

TAXONOMICAL REVISION OF *SORBUS PSEUDOSEMIINCISA*
(ROSACEAE), A STENOENDEMIC WHITEBEAM
FROM THE VÉRTES MTS (HUNGARY), WITH THE
DESCRIPTION OF A NEW SPECIES, *SORBUS PYRICARPA*

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Abstract: In this paper taxonomical revisions and treatments of *Sorbus pseudosemiincisa* during the last 80 years since its description until the present are discussed and summarised. As a result of these revisions the name and the interpretation of *S. pseudosemiincisa* were finally narrowed only to its lecto- and isolectotypes. According to our recent knowledge apart from the type specimens neither further herbarium materials nor living representatives of the species are known. All the remaining specimens deposited in BP and BPU and formerly identified as *S. pseudosemiincisa* proved to belong to other taxa, such as *S. adami*, *S. simonkaiana*, *S. karpatii*, *S. vertesensis*, *S. pseudolatifolia*, *S. cf. degenii* as well as *S. pyricarpa*, a new species described here. Illustrations of the type specimens of *S. pyricarpa*, leaves, fruits and in situ photographs of its flowering and fruiting shoots, in addition a detailed map of its actual distribution are also provided. The distribution of the stenoendemic *S. pyricarpa* is restricted to a narrow range, a network of dolomite valleys in the southwestern part of the Vértes Mts above the village of Csákberény.

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

INTRODUCTION

Sorbus pseudosemiincisa Boros was described by Ádám Boros based on miscellaneous herbarium specimens collected by the author himself in several localities of the Vértes Mts (BOROS 1937). In the protologue he enumerated four growth sites such as Szappanos Valley, Meszes Valley, Juh Valley and Nagy-Vásár Hill; in addition he published a leaf illustration (photograph) of the species.

However, following a broader species concept, Boros included several similar morphotypes in *S. pseudosemiincisa*. These anomalies were recognised just more than 10 years later, when Boros' collections from the Meszes Valley and Juh Valley were segregated as distinct species, *S. adami* Kárp. (KÁRPÁTI 1949) and *S. simonkaiana* Kárp., respectively (KÁRPÁTI 1950).

Kárpáti in his influential monographic work listed Szappanos Valley and Nagy-Vásár Hill from the original protologue, and he added two further sites, Horog Valley and Gránási Hill (KÁRPÁTI 1960). Meszes Valley from Boros' protologue was also mentioned: however, in reference to the collection of Szaniszló Priszter rather than Boros' sheets.

Several decades later KÉZDY (1999) reported *S. pseudosemiincisa* from Horog Valley, Kőkapu Valley and near Gánt-Kápolnapuszta.

Not long afterwards, as a result of an extensive mapping work, NÉMETH (2006) listed numerous records, each of them (Cseresnyés Valley, Fertés Valley, Köves Valley, Meszes Valley, Somos Valley, Szedres (Juhdöglő) Valley, Ugró Valley, Varga Valley) situated in the southwestern part of the Vértes Mts, an area stretching above the village of Csákberény with a densely divided network of small dolomite valleys.

Afterwards, as part of an overall typification work, *S. pseudosemiincisa* was also typified (NÉMETH 2010). Taking into consideration the correspondence between the specimens collected by Boros in Szappanos Valley and the leaf photo published by him in the protologue (BOROS 1937), furthermore regarding a note mentioned by Kárpáti in his paper concerning a personal information from Boros himself in connection with the precise derivation of this leaf (KÁRPÁTI 1950), the sheets coming from Szappanos Valley were designated as lectotype (Fig. 1) and isolectotypes, respectively.

MATERIAL AND METHODS

Field work was carried out between 2002 and 2015. Geographic coordinates and altitudes were determined using Garmin eTrex Legend GPS. In the course of typification work (NÉMETH 2010) and in the following years, all the herbarium materials labelled as *Sorbus pseudosemiincisa* in the Hungarian Natural History Museum (BP) and Eötvös Lóránd University (BPU) were comprehensively examined, if necessary revised. The nomenclature of vascular plants follows KIRÁLY (2009) and in the case of *Sorbus collina* LEPŠÍ *et al.* (2015), while that of the plant communities follows the work of BORHIDI (2003).

RESULTS

Recent revisions have revealed that beyond *Sorbus adami* and *S. simonkaiana*, two species formerly segregated from *S. pseudosemiincisa sensu lato* (KÁRPÁTI 1949, 1950), herbarium materials deposited in BP and BPU and identified as *S. pseudosemiincisa* contain further taxa (Table 1). The specimen from Horog Valley cited by KÁRPÁTI (1960) was revised as *S. karpatii* Boros. Sheets from Hajszabarna proved to be *S. simonkaiana* (KÁRPÁTI 1950). Vouchers from Nagy-Vásár Hill listed by



Fig. 1. Lectotype of *Sorbus pseudosemiincisa* (scale bar: 10 cm).

Table 1. Overview of taxonomic revisions of herbarium specimens originally identified as *Sorbus pseudosemimiscis* in BP and BPU. * = locality mentioned in the protologue of *S. pseudosemimiscis*.

Herbarium specimen(s)	Collector, date of collection	Locality	Reference (where first published)	Revised taxonomic affiliation, published in	Notes
BP 432650, BP 432651, BP 702557	Ádám Boros, 21.05.1934	Csákberény, Szappanos Valley*	BOROS (1937)	<i>Sorbus pseudosemimiscis</i> , BOROS (1937)	Lectotype and isolectotypes of <i>Sorbus pseudosemimiscis</i>
BP 81430, BP 702641	Ádám Boros, 29.04.1934	Csákberény, Meszes Valley*	BOROS (1937)	<i>Sorbus adamii</i> , KÁRPÁTI (1949)	
BP 432507	Ádám Boros, 08.09.1933	Gánt, Juh Valley*	BOROS (1937)	<i>Sorbus simonkaiana</i> , KÁRPÁTI (1950)	
BP 702556	Ádám Boros, 08.05.1932	Csákvár, Nagy Vásár Hill*	BOROS (1937)	<i>Sorbus simonkaiana</i> cf.	(too young, long shoots collected in early spring, not allowing exact identification)
BP 299992	Géza Lengyel, 08.05.1932	Csákvár, Nagy Vásár Hill*	BOROS (1937)	<i>Sorbus simonkaiana</i> cf.	(too young, long shoots collected in early spring, not allowing exact identification)
BP 432505	Ádám Boros, 08.09.1937	Mindszentspuszta, Hajszabarna	KÁRPÁTI (1950)	<i>Sorbus simonkaiana</i> , KÁRPÁTI (1950)	
BP 366422	Zoltán Kárpáti, 06.06.1943	Vértreskozma, Fáni Valley	KÁRPÁTI (1949)	<i>Sorbus adamii</i> , KÁRPÁTI (1949)	
BP 432272	Ádám Boros, 21.05.1950	Csákberény, Horog Valley	KÁRPÁTI (1960)	<i>Sorbus karpatii</i>	
BP 21434?	László Vajda, 26.04.1936	Csákvár	-	<i>Sorbus degenii</i> cf.	(very juvenile shoots collected in early spring, not allowing exact identification)
BPU 013820	Szaniszló Priszter, 22.08.1948	Csákberény, Meszes Valley	KÁRPÁTI (1950)	<i>Sorbus pseudolatifolia</i>	

Table 1. (cont.).

Herbarium specimen(s)	Collector; date of collection	Locality	Reference (where first published)	Revised taxonomic affiliation; published in	Notes
BPU 013821	Szániszló Priszter, 22.08.1948	Csákberény, Meszes Valley	KÁRPÁTI (1950)	<i>Sorbus vertesensis</i>	
BP 214377	László Vajda, 21.08.1948	Csákberény	-	<i>Sorbus vertesensis</i>	
BP 432273, BP 487977	Ádám Boros, 21.05.1950	Csákberény (Gánt), Gránás Hill	KÁRPÁTI (1960)	<i>Sorbus pyricarpa</i>	
BP 254329, BP 243846	László Vajda, 21.05.1950	Gánt	-	<i>Sorbus pyricarpa</i>	
BP 641934	Csaba Németh, 20.07.2002	Csákberény, Varga Valley	NÉMETH (2006)	<i>Sorbus pyricarpa</i>	
BP 649443	Csaba Németh, 09.08.2003	Csákberény, Varga Valley	NÉMETH (2006)	<i>Sorbus pyricarpa</i>	
BP 649446	Csaba Németh, 09.08.2003	Csákberény, Somos Valley	NÉMETH (2006)	<i>Sorbus pyricarpa</i>	
BP 696924	Csaba Németh, 09.09.2006	Csákberény, Ugró Valley	NÉMETH (2006)	<i>Sorbus pyricarpa</i>	
BP 704031, BP 704033	Zoltán Barina, 15.09.2006	Csákberény, Szentgyház Hill	NÉMETH (2006)	<i>Sorbus pyricarpa</i>	

both BOROS (1937) and KÁRPÁTI (1960) and collected in early spring are very juvenile, long shoots not allowing exact determination, consequently their taxonomic affiliation remains uncertain (perhaps *S. simonkaiana*). Exhibiting very juvenile shoots, the identity of the plant from Csákvár (leg. L. Vajda) is also dubious, it may belong to *S. degenii* Jáv. Priszter's collections from Meszes Valley cited by KÁRPÁTI (1950, 1960) can be identified as *S. vertesensis* and *S. pseudolatifolia*, respectively, while the plants of Vajda near Csákberény are *S. vertesensis*.

Shoots collected by Boros on Gránás Hill and cited by KÁRPÁTI (1960) under *S. pseudosemiincisa* are entirely identical with those collected by Vajda near Gánt on the same day and surely on the same site during a common field trip (BOROS 1915–1971).

In the course of the typification of *S. pseudosemiincisa*, these latter plants of Boros and Vajda from Gránás Hill and whitebeam collections from Szappanos Valley were recognised to have differences in some morphological features. Furthermore, voucher herbarium sheets collected by Németh during his *Sorbus* mapping and determined as *S. pseudosemiincisa* (NÉMETH 2006) turned out to be identical with those gathered by Boros and Vajda from Gránás Hill rather than the type material originating from Szappanos Valley. After recognising the fact of this divergences, Szappanos Valley was revisited on more occasions to search more thoroughly for living plants identical to the type sheets of Boros. Boros visited the site on 21 May 1934 and in his floristical diaries he described precisely the provenance of *S. pseudosemiincisa*. According to his notes he found *S. pseudosemiincisa* to be in abundance in the company of other *Sorbus* species (BOROS 1915–1971). By now, the habitat defined by him has been strongly transformed by forestry work, for instance clear felling in the growth site. Repeated attempts to find surviving individuals unfortunately were not successful. Since conscious search at the type locality and its surroundings failed and the former comprehensive field trips also had not resulted in detecting living trees, type herbarium material (Table 1) has to be considered as the exclusive known representatives of *S. pseudosemiincisa*.

For plants collected by Boros and Vajda on Gránás Hill (Table 1) as well as gathered nowadays by Németh as *S. pseudosemiincisa* during his *Sorbus* mapping (NÉMETH 2006), a new name, *S. pyricarpa* is proposed.

Sorbus pyricarpa Cs. Németh, spec. nova
(Figs 2–10)

Icon: Fig. 799 in KIRÁLY *et al.* (2011) p. 211, under *S. pseudosemiincisa*

Holotype: Hungary, Comit Fejér, In dumetosis sept. montis Gránási-hegy prope Csákberény; 300 m a.s.l., 21.05.1950, leg. and det. Ádám Boros sub. *S. pseudosemiincisa* (BP 432273) (Fig. 2).

Isotype: BP 487977 (Fig. 3).

Paratypes: Csákberény: Gránás Hill (L. Vajda, 21.05.1950, BP 254329, BP 243846), above Gánás vineyard (Cs. Németh, 02.07.2011, HCsn 3659/1, HCsn 3660/1), Cseresnyés Valley (Cs. Németh, 14.10.2006, HCsn 1938; 12.06.2011, HCsn 3639), Fertés Valley (Cs. Németh, 09.09.2006, HCsn 350/1, HCsn 350/3, HCsn 350/5, HCsn 350/6; 28.04.2007, HCsn 2097; 13.07.2014, HCsn 5828), Köves Valley (Cs. Németh, 06.06.2009, HCsn 2876), Somos Valley (Cs. Németh, 13.07.2002, HCsn 405; 09.08.2003, HCsn 798, BP 649446; 27.09.2004, HCsn 331, 02.09.2006, HCsn s.n.; 25.05.2008, HCsn 2454/2; 09.05.2010, HCsn 3188/2, HCsn 3189/2, HCsn 3189/6; 04.27.2014, HCsn 5455; 06.07.2014, HCsn 5754), Szedres (Juhdöglő) Valley (Cs. Németh, 14.10.2006, HCsn 1919, HCsn 1927, HCsn 1928, HCsn 1931; 09.09.2007, HCsn 18024; 12.06.2011, HCsn 3641/2, 18.07.2014, HCsn 5872, HCsn 5873), Ugró Valley (Cs. Németh, 09.07.2004, HCsn 99, HCsn 104; 03.10.2004, HCsn 416; 09.09.2006, HCsn 1789/1, HCsn 1789/3, BP 696924), Ugró Valley (Szentegyház Hill) (Cs. Németh, 10.09.2005, HCsn 1255; 09.09.2006, HCsn 1780/3, HCsn 1785/2, HCsn 1789/1; 13.07.2014, HCsn 5796, HCsn 5802; 17.05.2015, HCsn 6674; Z. Barina, 15.09.2006, BP 704031, BP 704033), Varga Valley (Cs. Németh, 20.07.2002, HCsn 437, BP 641934; 09.08.2003, HCsn 825, BP 649443); Magyaralmás: Tóhely Hill (Cs. Németh, 06.07.2014, HCsn 5742; 10.05.2015, HCsn 6692).

Description

Small tree or shrub to 5–6 m. Bark of trunks grey. Buds ovoid, acute, pilose with white hairs on margins. Leaves simple, ovate to broadly ovate, widest at the middle part of lamina, upper surface dark green, glossy, lower surface whitish-grey (Fig. 4), texture fairly thick. Leaves from fertile shoots, 8–10 cm long and 6–8(–9) cm wide, base rounded to broadly cuneate. Broad leaves of the middle part of short sterile shoots 7–9 cm long and 6–7 cm wide, base cuneate. Number of lateral veins 9–10 on each lamina side. Length of the distal margin of the longest lobe 7–10 mm, margin serrate. Lobes of the leaves narrow and acute. Apex shortly and bluntly acuminate (rarely just bluntly acute). Petiole 1.2–2 cm (Fig. 5).

Sepals narrowly triangular, tomentose. Petals white (Fig. 6), anthers 20, cream-coloured, styles 2, split to base. Fruits with viable seeds pyriform, 12–16 mm long and 10–13 mm wide, red at maturity, spotted with medium lenticels (Figs 7–8). Flowering in May, fruits maturing in September.

Comparison with similar taxa

Taxa most similar to *S. pyricarpa* in leaf morphology are *S. pseudosemiincisa*, *S. eugenii-kelleri* Kárp., *S. gerecseensis* Boros et Kárp., and *S. barabitsii* Cs. Németh (Fig. 9). Only the former two occur in the Vértes Mts, the latter two are endemic to

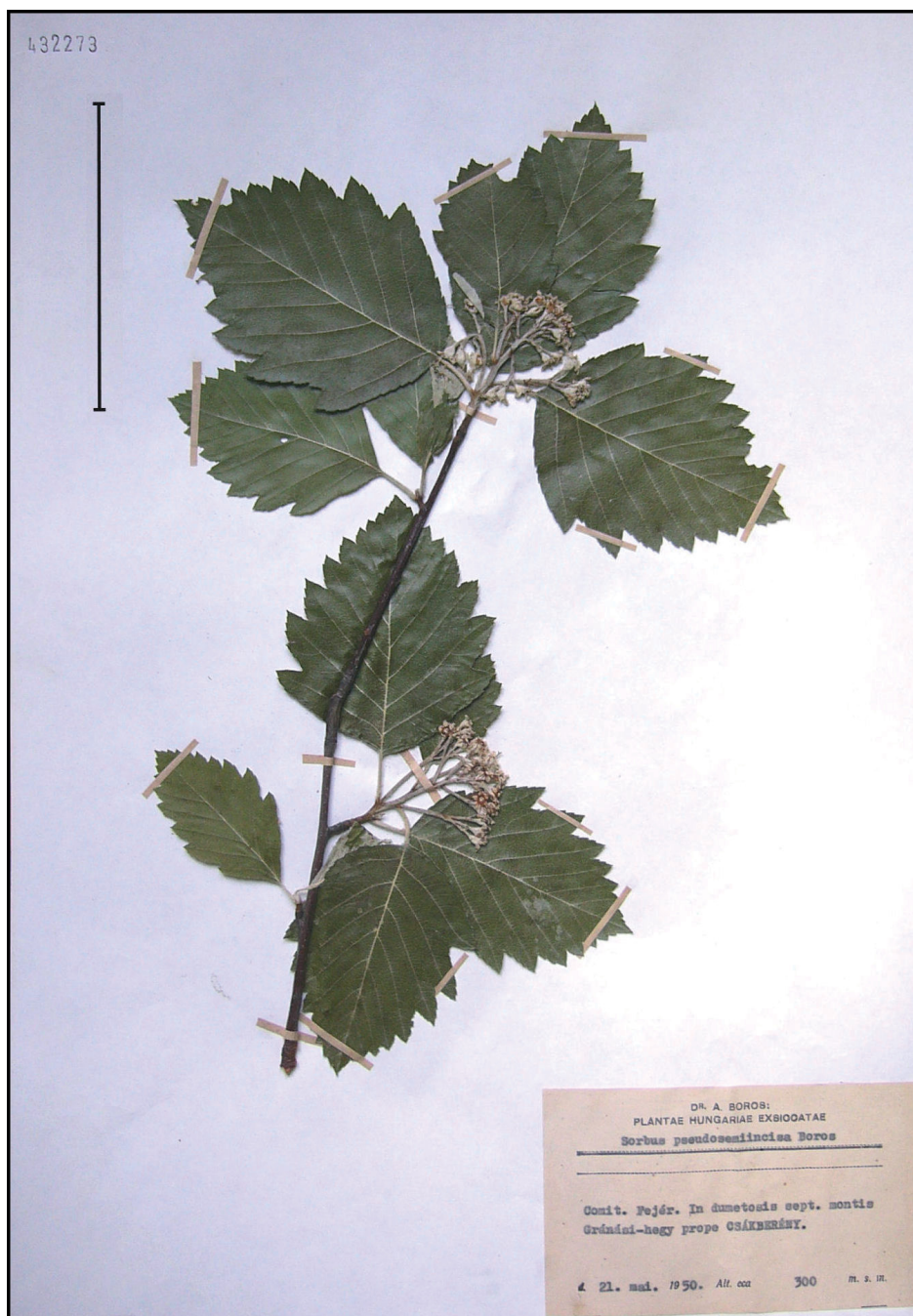


Fig. 2. Holotype of *Sorbus pyricarpa* (scale bar: 10 cm).

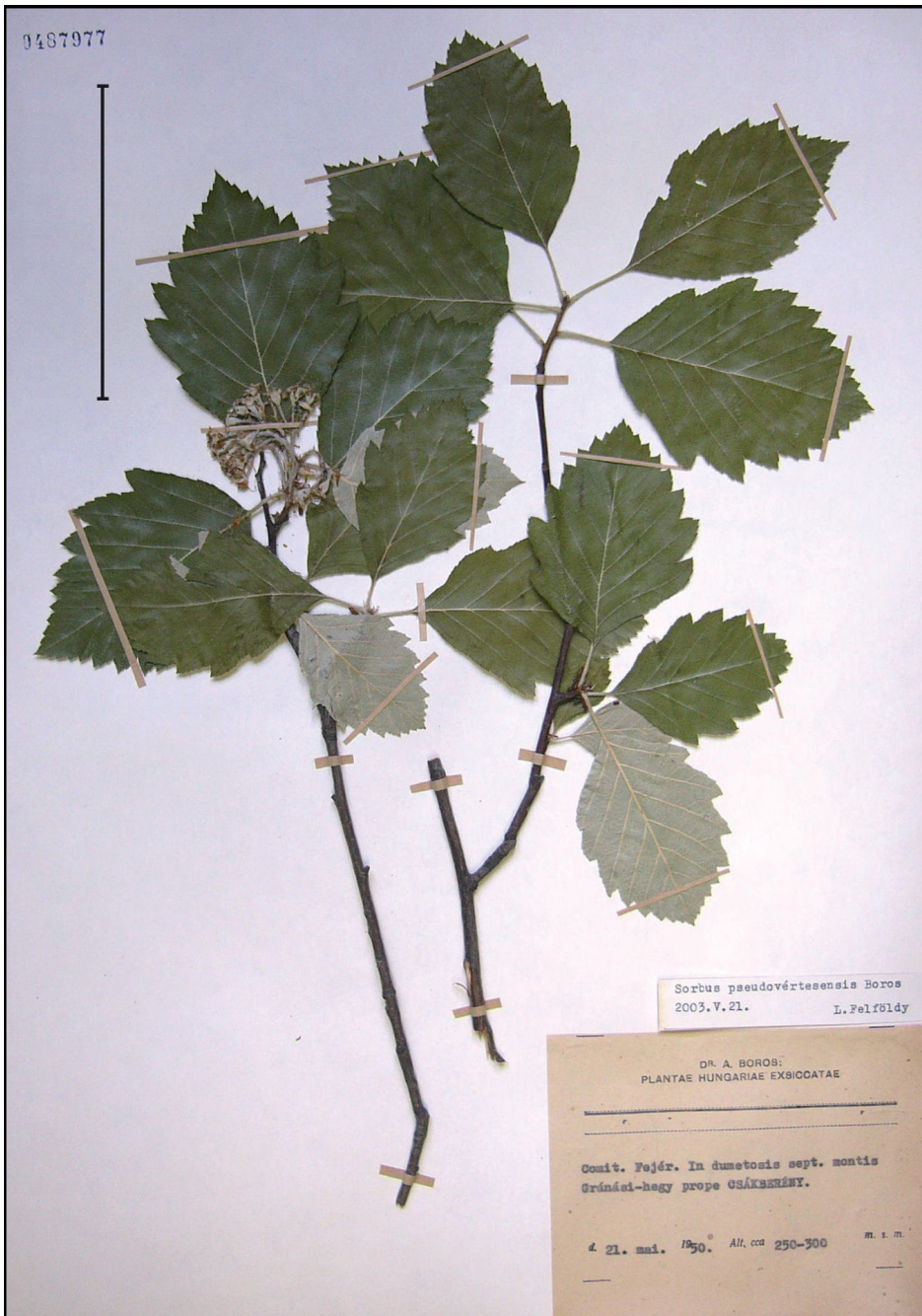


Fig. 3. Isotype of *Sorbus pyricarpa* (scale bar: 10 cm).

the adjacent regions, the Gerecse and Bakony Mts, respectively. All four species differ in the number of lateral veins of leaves (*S. pseudosemiincisa*: 7–9, *S. barabitsii*: 10–11, *S. eugenii-kelleri*: 11–12, *S. gerecseensis*: 12–13) and the colour of the lamina underside. Whilst the leaf underside of *S. pyricarpa* is whitish-grey, each of the resembling taxa have greenish-grey tomentum on their lower leaf surfaces, in addition their fruits are globose or subglobose in shape. Lobes of *S. pseudosemiincisa* are more acute and have more sharply and densely toothed leaf margins, and its leaf apex is also more acuminate than that of *S. pyricarpa*. Moreover, *S. pseudosemiincisa* has a sparsely tomentose leaf underside with greenish-grey colour, in contrast to that of *S. pyricarpa* having a densely hairy lower leaf surface being whitish-grey in colour (Fig. 4).

Red, pear-shaped fruit distinguishes *S. pyricarpa* from all *Tormaria* taxa known in Hungary but one. Apart from *S. pyricarpa*, red, pyriform fruit is exhibited exclusively by *S. karpatii*, a species also native to the Vértes Mts. However, leaves of *S. karpatii* are smaller (characteristically 7–8 cm long and 5–6 cm wide) and have much shorter lobes (length of the distal margin of the longest lobe 3–4 mm) and are greenish-grey beneath.



Fig. 4. *Sorbus pyricarpa* shoot bearing leaf with its characteristically densely hairy whitish-grey leaf beneath (Ugró Valley, 09.07.2004).



Fig. 5. Typical leaves of *Sorbus pyricarpa*; from fertile shoots (a); from sterile shoots (b) (scale bar: 1 cm).



Fig. 6. Flowering shoot of *Sorbus pyricarpa* (Tóhely Hill, 05.05.2013).

Although mature fruits of *S. pseudosemiincisa* have hitherto been unknown, according to its leaf morphology the species is suggested to be closely related to *S. torminalis*, hence its fruits may probably be similar to those of service tree (as seen in the case of *S. degenii* and *S. borosiana*) (KÁRPÁTI 1949, 1950).

Geographical distribution, population size and conservation status

Distribution of *S. pyricarpa* is restricted to some dolomite valleys above Csákberény in the southwestern corner of the Vértes Mts. The total number of individuals of different age was estimated to about 100. The overwhelming majority of the plants are located in Ugró Valley at Szentegyház Hill. The remaining individuals can be found in smaller subpopulations with a few to ten trees. Its presence with a single plant in the rocky grassland of Tóhely Hill is geographically isolated from the main distribution area. In the type locality Gránás Hill being also slightly separated from the main population, a single individual has been encountered as well (Fig. 10). All the occurrences fall into three grid cell 8675.2, 8675.4, 8676.1.

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

- Criterion B1: extent of occurrence to be about 10 km².
- Criterion B2: area of occupancy to be about 1 km².
- Criterion C2a: the number of mature individuals in each subpopulation is fewer than 50.
- Criterion D: number of mature individuals was estimated to be fewer than 50 trees.



Fig. 7. Mature fruits of *Sorbus pyricarpa* (Somos Valley, 02.09.2006) (scale bar: 1 cm).

For *S. pseudosemiincisa* the threat status of DD (data deficient) or rather EX (extinct) should be applied.



Fig. 8. Fruiting shoot of *Sorbus pyricarpa* (Somos Valley, 02.09.2006).

Origin

By virtue of morphological features *Sorbus pyricarpa* has unambiguously arisen from an interspecific cross event between the diploid sexual *S. torminalis* as one parent species and a polyploid apomictic member of *S. aria* agg. Accordingly it should be classified to nothosubg. *Tormaria* Májovský et Bernátová (*S. aria* agg. × *S. torminalis*, *S. latifolia*-group). *Sorbus pyricarpa* represents triploid cytotype in its whole distribution range (Németh *et al.* ined.).

Etymology

The epithet “*pyricarpa*” refers to the characteristic pear-shaped fruits of the species.

Coenology

S. pyricarpa grows in or at the margin of closed thermophilous oak forests (*Vicio sparsiflorae-Quercetum pubescentis* Zólyomi ex Borhidi et Kevey 1996) or dolomite rocky grasslands (*Seseli leucospermi-Festucetum pallentis* Zólyomi (1936) 1958) occurring sympatrically with other *Sorbus* taxa as *S. danubialis* (Jáv.) Kárp., *S. collina* M. Lepší, P. Lepší et N. Meyer (a member of *S. graeca* agg., formerly

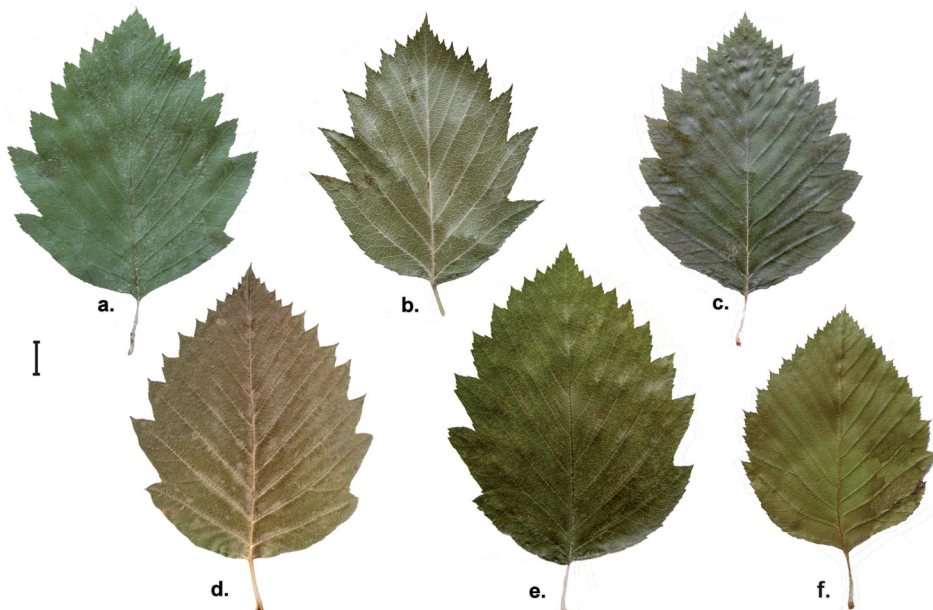


Fig. 9. Typical leaf of *Sorbus pyricarpa* (a) and the taxa with the most similar leaves: *S. pseudosemi-incisa* (b), *S. eugenii-kelleri* (c), *S. gerecseensis* (d), *S. barabitsii* (e) and *S. karpatii* (f) (scale bar: 1 cm).

named as *S. graeca* (Spach) Lodd. in Hungary), *S. pannonica* Kárp. representing subg. *Aria* Pers. in addition with *S. adami*, *S. degenii*, *S. eugenii-kelleri*, *S. karpatii*, *S. pseudovertesensis* Boros, *S. simonkaiana*, *S. vallerubusensis* Cs. Németh, *S. vertesensis* Boros from subg. *Tormaria*, as well as *S. torminalis* from subg. *Torminaria* (DC.) C. Koch.

History

According to the present knowledge, the first known collections of *S. pyricarpa* were made by Ádám Boros and László Vajda on Gránás Hill between Csákerény and Gánt on 21 May 1950 during a joint excursion. They both regarded these samples to be identical with the plants collected by Boros in Szappanos Valley exactly 16 years before on 21 May 1934, on which the description of *S.*

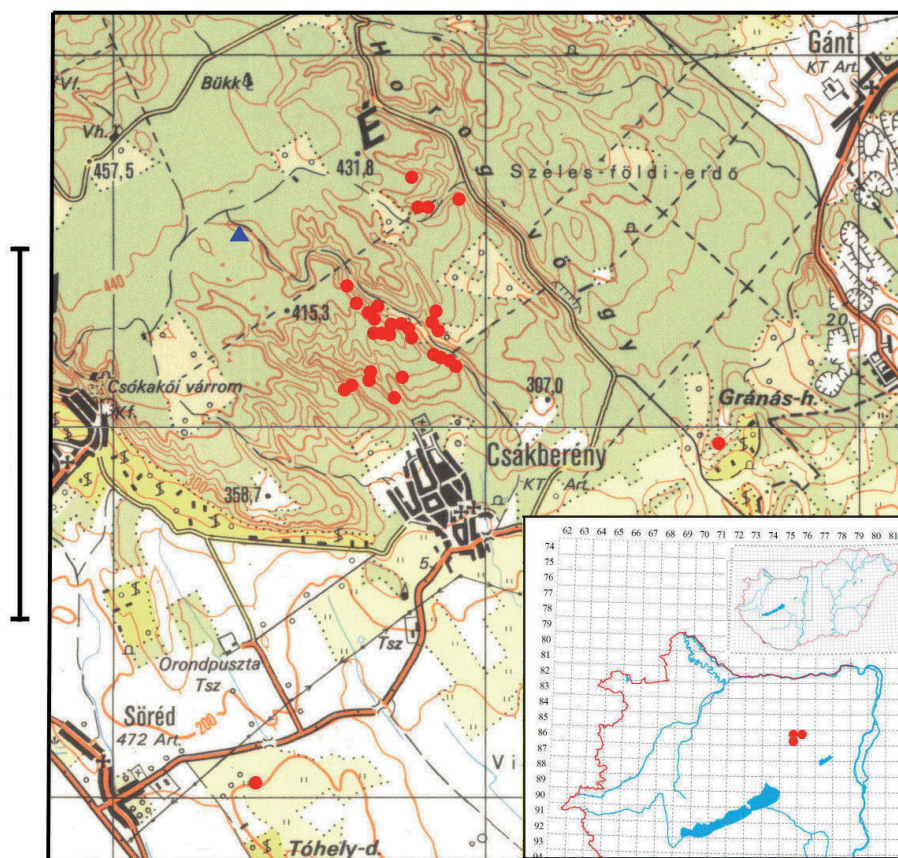


Fig. 10. Actual distribution of *Sorbus pyricarpa* ●, and the type locality of *S. pseudosemiincisa* ▲ (scale bar: 4 km) (NÉMETH 2006, complemented).

pseudosemiincisa was mainly based (BOROS 1937). However, this occurrence from Gránás Hill as well as those published later by the present author under the name *S. pseudosemiincisa* all represent the new species, *S. pyricarpa* (NÉMETH 2006, BARINA and NÉMETH 2009, NÉMETH 2009).

DISCUSSION

With the description of *S. pyricarpa*, the number of known species belonging to *Sorbus* nothosubg. *Tormaria* has increased to 32 in Hungary and to 15 occurring in the Vértes Mts. With this considerable number at present Hungary seems to be the richest European country in this respect preceding such other main *S. aria* agg. × *S. torminalis* hybridisation centres as Germany (with its 19 *Tormaria* species, MEYER *et al.* 2005, HAMMEL and HAYNOLD 2014), Czech Republic (with its 10 *Tormaria* species, KOVANDA 1961, 1984, 1996, LEPŠÍ *et al.* 2008, 2009, VELEBIL 2012, VÍT *et al.* 2012) or Great Britain (with its 7 *Tormaria* species, RICH *et al.* 2009). This holds true even if 3 of them have early data only and are represented solely by their type herbarium materials. In spite of many recent efforts, these species have so far not been re-found, neither in their type localities nor elsewhere. These are *S. decipientiformis* Kárp. and *S. latissima* Kárp. from the Keszthely Mts as well as *S. pseudosemiincisa* from the Vértes Mts discussed here.

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Összefoglaló: A *Sorbus pseudosemiincisa*t, egy szélesebb fajkoncepciót követve Boros Ádám írta le 1937-ben a Vértes területéről, a faj protológusában több, egymástól földrajzilag viszonylag távol eső gyűjtésre hivatkozva. A nemzetségen belüli faji koncepció fokozatos változásával, valamint a terepi kutatómunka fokozódásával később a *S. pseudosemiincisa* név újabb és újabb tartalmat kapott. Boros eredeti típusanyagának revíziójával, a *S. adami* és *S. simonkaiana* leírásával Kárpáti Zoltán a faj értelmezését jelentősen leszűkítette. A faj interpretációja ezt követően is fluktuált, míg nem a recens revíziók a *S. pseudosemiincisa* értelmezését egyetlen élőhelyen, a Csákberény feletti Szappanos-völgyben gyűjtött, három lapból álló típusanyagra korlátozták. Ez utóbbi típusanyagot leszámítva jelen ismereteink szerint a *S. pseudosemiincisa* néven határozott herbáriumi anyag (BP, BPU) a már említett *S. adami* és *S. simonkaiana* mellett *S. karpatii*, *S. vertesensis*, *S. pseudolatifolia* és *S. cf. degenii* lapokat is tartalmaz, továbbá egy olyan növény herbáriumi példányait, melyek sem a *S. pseudosemiincisa* típusával, sem más ismert fajjal nem azonosíthatók. E növény, utalva jellegzetes, körte alakú termésére, *S. pyricarpa* néven jelen munkában kerül elkülönítésre. Míg a *S. pseudosemiincisa* a többszöri, alapos keresés ellenére sem a jelentős erdészeti beavatkozásokon átesett típus élőhelyéről, sem más lelőhelyről nem került elő, addig a *S. pyricarpa* a Csákberény feletti völgyrendszer mérsékeltölgyeseinek napjainkban is meghatározó, bennszülött színezőeleme.

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