, G. 1998. Thysanoptera. An Identification Guide. 2nd edition. Wallingford, UK, CAB International, 70 pp.
- OEPP/EPPO 2017. Diagnostics *Epitrix cucumeris*, *Epitrix papa*, *Epitrix subcrinita*, *Epitrix tuberosa*. PM 7/109 (2). Bulletin OEPP/EPPO Bulletin 47: 10-17.
- Radonjić, S., Hrnčić, S. 2017. A Review of New Alien Arthropod Pests and their Impact on Agriculture Crops in Montenegro. Acta zool. Bulg., 9: 203-210.
- 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.
- Ramos, F., Montilla, R., Escalona, E., Sandoval, E. 2015. La mosca blanca *Singhiella simplex* (Singh, 1931) (Hemiptera: Aleyrodidae) en Venezuela. *Entomotropica*, 30, 25: 236-238.
- Seljak, G. 2018. Kaj vemo o favni ščitkarjev (moljevki) Slovenije (Hemiptera, Sternorrhyncha, Aleyrodidae)? Peti slovenski entomološki simpozij z mednarodno udeležbo, Maribor, 2018, Knjiga povzetkov: 26.
- Suh, S. J., Evans, G. A., Oh, S. M. 2008. A checklist of intercepted whiteflies (Hemiptera: Aleyrodidae) at the Republic of Korea ports of entry. *Journal of Asia-Pacific Entomology* 11: 37-43.
- 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* 17, 6: 523-538.
- Šimala, M., Pintar, M., Masten Milek, T., Novak, A., Ivić, D., Džoić, D. 2020. Ružin buhač [*Luperomorpha xanthodera* (Fairmaire, 1888)] – novi invazivni štetnik ukrasnog bilja u Hrvatskoj. *Glasilo biljne zaštite* 20, 4: 484-491.
- Šimala, M., Pintar, M., Masten Milek, T. 2020 a. Intercepcija fikusovog štitastog moljca [*Singhiella simplex* (Singh, 1931)] u Hrvatskoj. *Glasilo biljne zaštite* 20, 5: 540-547.
- Wang., Z., Mound, L. A., Tong, X. 2019. Character state variation within *Dendrothrips* (Thysanoptera: Thripidae) with a revision of the species from China. *Zootaxa* 4590, 2: 231-248.
- Warchalowski, A. 2003. Chrysomelidae. The leaf-beetles of Europe and the Mediterranean area. *Natura optima dux Foundation, Warsaw, PL: 600 pp.*
- Watson, G. W., Chandler, L. R. 1999. Identification of Mealybugs important in the Caribbean Region with notes on preparation of whitefly pupae for identification. *Commonwealth Science Council and CAB International: 40 pp.*
- Yükselbaba U., Topakcı N., Göçmen H. 2017. A new record of Turkey Aleyrodidae fauna, ficus whitefly *Singhiella simplex*(Singh) (Hemiptera: Aleyrodidae). *Phytoparasitica* 45, 5: 715-717.
- Zur Strassen, R. 2003. Die terebranten Thysanopteren Europas und des Mittelmeer-Gebietes. *Goecke & Evers, Keltern, Deutschland: 277 pp.*