

**SORBUS PELSOENSIS (SORBUS SUBGENUS TORMARIA),
A NEW SPECIES FROM THE SURROUNDINGS OF
LAKE BALATON, HUNGARY**

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Abstract: A new triploid *Sorbus* species, *S. pelsoensis* is described in *Sorbus* subgenus *Tormaria* (*Sorbus latifolia* group) from Balaton Uplands (Hungary). Illustrations (photographs of the type specimen, leaves, and fruits) and a detailed distribution map are provided as well as photographs of in situ flowering and fruiting individuals. *S. pelsoensis* is a stenoendemic species putatively derived from hybridisation between *S. torminalis* and *S. graeca*. The species is restricted to two neighbouring valleys with about 100 individuals found in thermophilous oak woodlands (*Vicio sparsiflorae-Quercetum pubescentis*), pubescent oak shrub woodlands (*Cotino-Quercetum pubescentis*), mixed forests of rocky slopes (*Primulo veris-Tilietum platyphyllae*), mixed karstic forests (*Fago-Ornetum*), and at the light-rich margins of these plant communities, respectively.

Key words: endemic, Hungary, hybridisation, *Sorbus latifolia* agg., speciation, *Tormaria*

INTRODUCTION

Based on intensive field work and taxonomic research carried out in the recent years, several new *Sorbus* species have been described from the Bakony region (BARABITS 2007, NÉMETH 2007, 2009, 2012, SOMLYAY and SENNIKOV 2014), and the distributions of the existing *Tormaria* taxa have been clarified (NÉMETH 2006, 2013).

The Transdanubian Mountain Ranges, in particular the Bakony, Keszthely and Vértes Mts are particularly rich in *Sorbus* taxa derived through hybridisation between a member of *S. aria* agg. (subgen. *Aria* Pers.) and *S. torminalis* (L.) Crantz (subgen. *Torminaria* (DC.) C. Koch) resulting in apomictic species belonging to the nothosubgen. *Tormaria* Májovský et Bernátová (*S. latifolia* group). In contrast to these regions, the central and eastern parts of Balaton Uplands have been less studied for *Sorbus*, whilst the western area with its spectacular remnant basalt hills has been thoroughly explored (KÁRPÁTI 1960, NÉMETH 2014, SOMLYAY and SENNIKOV 2014).

Considering the localities of *S. balatonica* Kárp. listed by Kárpáti (1960), a distribution pattern is revealed that shows a conspicuously unusual disjunction with

a central coherent area and further isolated localities separated from the central block. A similar pattern is observed in the well-known case of *S. bakonyensis* (Jáv.) Kárp. (KÁRPÁTI 1960, BARABITS 2007). This type of geographical distribution is not typical for apomictic *Sorbus* endemics. In the case of *S. bakonyensis* this anomaly was resolved by describing some isolated populations as distinct species (*S. majeri* Barabits, *S. polgariana* Cs. Németh, *S. tobani* Cs. Németh), and by revising the names of formerly misidentified gatherings (revised as *S. danubialis* (Jáv.) Kárp. and *S. redliana* Kárp.) (BARABITS 2007, NÉMETH 2007, 2012). This kind of disjunction is also observed in the distribution of *S. balatonica* (KÁRPÁTI 1960) displaying a more or less continuous area in Keszthely Mts, Sümeg–Tapolca Range and Szent György Hill, as well as a separated site in the eastern parts of Balaton Uplands near the settlements Felsőörs and Lovas, 40–50 km distant from the well-defined central block. Although the similarity of these eastern plants to *S. balatonica* in the main area is undisputable, a meticulous study of this *Tormaria* population reveals conspicuous morphological differences not only from *S. balatonica* but also from all other known *Sorbus* taxa. Based on these differences a new species is described here and the name *S. pelsoensis* is introduced for this endemic whitebeam population.

MATERIAL AND METHODS

Field work, plant material

Herbarium materials for the description were collected between 2011 and 2014. Geographical coordinates and altitudes were determined using Garmin eTrex Legend GPS. The nomenclature of the plant communities follows the work of BORHIDI (2003). The corresponding part of the *Sorbus* collection housed in the Hungarian Natural History Museum (BP) was also examined. Type specimens are deposited in BP; however, all paratypes are stored in the private collection of the author. Leaf comparison of the taxa is based on the broadest leaves taken from the middle part of sterile shoots, as recommended *e. g.* by MEYER *et al.* (2005) or RICH *et al.* (2009).

RESULTS

Sorbus pelsoensis Cs. Németh, spec. nova (Figs 1–3, 6–7)

Synonymy: *S. balatonica* Kárp. in Feddes Repert. 1960, p. 290 in part.

Holotype: Hungary, Balaton Uplands, Felsőörs, Malom-völgy, 47.02010° N, 17.93321° E, 265 m, 03.06.2012, Cs. Németh no. HCsN 4342-1/2 (BP, accession number 739621) (Fig. 1).

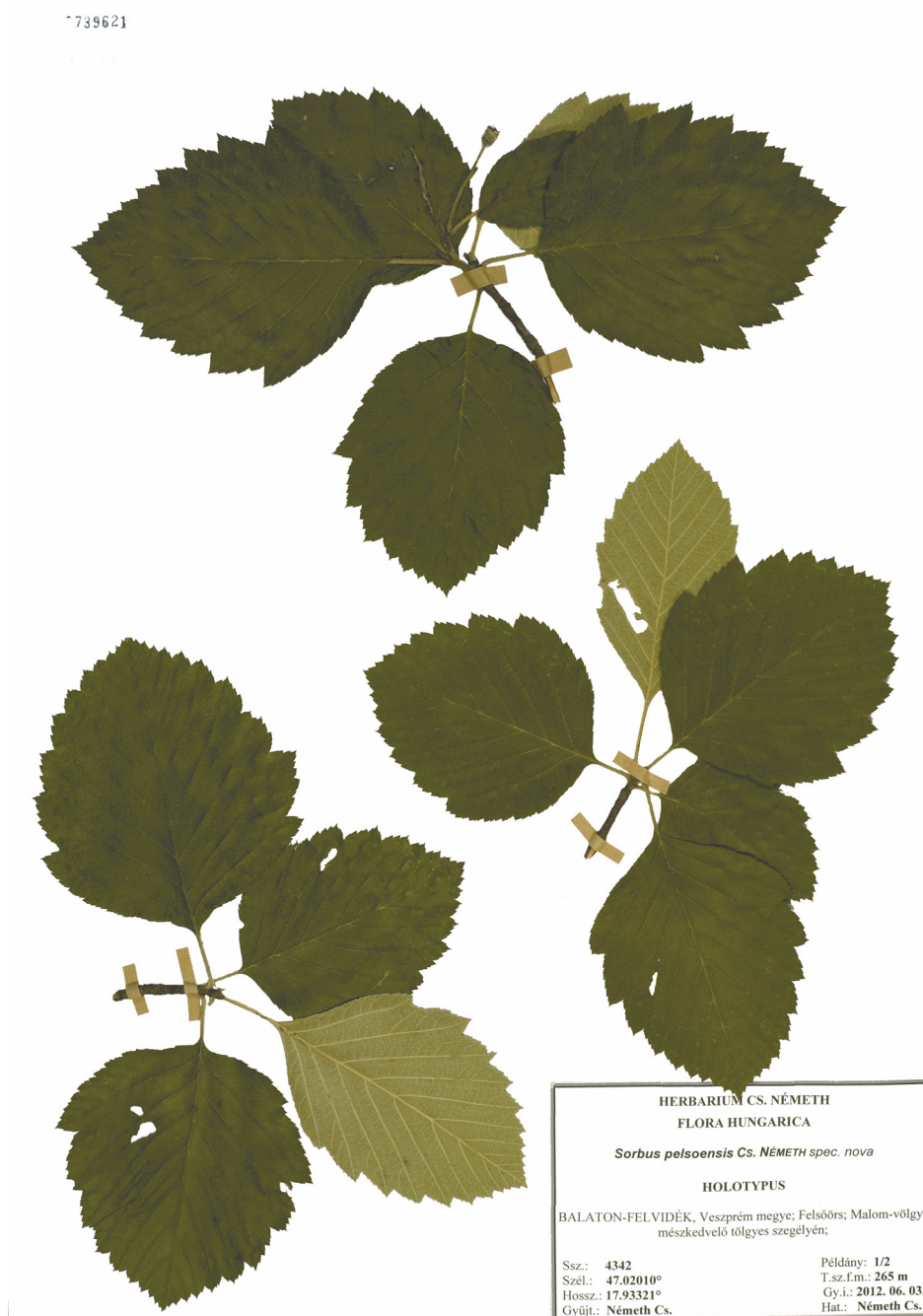


Fig. 1. The holotype of *Sorbus pelsoensis*.

Isotype: no. HCsN 4342-2/2 (BP, accession number 739622).

Paratypes: Felsőörs: Malom-völgy (Á. Boros, 09.09.1957, BP 432690, BP 432691 sub *S. balatonica*), (Cs. Németh, 26.06.2011, HCsN 3652/1, HCsN 3652/2, HCsN 3652/3, HCsN 3653/1, HCsN 3652/2, HCsN 3654; 24.7.2011, HCsN 3717, HCsN 3718, HCsN 3719, HCsN 3720/1, HCsN 3721, HCsN 3722, HCsN 3723/1, HCsN 3725/2, HCsN 3726/1, HCsN3 727/3, HCsN 3729, HCsN 3730, HCsN 3733, HCsN 3736; 03.06.2012, HCsN 4339, HCsN 4341, HCsN 4344, HCsN 4345, HCsN 4346; 22.9.2013, HCsN 5039, HCsN 5045, HCsN 5047, HCsN 5049, HCsN 5051, HCsN 5054; 26.07.2014, HCsN 5936, HCsN 5937, HCsN 5940, HCsN 5942, HCsN 5943, HCsN5944, HCsN 5945, HCsN 5949, HCsN 5950, HCsN 5951); Lovas: Király-kúti-völgy (Cs. Németh, 24.07.2011, HCsN 3739/1, HCsN 3740/1, HCsN 3741/2, HCsN 3742/3; 22.09.2013, HCsN 5056, HCsN 5058, HCsN 5059).

Description

Tree to at least 8 m. Bark of trunks grey. Buds ovoid, acute, pilose with white hairs on margins. Leaves simple, 7–10 cm long and 6.5–9 cm wide, widest in the lower part of lamina, upper surface dark green glossy with a convex surface between veins, lower surface greyish-green, texture relatively thin. Leaves from fertile shoots ovate to broadly ovate. Broad leaves of the middle part of short sterile shoots broadly ovate, orbicular-ovate, often as long as wide. Lobes of leaves from fertile shoots narrower and more acute, whilst leaves of sterile shoots have broader lobes with a more rounded outline. Apex shortly acuminate (rarely just acute), base broadly cuneate to rounded, shortly decurrent along petiole, number of lateral veins 9–10 on each lamina side. Length of the distal margin of the longest lobe (4–)5–7(–8) mm, margin serrate. Petiole 1.3–2 cm (Fig. 2). Sepals narrowly triangular, tomentose. Petals 6 mm × 4–5 mm, white. Anthers 20, cream-coloured. Styles 2, split to base (Fig. 7). Fruits with viable seeds globose or subglobose, 10–12 mm in diameter, orange-red to red at maturity, sparsely spotted with medium lenticels (Fig. 3), fruits with abortive seeds smaller and orange in colour. Flowering in May, fruits maturing in September and October.

Distinguishing from similar taxa

The convex leaf lamina between the lateral veins give *S. pelsoensis* a characteristic appearance and distinguishes it from other known native *Tormaria* taxa at first sight. This feature is recognizable when viewing the plants from a distance of a few metres (Fig. 6).

Sorbus pelsoensis is most similar to *S. balatonica* from the adjacent Keszthely Mts, southern Bakony and Szent György Hill. It slightly resembles *S. gayeriana* Kárp. growing in the Keszthely Mts and southern Bakony as well as *S. bakonyensis*,

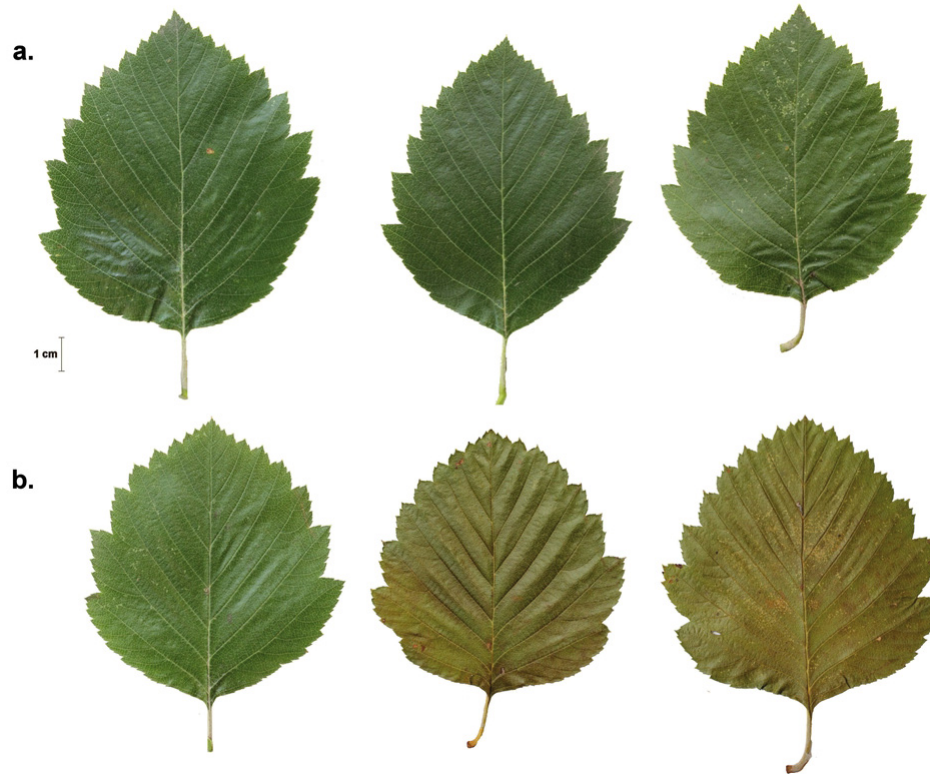


Fig. 2. Typical leaves of *Sorbus pelsoensis*; from fertile shoots (a); from sterile shoots (b).



Fig. 3. Mature fruits of *Sorbus pelsoensis* containing viable seeds.

a common endemic of the Keszthely Mts, southern Bakony and the basalt hills of the Tapolca Basin. In addition, it shows some resemblance with *S. majeri*, *S. polgariana*, and *S. tobani*, which were recently separated from the so-called “*S. bakonyensis*-group” (BARABITS 2007, NÉMETH 2007, 2012). From the above mentioned taxa, *S. bakonyensis* has the nearest occurrence (ca 20 km away at the valley Mina-völgy) to *S. pelsoensis* (NÉMETH 2013).

The main features distinguishing *S. pelsoensis* from similar *Tormaria* species of the surrounding areas are as follows (Fig. 4).

Sorbus balatonica has thicker leaf lamina; shorter (length of the distal margin of the longest lobe 3–5 mm), more acuminate lobes; whitish-grey, more densely hairy underneath; lobes more triangular in their outline.

Sorbus gayeriana has thicker leaves; broader, somewhat longer (length of the distal margin of the greatest lobe 6–10 mm), more acuminate lobes with sharper teeth; brownish, densely lenticelled fruits.

Sorbus bakonyensis (sensu BARABITS 2007 and NÉMETH 2013; *S. udvardyana* Somlyay et Sennikov sensu SOMLYAY and SENNIKOV 2014) has more rigid lamina; smaller, rhombic leaves with cuneate base not decurrent on the petiole; more finely and sharply acuminate lobes.

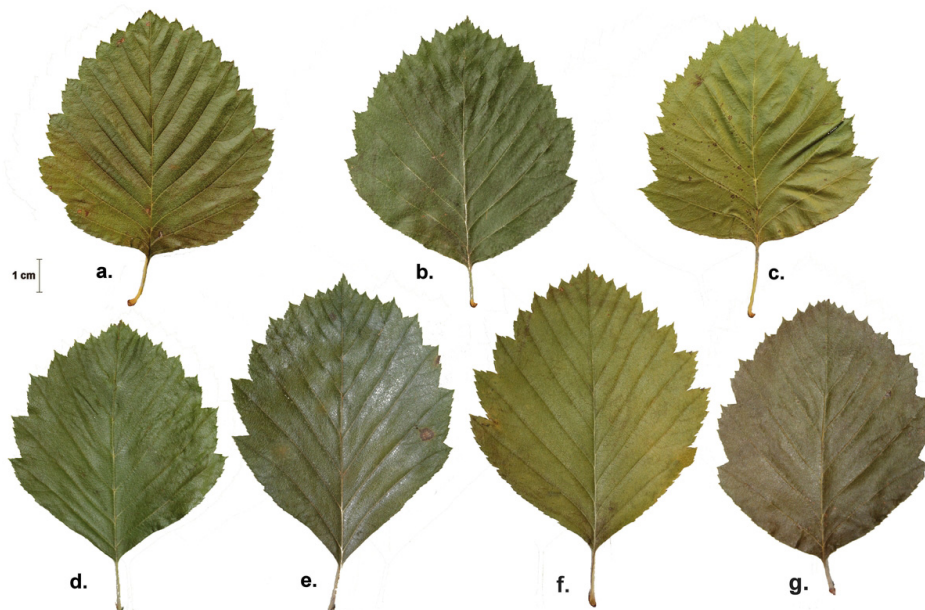


Fig. 4. Typical leaves from the middle part of sterile shoots of *Sorbus pelsoensis* (a) and the most similar taxa *S. balatonica* (b) and *S. gayeriana* (c), as well as moderately similar species *S. bakonyensis* (d), *S. majeri* (e), *S. polgariana* (f), *S. tobani* (g) from the adjacent areas.

Sorbus majeri (sensu BARABITS 2007 and NÉMETH 2013; *S. bakonyensis* sensu SOMLYAY and SENNIKOV 2014) has elliptic to elliptic-ovate leaf shape; more cuneate leaf base; fewer pairs of lateral vein (8–9); whitish-grey underneath.

Sorbus polgariana has ovate-elliptic to broadly ovate-elliptic leaf shape; slightly longer (length of the distal margin of the longest lobe 8–9 mm), narrower and more acute lobes; more cuneate leaf base.

Sorbus tobani has orbicular-elliptic to elliptic leaves; smaller lobes (length of the distal margin of the greatest lobe 3–5 mm); densely tomentose, whitish-grey lower surface; obtuse leaf apex.

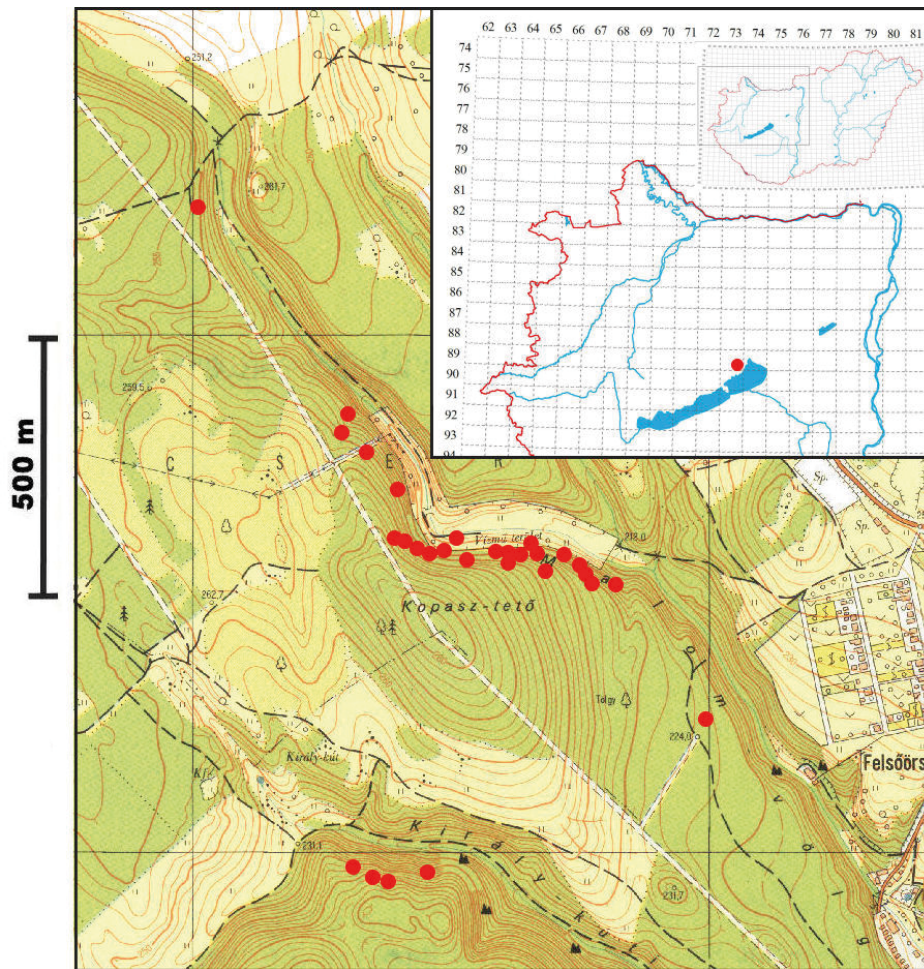


Fig. 5. Distribution of *Sorbus pelseensis*.

Geographical distribution, population size and conservation status

Sorbus pelsőensis is restricted to two valleys that are located within *ca* 600 m from each other. The largest subpopulation with about 90% of the plants is situated in the middle part of valley Malom-völgy. The second smaller subpopulation with about 10% of the plants occurs in the neighbouring Király-kúti-völgy (Fig. 5).

The total population size of *S. pelsőensis* is estimated to about 100 individuals. The population is diversified with respect to age, consisting of fertile, adult trees and young individuals from sapling to larger but still not fertile trees of different ages.

All the occurrences fall into the grid cell 8973.4 and both of the valleys where the species grows are protected by law.

According to IUCN (2001) the threat status proposed for *S. pelsőensis* is critically endangered (CR):

Criterion B: area of occupancy to be about 1 km².

Criterion C: the population size is about 100 individuals.

Criterion D: number of mature individuals was estimated to be fewer than 50 trees.



Fig. 6. *Sorbus pelsőensis* in its natural habitat in valley Malom-völgy, showing characteristic appearance of the convex leaf lamina between lateral veins (22.09.2013).

Origin

On the basis of morphological features *Sorbus pelloensis* is obviously a member of subgenus *Tormaria* (*Sorbus aria* agg. × *Sorbus torminalis*). It possesses triploid ($2n \sim 51$) cytotype (Németh *et al.* in prep.) and has probably been derived from hybridisation between the diploid ($2n = 34$) *S. torminalis* and either *S. graeca* (Spach) Lodd. or *S. danubialis* (both are tetraploid, $2n \sim 68$ (Németh *et al.* in prep.)) occurring sympatrically. According to the leaf morphology, *S. graeca* is more likely to be one of the parent species than *S. danubialis*. The presumably asexual (apomictic) reproductive mode of *S. pelloensis* is indicated by both the morphological uniformity and polyploidy.

Etymology

The epithet “*pelloensis*” refers to the name of Lake Balaton in the Roman age (Lacus Pelso) when the Transdanubian region belonged to the Roman Empire as a distinct province, Pannonia. Since the Hungarian epithet “*balatoni*” has already



Fig. 7. Flowering shoot of *Sorbus pelloensis* in valley Király-kúti-völgy (photo: Gábor Mészáros, 05.05.2013).

been reserved for *S. balatonica* (KÁRPÁTI 1949), based on the immediate vicinity of the village Felsőörs to the main site of *S. pelsoensis*, “*felsőörsi berkenye*” is proposed as its Hungarian vernacular name.

Coenology

Sorbus pelsoensis grows in closed thermophilous oak woodlands (*Vicio sparsiflorae-Quercetum pubescentis* Zólyomi ex Borhidi et Kevey 1996), pubescent oak shrub woodlands (*Cotino-Quercetum pubescentis* Soó (1931) 1932), mixed forests of rocky slopes (*Primulo veris-Tilietum platyphyllae* (Isépy 1968) Borhidi 1996) and mixed karstic forests (*Fago-Ornetum* Zólyomi (1950) 1958) that are occasionally mixed with planted pine trees (*Pinus nigra* J. F. Arnold), or at the margin of these assemblages always with a northern or northeastern aspect.

Phenotypic variation

Apart from the generally experienced within-individual variation of leaf morphology in *Sorbus* taxa (MEYER *et al.* 2005, RICH *et al.* 2009), no variability can be observed in the *S. pelsoensis* population.

History

According to the present knowledge, *Sorbus pelsoensis* was first collected by Ádám Boros on 9 September of 1957 in the valley Malom-völgy and determined as *S. balatonica* according to the labels of herbarium specimens (BP 432690, BP 432691). However, contrary to this determination, in his floristical diaries (BOROS 1915–1971) the note “*bakonyensis*” can be read (written in pencil instead of the usual pen probably because of his uncertainty concerning the correctness of the identification) with a short addition “böven, szép [abundant, nice]”. Three years later this occurrence was published by KÁRPÁTI (1960) in his *Sorbus* monograph under the name *S. balatonica*. Recently, BAUER (2015) rediscovered the population and identified it as *S. udvardyana*.

DISCUSSION

With *Sorbus pelsoensis* the number of *Sorbus* subgen. *Tormaria* taxa known from Hungary has increased to 31. Apart from *S. balatonica* and *S. bakonyensis* growing on basalt hills of the western part of Balaton Uplands, *S. pelsoensis* is the third taxon from this hybridogenous group that occurs in the region. While the former two taxa can also be found in the adjoining landscape units such as the Bakony and Keszthely Mts, *S. pelsoensis* can be regarded as the only *Sorbus*

endemic to the Uplands. The population of approximately 100 individuals is geographically isolated from any other *Tormaria* species but shares its habitat with the widely distributed *S. danubialis*, *S. graeca* (from subgen. *Aria*) as well as *S. torminalis* that played a crucial role in its origin by interspecific hybridisation. The *S. pelsőensis* population does not exhibit any phenotypic variability, probably due to apomixis (way of asexual reproduction by means of seeds), a phenomenon that can be experienced across the genera causing intraspecific genetic uniformity, actually clonality.

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Összefoglaló: A Dunántúli-középhegység berkenyeflórája európai mércével mérve is rendkívül alagzadag és már közel 150 esztendeje kutatott. A vonulat többi tagjához viszonyítva a Balaton-felvidék *Sorbus*-kutatásának – a Tapolcai-medence bazalt tanúhegyeit leszámítva – valamivel alárendeltebb szerep jutott, ennek megfelelően az MTM Növénytárának herbáriuma is viszonylag kisszámú, a területet reprezentáló gyűjtéssel rendelkezik. E példányok közé tartozik a felsőörsi Malom-völgyből származó, a *Tormaria* alnemzetséghez (*Sorbus aria* agg. × *Sorbus torminalis*) tartozó berkenye két herbáriumi lapja is, melyet Boros Ádám 1957-ben gyűjtött és florisztikai jegyzeteiben *S. bakonyensis* bejegyzéssel regisztrált, a példányok céduláin viszont *S. balatonica* néven határozott. Az előfordulás végül az utóbbi név alatt került publikálásra Kárpáti Zoltán 1960-ban megjelent *Sorbus* monográfiájában. A területet érintő recens terepbejárások megfigyelései és a gyűjtött herbáriumi összehasonlító anyagok alapján ezzel szemben az állapítható meg, hogy a Felsőörs határában húzódó Malom-völgy, valamint a szomszédos Lovas községhez tartozó Királykúti-völgy északi, északkeleti kitétségszerű sziklás lejtőinek mészkedvelő tölgyeseiben, hársas dolo-mittórmelékletjei erdeiben és elegyes karszterdeiben élő, változatos koreloszlást mutató, kb. 100 egyedből álló *Tormaria* populáció sem a *S. bakonyensis*, sem a *S. balatonica* fajokkal, sem más, ez ideig leírt berkenyefajon nem azonosítható. A populáció a tájegység saját endemizmusaként az alábbiakban *S. pelsőensis* néven kerül leírásra. Ezzel a Balaton-felvidékről ismert *Tormaria* taxonok száma a Tapolcai-medence tanúhegyein előforduló *S. bakonyensis* és *S. balatonica* fajokkal együtt háromra, a teljes hazai flórát tekintve pedig harmincegyre emelkedett.

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