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REVIEW OF THE HUNGARIAN LITERATURE AND NEW DATA OF *GEMMINA GEMMARUM* AND *LOPHODERMIUM FOLIICOLA*: TWO LITTLE-KNOWN ASCOMYCOTA SPECIES

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Abstract

Our study aimed to expand the data available about two little-known species of Ascomycota in Hungary. The data were collected from 2015 to 2023. The samples collected in the field were identified by using determinantal books and a light microscope. One of the species examined on poplars was *Gemmina gemmarum*. We present five new records of it from several parts of the country, in each case accurately identifying the Populus species on whose decaying bud scales the fungus appeared. The other species we studied was the *Lophodermium foliicola*, about which, in addition to new data, we report its appearance on the leaves of *Pyrus pyraster* as a new result. We also observed that the species prefers the leaves of *Crataegus laevigata* among the hawthorns. For each species, we carried out precise substrate identification and described the type of habitat of the collection sites according to the ÁNÉR, thus expanding the knowledge of the distribution and substrate preference of Hungarian Ascomycota species.

Keywords: *Ascomycota, Crataegus laevigata, Gemmina gemmarum, leaf, bud scale*

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Absztrakt

Munkánk során két kevésbé ismert magyarországi tömlősgombafaj adatait bővítettük. Az adatok 2015 és 2023 közöttiek. A terepen begyűjtött mintákat határozókönyvek és fénymikroszkóp segítségével azonosítottuk. Az egyik faj a nyár nemzetségen élő *Gemmina gemmarum*, melynek öt új adatát közöljük az ország több pontjáról, minden esetben pontosan megjelölve azt a *Popolus* fajt, melynek korhadó rügypikkelyén a gomba megjelent. A másik bemutatott fajunk a *Lophodermium foliicola*, melyről új adatok mellett új eredményként közöljük a *Pyrus pyraster* levelén való megjelenését. Azt is megfigyeltük, hogy ez a gombafaj a *Crataegus laevigata* leveleit kedveli jobban a galagonyák közül. A fajoknál pontos szubsztrátummegjelölést végeztünk, valamint az ÁNÉR szerint leírtuk a gyűjtési helyek élőhelyének típusát, bővítve ezzel hazánk tömlősgombafajainak elterjedési ismereteit és szubsztrátumpreferenciáját.

Kulcsszavak: *tömlősgomba, Crataegus laevigata, Gemmina gemmarum, levél, rügypikkely*

Introduction

Research of occurrence of Ascomycota in Hungary was mainly significant in the 20th century. As a result, the Review of the Mycoflora of Hungary article series was created, in which the fungal species detected in Hungary were summarized (Ubrizsy 1967a, 1967b, 1967c, 1968a, 1968b, 1968c, Vörös 1969, Vörös & Léránth 1969, 1970a, 1970b, 1972, 1974a, 1974b). This work have contributed with other publications to create the microscopic fungi determinate of Bánhegyi et al (1985). This included fungal species detected in Hungary, and also species which have not collected in Hungary but in other countries. *Gemmina gemmarum* (Boud.) Raitv., 2004 is such a species, which had one data from Vértes Mountain of Hungary (Koszka, 2020) before we have started studying them.

According to the definition of Bánhegyi et al (1985), *Lophodermium foliicola* (Fr.) P.F. Cannon & Minter, 1983 (Ascomycota: Rhytismataceae) lives on the leaves of *Berberis vulgaris* L., 1753 and *Crataegus* species. Hollós (1913) found it in the vicinity of Kecskemét on *B. vulgaris* and *Crataegus monogyna* Jacq., 1775, and has also described it on *P. communis* from Nagy-Bükk near Szekszárd. Moesz (1942) gives his data on Hármashatárhegy and Csillebérc from the genus *Crataegus*. These researchers refer to the species as a synonym, *Lophodermium hysterioides* (Pers.) Sacc., 1883. Among these forms are *L. hysteroides f. crategi* living in the genus *Crataegus* and *L. hysteroides f. piri* appearing on leaves of the genus *Pyrus* (GBIF 2022).

The aim of our study is to review the Hungarian literature and provide new data about *G. gemmarum* and *L. foliicola*, regarding their occurrence and the substrates they could be detected.

Material and methods

We eximined several *Popolus* plantations during the spring of 2023. During collections, we researched the H level of soil, where the parts of plants were rotted or partially rotted. We use the name of plant communities based on ÁNÉR (2011), and also the name of fungal species based on Mycobank Database. For the determination of the collected samples we used LOMO MBC-10 and Olympus SZX12 stereomicroscopes and Bresser Researcher Bino light microscope. The determination was based on the description of Bánhegyi et al. (1985). Photos were taken by an Olympus EP50 camera. We placed fungarium specimens in the natural science laboratory of the Északi ASzC Mátra Forestry Technikum and College in Mátrafüred.

Results and discussion

G. gemmarum is a fungal species belonging to the genus Ascomycota, family *Hyaloscyphaceae* (Mycobank database). According to the literature, this fungal species lives on fallen, rotting and overwintered bud scales of the genus *Populus* (Bánhegyi et al. 1985). It has a fruiting body and a cup-shaped apothecium, of which has a diameter of 0.3-1.5 mm, its colour is white or grayish-white, and it is covered with fluff (Figure 1.) (Bánhegyi et al 1985, Koszka 2020).

Figure 1. *G. gemmarum on P.* × *euramericana* rügypikkely

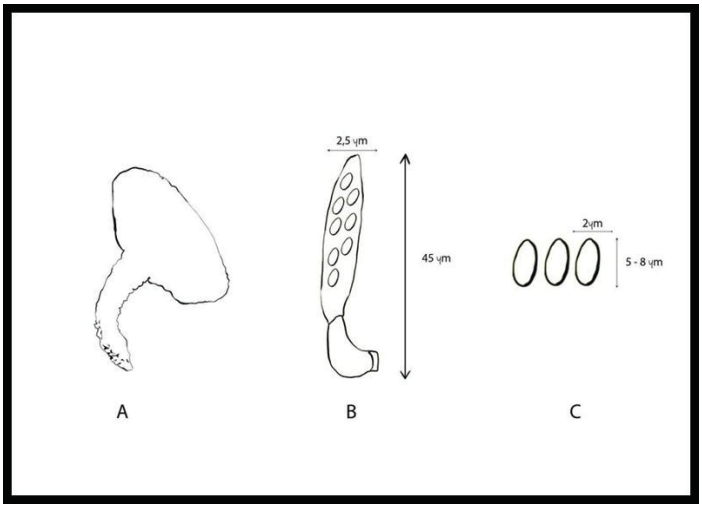

Figure 2. A: Apothecium, B: Ascus, C: Spores

The size of the asci are 45—50 × 2—2.5 µ (Bánhegyi et al. 1985), the spores are elliptical, 5.5—8 × 2—3 µ size (Figure 2.), apex of asci shows a blue reaction to iodine (Bánhegyi et al. 1985, Koszka, 2020). For the first time, in the Hungarian literature, Bánhegyi et al. (1985) reported their adverbial keys without data about their occurrence. Koszka (2020) reports the only Hungarian data from the Vértes Mountains, specifying the genus *Populus* as its substrate. The new data we provided are presented in Table 1.

Sampling sites	Date	Substrates	Habitats (ÁNÉR)	Collectors
Kelemér, besides Keleméri-brook	24. 02. 2015.	*Populus nigra* L., 1753 overwinterd, falled bud	Native narrow tree lines with *P. nigra*	Szilvásy Edit
Nagyréde, 8B forest section	26. 03. 2023.	*P.* × *euramericana* (Dode) Guinier ex Piccaroli, 1953 overwinterd bud and falled leaves	*P.* × *euramericana* plantation	Dredor Dominik Szmatona-Túri Tünde
Nagyrédei crossroads	26. 03. 2023.	*P. euramericana* overwinterd, falled bud	*Salix alba* plantation with *P. euramericana*	Dredor Dominik Szmatona-Túri Tünde
Gödöllő, mogyoródi crossroads	31. 03. 2023.	*P. tremula* L., 1753 overwinterd, falled bud	*Robinia pseudoacacia* plantation with *P. tremula*	Dredor Dominik Szmatona-Túri Tünde
Balatonfüred, Tihanyi road	31. 03. 2023.	*P. tremula* overwinterd, falled bud	*S. alba* plantation with *P. euramericana*	Dredor Dominik Szmatona-Túri Tünde

Table 1. Sampling sites, date of collection, substrates, habitats (ÁNÉR) and collectors of *G. gemmarum*

It can be seen from our results that the species *G. gemmarum* lives in several places in Hungary, and we can report on additional new occurrences by examining the *Populus* populations. We have shown that in addition to bud scales *G. gemmarum* rarely appears on rotting leaves too (there was only one example).

In our work, we reported the occurrence for the first time of the species *G. gemmarum* in Hungary with an accurate substrate description. The previous lileratures only included the name of the genus. We can conclude from the varied habitats, that the species does not depend on an association or special conditions, the presence of the rotted bud scales and leaf of poplars (*Populus* spp.) is enough for its appearance. The *G. gemmarum* was collected from three species of the genus Popolus (*P. nigra*, *P.* × *euramericana*, *P. tremula*).

Another species examined in our work was *L. foliicola*, the collection results of which are shown in Table 2. The fruiting body of this species is the apothecium, wich is 1 × 0,5 mm, black and oval-shaped with a long fissue in the middle. The size of the ascii is 80—100 × 9—10 µ, and the size of the spores is 60—70 × 1,5 µ (Bánhegyi et al., 1985).

Sampling sites	Date	Substrates	Habitats (ÁNÉR)	Collectors
Mátrafüred, Mátra Szakképző Iskola, next to lake	13. 03. 2023.	*Crataegus laevigata* (Poir.) DC. 1825.	Wet and mesic pioneer scrub	Dredor Dominik Szmatona-Túri Tünde
Gyöngyössolymos, Csepegő-headspring	23. 03. 2023.	*C. laevigata*	*Quercus cerris-Quercus petraea* forests	Dredor Dominik Szmatona-Túri Tünde
Veszprém, abandoned fruit plantation and border shrub of pionier forest	31. 03. 2023.	*C. laevigata*	Dry and semi-dry pioneer scrub x Scattered trees or narrow tree lines of non-native trees (*Gleditsia triacanthos* L. 1753) x Scattered native trees or narrow tree lines (*Malus domestica* (Suckow) Borkh. 1803	Dredor Dominik Szmatona-Túri Tünde
Gyöngyössolymos, Kis-hill	06. 04. 2023.	*Pyrus pyraster* (L.) Burgsd. 1787	*Quercus cerris-Quercus petraea* forests	Dredor Dominik Szmatona-Túri Tünde
Gyöngyöstarján, Köves-tető	09. 04. 2023.	*P. pyraster*	Dry and semi-dry pioneer scrub	Dredor Dominik Szmatona-Túri Tünde
Gyöngyöstarján, border shrub next to Jutka-tanya	09. 04. 2023.	*P. pyraster*	Dry and semi-dry pioneer scrub	Dredor Dominik Szmatona-Túri Tünde
Gyöngyöspata, black pine plantation	09. 04. 2023.	*P. pyraster* *C. laevigata*	Scots and black pine plantations	Dredor Dominik Szmatona-Túri Tünde
Szurdokpüspöki, forest next to diatomaceous earth mine	09. 04. 2023.	*C. laevigata*, *Crataegus monogyna* Jacq. 1775 és *P. pyraster*	Dry and semi-dry pioneer scrub	Dredor Dominik Szmatona-Túri Tünde
Gyöngyös, crossroad of Dr. Harrer Ferenc Street and Gólya Street	09. 04. 2023.	*Berberis vulgaris* L. 1753	Cities, areas with blocks of flats	Dredor Dominik Szmatona-Túri Tünde
Gyöngyöstarján, Köves-tető	10. 04. 2023.	*C. laevigata*	Dry and semi-dry pioneer scrub	Dredor Dominik Szmatona-Túri Tünde
Tar, next to Alsó-csevice	10. 04. 2023.	*C. laevigata*	*Quercus cerris-Quercus petraea* forests	Dredor Dominik Szmatona-Túri Tünde
Mátrafüred, backyard of Mátra Szakképző Iskola	27. 04. 2023.	*P. pyraster*	Dry and semi-dry pioneer scrub	Dredor Dominik Szmatona-Túri Tünde

Table 2. Sampling sites, date of collection, substrates, habitats (ÁNÉR) and collectors of L. foliicola

Based on collected samples, it can be concluded that *L. foliicola* was most common on dry, decomposing leaves of *C. laevigata*, while it was found only once on *C. monogyna* and *B. vulgaris.* The appearance of *P. pyraster* as a substrate species is a new data, because it has

not have been mentioned yet in the Hungarian literature. We examined a similar amount of leaves from both *Crataegus* species, so it can be said that, the *L. foliicola* appeared mainly on *C. laevigata* among hawthorns and also appeared on leaves of *P. pyraster* (Figure 3.).

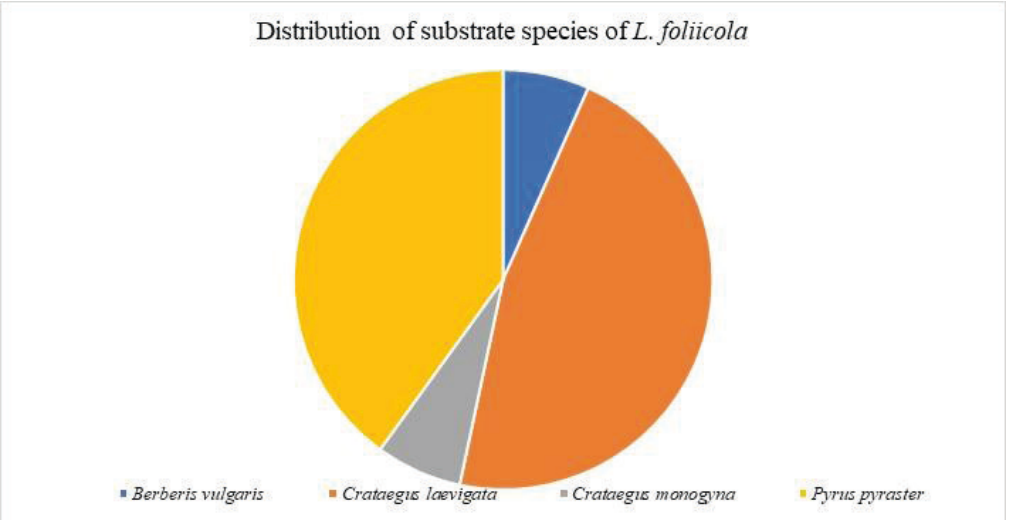

Figure 3. Distribution of substrate species of L. foliicola

During our work, we found both forms, which were already described in the last century from the country: this is *L. hysteroides f. piri* (Figure 4A.) living on the leaves of *Pyrus* and *L. hysteroides f. crategi* (Figure 4B.) living on *Crataegus* leaves. Due to the small appearance of *B. vulgaris* in Mátra, we could only examine one individual, this data does not represent its preference as a substrate under local conditions.

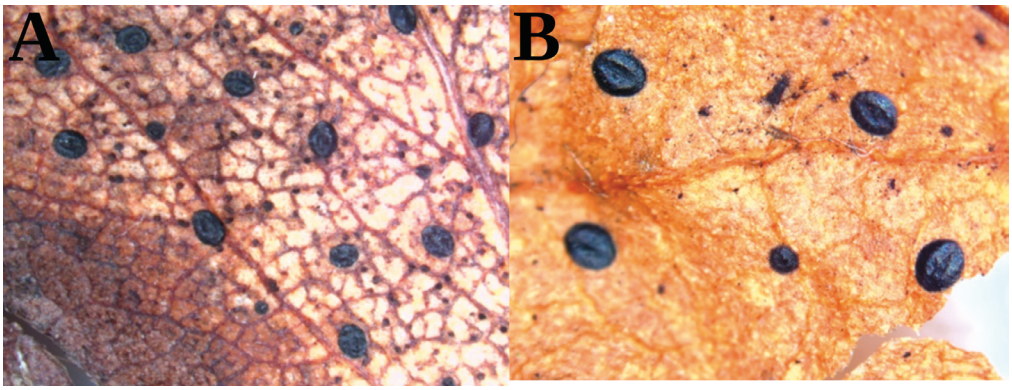

Figure 4. Substrates of L. foliicola A) L. foliicola on P. pyraster B) L. foliicola on C. laevigata

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