

SPREAD RATE OF ACERIA PYRACANTHI IN SLOVAKIA IN THE PERIOD 2006–2018

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Scarlet firethorn (*Pyracantha coccinea* M. Roem) is an ornamental shrub, non-native in the conditions of Slovakia. It can endure urban environment, which is why it is used intensively in landscaping. In 2006, *Aceria pyracanthi*, a spider mite damaging firethorns, was discovered in the Botanical Garden of the Slovak Agricultural University in Nitra. After 12 years from its first record we tried to summarize its distribution and spread rate in Slovakia. Data were gained through a field work and through citizen scientists. In total, *A. pyracanthi* was observed in 9 localities. It can be concluded that *A. pyracanthi* can damage firethorn plants in all climatic regions where firethorns can thrive. A commercial plant sale can be considered the main vector for the spread of *A. pyracanthi*.

Keywords: Aceria pyracanthi, insect pest, invasive species, urban greenery

1 Introduction

The eriophyids are among the most important plantfeeding mites, causing damage to wild and cultivated plants. Although they are the most numerous of the plant-feeding mites, only 1859 species are known at present (Davis et al., 1982) Eriophyoid mites are obligatory phytophagous organisms and are well adapted to living on plants. Since eriophyoid mites are of great economic importance, both as pests and candidates for biological control of weeds, the need for understanding the ecological and evolutionary patterns of their host specialization is obvious (Lindquist et Oldfield 1996). The galling eriophyoids constitute a highly specialized phytophagous group capable of inducing modifications in plant tissues by cellular hyperplasia and hypertrophy (Nasareen and Ramani, 2014). Csóka (1997) mentioned 500 species of mites which cause galls. Previous studies (Keifer et al., 1982; Lindquist and Oldfield, 1996; Skoracka, 2006; Nasareen and Ramani, 2014; Araújo and Kollár, 2019) demonstrated a high specialization of eriophyoids on host plants. Araújo and Kollár (2019) observed that 74% of mite species were recorded on a single host plant species (i.e. monophagous species), which is also the case of Aceria pyracanti (G. Canestrini, 1891). A total of 900 species are known from the genus Aceria Keifer, 1944 (Fam. Eriophyidae) (Amrine et al., 2003). A. pyracanthi is a spider mite and there is only a few data about its distribution and ecology (Amrine et al., 1994; Kollár, 2011; Kollár and Donoval, 2013). A. pyracanthi is present in Hungary (Ripka, 2010), Croatia, Bosnia and Herzegovina, Italy (Amrine et al., 1994) and Slovakia (Kollár, 2011; Kollár and Donoval, 2013). A. pyracanthi causes carmine erineum especially on the underside of the leaves of Pyracantha coccinea (Ripka, 2010), but it can also appear on the upper side of the leaves (Kollár and Donoval, 2013). Pyracantha coccinea is distributed especially in North, Central and South Anatolia in Turkey and South Europe, Crimea, Caucasia, North-West Iran in the world; Wild in Turkey, especially near the Black Sea Coast; also cultivated for its ornamental berries (Akguc et al., 2010). P. coccinea is a naturalised neophyte in the conditions of Slovakia and its current status is a frequently spreading neophyte (Reháčková, 2009).

In our research we cooperated with citizen scientists. The use of citizen scientists in entomology has a long tradition in Hungary (Vig and Szél, 2010) and in many other places in the world as well (e.g. Gaedike, 1955; Allen, 1959; Eliáš, 2014). In recent years, Internet platforms and social media are playing larger roles in studies of insects (e.g. Walther and Kampen, 2017; Le Feon et al., 2016; Bakay and Kollár, 2018). In contrast, the role of the citizen scientist in acarological studies is relatively *minor*. Mites are small and not easy to notice

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on plants, in the soil or on animal hosts (Kontschán et al., 2019). In the case of *A. pyracanthi* it is different, because they create visible plant galls on the leaves of the firethorn, which are hard to misidentify (Kollár and Donoval, 2013).

Our aim was to analyse the distribution of this nonnative insect pest in Slovakia and identify possible vectors, which lead to the spreading of this species.

2 Material and methods

The monitoring of *A. pyracanthi* distribution in Slovakia was carried out with the help of questionnaires addressed to landscape architects and horticulturists (mostly Alumni students from the Slovak University of Agriculture), citizen scientists and through field observations in the years 2006–2018. The questionnaire contained detailed descriptions and photos of *A. pyracanthi* and its symptoms on *P. coccinea*. For the dissemination of the questionnaire we used Facebook. The questionnaire was posted on the page Zelovoc Laca Bakaya, which is a page for plant enthusiasts (1,002 likes, 1,050 followers, and max. organic reach around 10,000 profiles). The respondents confirmed the presence or absence on the locality and attached pictures, where it was possible to clearly identify *A. pyracanthi*. Doubtful data were not considered and such localities were visited to ensure the presence of this insect pest.

3 Results and discussion

In total, *A. pyracanthi* was detected in 9 localities in Slovakia (Figure 1) The first occurrence of *A. pyracanthi* in Slovakia was recorded in the locality of Nitra (faunistic square (dfs): 7674d, 7674c; 48.3058972 N, 18.0962242 E) in the Botanical Garden of the Slovak University of Agriculture in 2006 (Kollár and Donoval, 2013). All the plants in the Botanical Garden were infested. Now, *A. pyracanthi* can be found in all city parts. It can be assumed that *A. pyracanthi* spread from this place into the other parts of Nitra.

In Žilina (dfs: 6778c; 49.2261622 N, 18.7460217 E), infested plants of *P. coccinea* were present in an



Figurere 1: Distribution of Aceria pyracanthi in Slovakia marked with black squares

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ornamental plant nursery in 2018. The infested plants were imported from the Czech Republic.

At the locality of Banka (dfs: 7473a; 48.5758694 N, 17.8394644 E), we found infestation of *A. pyracanthi* on older plants of *P. coccinea* in 2016. *A. pyracanthi* was observed on a firethorn hedge in a private garden by a citizen scientist, who sent us pictures of the monitored insect pest. The determination was correct. We visited the locality every year and *A. pyracanthi* was still present even though the owner applied acaricides several times.

In Bratislava (dfs: 7868d; 48.1332442N, 17.1085628E), we found infestation on a newly planted *P. coccinea* near the shopping centre Aupark in 2018.

Heavily infested plants of *P. coccinea* with *A. pyracanthi* were found in Levice (dfs: 7777d; 48.2157717 N, 18.6036822 E) in 2016. Firethorns grow in the city park in the understorey of trees.

During the survey of the Tovarníky park near Topoľčany (dfs: 7474b; 48.5674056N, 18.1469983E) we detected *A. pyracanthi* all around the park on firethorns in 2017.

In Malé Leváre (dfs: 7467d, 48.5032406N, 16.9694336E), we identified *A. pyracanthi* on a firethorn hedge in a private garden of a citizen scientist in 2018, who sent us pictures of the monitored insect pest. The determination was correct.

In Palárikovo (dfs: 7974c; 48.0401944N, 18.0746111E), we identified *A. pyracanthi* on a single firethorn plant in a private garden of a citizen scientist in 2018, who sent us pictures of the monitored insect pest.

The data did not show a pattern in the distribution of *A. pyracanthi* in Slovakia according to climatic regions. As Némethy (2019) mentions in her article, *A. pyracanthi* could spread with the help of commercial plant sale, which is also the case in Slovakia. The questionnaire on Facebook had 75 shares and an organic reach of 10,300 profiles. We received 6 messages with correct identification of the monitored insect pest with new data in localities. With the help of citizen scientists we confirmed the presence of *A. pyracanthi* at the following localities: Bratislava, Malé Leváre and Palárikovo. Our results were similar to the findings by Kontschán et al. (2019).

4 Conclusion

A. pyracanthi is a non-native insect pest on a nonnative ornamental shrub *P. coccinea*, which is widely used in landscaping in the conditions of Slovakia. This spider mite is very data deficient, and there is a lack of information on its biology, origin and distribution. A. pyracanthi causes carmine erineum on leaves and lowers the overall aesthetical value of the plant. It is present in Slovakia in 9 localities: Nitra, Topolčany, Levice, Žilina, Malé Leváre. A. pyracanthi has been present in Slovakia since 2006 and its main vector is probably a plant trade. A. pyracanthi can survive in Slovakia wherever firethorns can withstand the climate conditions. A part of the data (33%) was gained with the help of citizen scientists. This result highlights the possibilities of social media in the field of entomology, especially in monitoring of non-native or invasive insect species.

Acknowledgements

This research was supported by the Cultural and Educational Grant Agency (KEGA), project no. 003SPU-4/2017 "Development and implementation of the standards for urban greenery management".

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