First Report: *Phloeotribus scarabaeoides* (Bernard, 1788) in Czech Republic - could the new lifestyle of the population cause the spread of another bark beetle to Central Europe?

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Case Report

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Abstract

In IV. 2023 in Ždánice, South Moravia, Czech Republic, material of small stems of *Olea europaea* with *Phloetribus scarabaeoides* infestation was found. In VI.2023, 253 specimens of 80 cm long stems with a diameter of 8 cm were found in the laboratory. The basic dimensions of the gallery systems were found.

Context

Spread and possible invasion of bark beetles species represent a serious problem in forestry and the ecological stability of forest ecosystems in individual countries (Pimentel et al. 2005; Ruiz and Lanfranco 2008). Most bark beetles spread through global trade, where there is a large-scale movement of materials and goods, which bring invasive bark beetles to other continents or unoccupied regions (Westphal et al. 2008; Hulme 2009). From there, they can spread through their flight activity and thus occupy new territories (see Marchioro and Faccoli 2022; Kašák et al. 2023; Saurat et al. 2023; Fiala et al. 2024,). Some bark beetle species are spreading due to climate change, when they gradually spread from south to north (see Fiala and Holuša 2019; Martinek et al. 2024). There is also a significant proportion of introductions of non-native tree species to new areas, where these tree species "bring" their bark beetles with them, which can then adapt to other native tree species in the area (Lantschner et al. 2017).

Phloeotribus scarabaeoides (Bernard, 1788) is a serious pest of Olive tree (*Olea europea*) in the olive tree range i.e. the Mediterranean region (Gonzalez and Campos 1994). However, it can also attack other trees in the Oleaceae family, such as *Fraxinus* spp. or *Syringa vulgaris* L. (Bright and Skidmore 1997). *P. scarabaeoides* is abundant throughout southern Europe (Bulgaria, Croatia, France, Greece, Italy, Malta, Portugal, Spain and Switzerland), in North Africa (Algeria, Canary Islands, Egypt, Libya, Morocco and Tunisia) and the Middle East (Cyprus, Iran, Iraq, Israel, Jordan, Lebanon, Syria and Turkey) (Alonso-Zarazaga et al. 2023), with its northernmost range extending to Hungary (Podlussány et al. 2019). In Europe, it is invasive in Great Britain (Wichmann 1955) and has been introduced to the USA (Arekalian 2017) and Uruguay (Leoni et al. 2013).

This article reports a new occurrence of the *P. scarabaeoides* in the Czech Republic, which was introduced here through the trade in European olive trees (*Olea europaea*).

Material and methods

Material. On 9.IV.2023, in the premises of an unnamed company in Ždánice (49°4'2.597"N, 17°1'38.866"E, 220 m a.s.l.) (at the request of the company, name not disclosed, company dealing with the import of olive trees and olive wood cuttings to the Czech Republic) we found piles of crumbs on the surface of a cut short trunk with a diameter of 7 cm of *O. europaea* when purchasing a tree. 4 cutouts with a length of 12–18 cm were cut from the trunk, which we then placed in a photoeclectors, which were stored in a laboratory at room temperature of 18–20°C. Totally 253 imagos (Fig. 1) were collected from 10.VI to

20.VII.2023. Subsequently, the short logs were debarked and the species' gallery system was briefly described based on the examination of 25 gallery systems.

Results and discussion

In the municipality of Ždánice in South Moravia, the non-native bark beetle *Phloeotribus scarabaeoides* was found on imported *O. europaea* trees in 2023. A total of 253 individuals were hatched in photoelectric cells. This corresponds to a population of approx. 320 adults per 80 cm long trunk with a diameter of 7–8 cm. The studied gallery systems of *Phloeotribus scarabaeoides* consisted of two transverse (or slightly inclined to the longitudinal axis of the stem) opposing egg galleries originating from a very short mating chamber (Fig. 2). The egg galleries were 6–28 mm (n = 20, mean ± standard error = 19.38 ± 6.75 mm) and 0.9–1.6 mm wide (n = 20, mean ± standard error = 1.23 ± 0.27 mm). The larval passages were longitudinal (only those that ended with a pupal cradle were measured), straight only slightly curved with a length of 26–40 mm (n = 20, mean ± standard error = 32.61 ± 5.05 mm). Larval galleries were very densely distributed along the egg galleries with a density of approximately 9–12 galleries on the egg corridor side. The density of exit holes was up to 42 per 10 cm^2 (Fig. 3).

The Olive tree is a native species in the Mediterranean hardwood biome, its northernmost range reaching the foothills of the Alps in northern Italy (Guerrero Maldonado 2016). Olive trees are a non-native species in the Czech Republic, which is grown only in the warmest areas of the country (Křesadlová et al. 2015). The biggest stressor for the olive tree here is winter (frost), which it does not tolerate (Petruccelli et al. 2022). However, as a result of climate change, when there is practically no snow in the warmest areas in winter and temperatures do not drop below freezing, the chances of survival are significantly increasing. Many residents buy olive trees for summer gardens in pots and move them to insulated spaces for the winter (Fig. 4a). Olive trees can also indicate a higher social status of residents and people may buy them more often. It is already a common ornamental tree in areas of South Moravia (Fig. 4a,b). This behavior may contribute to the spread of non-native bark beetle species.

The finding and subsequent survey of the surroundings did not confirm the establishment of the species, the species was not found on other *Olea europea* in the store or on surrounding trees in the built-up areas of the nearest municipalities - Ždánice town, Uhřice village, Žarošice village etc. This is therefore the first finding. For owners of *Olea europea* trees, it is important to pay attention to the health of the trees, especially after successful overwintering, i.e. remove any dead branches and twigs that could be attractive to the species.

P. scarabeoides has the potential to attack native species in the region, e.g. is a pest of ash trees and therefore a potential threat to native species *Fraxinus excelsior* or *Fraxinus angustifolia* in the floodplain forests of the south-east of the Czech Republic, and in the parks for *Syringa vulgaris.* A survey of the nearest trees and parks to the site of discovery did not reveal the spread and infestation of other trees, especially *Fraxinus* sp. or *Syringa* sp. The potential spread of *P.scarabaeiodes* in the wider area of the South Moravia region is particularly significant, especially the "transition" to the species *Fraxinus*

excelsior and *Fraxinus angustifolia*. *Fraxinus excelsior* is an important tree species in the hilly areas of the Czech Republic with a representation of 4.6% (Ministry of Agriculture 2025), and especially in the natural forest area No.35 Jihomoravské úvaly, where *Fraxinus excelsior* and *F. angustifolia* occur with varying representation on an area of approximately 16,000 ha (Šrámek 2020), and in Natural forest area No.36 - Středomoravské Karpaty Mts. (here lies the site of discovery) *Fraxinus excelsior* occurs on an area of approximately 400 ha (Sekanina 2000). Also with regard to the significant weakening of *F. excelsior* and *F. angustifolia* stands, since bark beetles play a significant role in ash dieback, which has affected the area of interest in the last years (Havrdová 2016).

Similarly, increased imports of the non-native species Austrian pine (*Pinus nigra*) have also brought its bark beetles, *Pityogenes bistridentatus* Eichhoff, 1878 and *Orthotomicus robustus* Knotek, 1899 (Knížek and Mertelík 2017; Fiala 2019). Increased imports of non-native species will lead to more frequent introductions of non-native bark beetles.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

Author Contribution

OH, KH formally analyzed data. OH, TF and JH wrote manuscript. TF, OH, and KH wrote manuscript after reviews. The authors read and approved the final manuscript.

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Figures

Figure 1

Imago of Phloeotribus scarabaeoides, Dorsal view (a), lateral view (b), lenght 2.2 mm (photo. J. Lahoda)

Figure 2

Gallery system on the trunk of Olea europaea after debarking (photo O. Holuša)

Figure 3

Exit holes on the surface of trunk of Olea europaea (photo O. Holuša)

Figure 4

(a) Ždánice village – low trees in flowerpots near a restaurant in the village of Střílky, Kroměříž district; (b) Uhřice village, Hodonín district – Olea europaea tree planted (year-round) in the garden in Uhřice, Czech Republic (photo O. Holuša)