Revision of *Rubus* ser. *Micantes* occurring in Hungary and re-evaluation of the neglected *Rubus balatonicus*

Revize rozšíření zástupců *Rubus* ser. *Micantes* v Maďarsku a přehodnocení přehlíženého druhu *Rubus balatonicus*

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Rubus balatonicus Borbás, belonging to ser. *Micantes* Sudre and a long-neglected apomictic species occurring in Hungary, is herein re-evaluated. This species is a nemophilous bramble occurring in the Transdanubian Mts (central Hungary) and has distinctive morphological features that clearly differ from those of related species. A list of localities and a distribution map are presented in addition to the designation of a lectotype and the description and first complete illustration of this species. As part of a general revision of *Rubus* ser. *Micantes* occurring in Hungary, the characteristics, distribution and ecology of three additional species (*R. clusii* Borbás, *R. styriacus* Halácsy and *R. tabanimontanus* Figert) of this series reported from Hungary are also assessed.

K e y w o r d s: biogeography, distribution, ecology, Hungary, *Rubus*, ser. *Micantes*, taxonomy

Introduction

With over 700 European species (Kurtto et al. 2010), the genus *Rubus* L. is often considered to be one of the most taxonomically complicated groups of vascular plants. The representatives of this genus form a complex of a few sexual diploid species and many apomict polyploids. New morphotypes originating as a result of occasional hybridization and segregation can be stabilized by renewed apomixis (Holub 1992, Weber 1995, 1999). However, batological research has suffered from methodological and taxonomical inaccuracies for some time with the description of innumerable individual morphotypes, which have mainly been resolved by applying the new modern species concept developed over the last 40 years ("Weberian reform", see Holub 1997). A scale of distribution ranges was eventually established and widely accepted for taxonomic classification, with only uniform morphotypes having sufficiently large distribution areas being classified as species (Weber 1973, 1985, 1996, Holub 1997, Matzke-Hajek 1997, Kurtto et al. 2010).

Rubus subsect. *Hiemales* E. H. L. Krause ser. *Micantes* Sudre is not a consistent group: it has an intermediate position, including species originating via the hybridization of glandular and non-glandular biotypes (Holub 1992, Weber 1995). The number of species in this series is approximately 60 and the centre of their distribution is in central and northwestern Europe (Kurtto et al. 2010).

As verified by current herbarium revisions, several older Hungarian accounts (Gáyer 1921, 1924–1925) evaluated more species of ser. *Micantes* in the currently accepted sense (e.g. *Rubus clusii* Borbás*, R. styriacus* Halácsy). Unfortunately, the majority of the later Hungarian assessments of *Rubus* (Kiss 1951, 1966), which base their nomenclature on the monograph of Sudre (1908–1913) and incorporate the species names accepted today as minor infraspecific units, are useless. Accordingly, the distribution data associated with the actually accepted taxon names reported by Kiss (1951, 1966) are also inaccurate. Furthermore, both the Flora Europaea (Heslop-Harrison 1968) and the checklists of Soó (1980) and Simon (1992) repeat the dubious conclusions of former studies. Although the modern assessment of *Rubus* in Atlas Florae Europaeae (Kurtto et al. 2010) documents three species of ser. *Micantes* occurring in Hungary, there is no specific assessment of these species for this country.

The aim of the present study is to clarify the status and refine the known distributions of the previously reported species of this series occurring in Hungary and carry out a taxonomical re-evaluation of *R. balatonicus* Borbás.

Material and methods

The field study was conducted between 2009 and 2012 at approximately 800 localities where *Rubus* occurs in Hungary. For each locality, the geo-coordinates were determined using a Trimble Nomad GPS handheld device in WGS 84 projection. Quadrant numbers of the Central-European Flora Mapping System (Niklfeld 1971) are also given, whereas the grid codes of old records with insufficient information regarding the exact locality are disregarded. Nearby localities (within 500 m) were only considered when situated in a different quadrant or municipality.

Specimens in the following herbaria (herbarium acronyms according to Thiers 2013) were searched for possible previous records of *Rubus* ser. *Micantes* from Hungary: BP, BPU, DE, GJO, GZU, JPU, OL, SAMU and W. The previous collections in the herbaria (containing other groups of *Rubus*, often improperly preserved or mixed specimens) were only partly useful. An assessment of data in the literature on the distribution of the taxa proved to be unusable after herbarium revisions; thus, we only accepted the literature data of Borbás and Gáyer on *R. balatonicus*, *R. clusii* and *R. styriacus*, which was strengthened by voucher specimens. The geographical division of Hungary follows Dövényi (2010). The characterization of the re-evaluated species, *R. balatonicus*, was based on the revision of historical herbarium material and 20 specimens collected recently by the authors of the present paper during a study of brambles in Hungary. First-year branches with well-developed leaves were typically examined together with the flowers and fruits of living material; abnormal and injured plants were not included in the assessments. The reference material for the comparative study of related species was derived from the herbaria listed above. The concept of the terms adopted in the ecological characterization of the species follows Weber (2001).

Results and discussion

Based on recent field studies there are 280 localities in Hungary with four species of *Rubus* ser. *Micantes* (*R. balatonicus*, *R. clusii*, *R. styriacus* and *R. tabanimontanus* Figert). The number of older herbarium specimens that could be used was not more than 30; however, among them are remarkable reports from localities not visited by the authors. The detailed results for each species are described below.

Rubus balatonicus Borbás, Balaton flórája p. 414, 1900.

Loc. typ. cit.: "Keszthelyen Büdöskút felett, s Keszthely és Gyenes erdős völgyeiben".
Typus: "in montibus ad Keszthely versus Büdöskút", 4 IX 1893, V. Borbás (BP82077; **lectotype**, G. Király, **here designated**).

Vince Borbás described nearly one hundred species of *Rubus*. Unfortunately, a major portion of his herbarium was destroyed during World War II (Soó 1956, Radics 1975) and only negligible fragments of the former collection that were distributed to several other herbaria remain. Hence, the study of the type material of his taxa is often hindered or impossible (see the precedent of *R. clusii* below). However, the situation in the case of *R. balatonicus* is unexpectedly favourable because two of Borbás' herbarium specimens (in two herbaria) with original labels (lithographs) have survived. In the protologue Borbás (1900) mentioned one narrow ("above Büdöskút springs near Keszthely") and two slightly broad ("in afforested valleys of Keszthely and Gyenes") localities in a nearby region. The specimen in Budapest (BP82077, Fig. 1, Electronic Appendix 1) has the most appropriate locality description compared with that in the locus classicus in the protologue, hence it is designated here as the lectotype. On a small label stuck to sheet BP82077 is a note by Sabransky: "*R. balatonicus* Borbás 1907 = *R. brachyadenes* Waisb. 1896 non P. J. Müller = *R. waisbeckeri* Sudre 1905 non Borbás 1887". A supplementary note by Gáyer on the same label reads: "non est *R. serpentini* Sudre [*R. waisbeckeri* Sudre]". Based on the two original specimens of *R. brachyadenes* Waisb. in BP we think this taxon most likely belongs to and is an individual morphotype of *Rubus* ser. *Radula* (Focke) Focke. Furthermore, *R. waisbeckeri* Sudre was described from a serpentine region of former western Hungary (today Burgenland Province, Austria), thus, it also cannot be identical to *R. balatonicus*. The locality given on the second original sheet in Vienna (W7096, "in montibus ad Keszthely"), which was designated but never validly published as a lectotype by J. Danner 2001, is rather imprecise; thus, we recommend its rejection.

Rubus balatonicus was described by Borbás (1900) from the Keszthely Mts, the westernmost outpost of the Transdanubian Mts (Dunántúli-középhegység). The taxon was later collected in the 1920s by Gy. Gáyer in the southern Bakony Mts (Kab-hegy) and by S. Polgár in other parts of the Northern Bakony Mts. Gáyer (1921, 1924–25) evaluated the taxon correctly at the species level (classified in the group "*Senticosi*") and emphasized (1921) that it is a highly important endemic species. We quote only as a curiosity that this taxon was later also referred to as "*R. schmidelyanus* Sudre subsp. *balatonicus* Borbás" by Kiss (1951) and as "*R. teretiusculus* Kaltenb. subsp. *balatonicus* (Borbás) Soó" by Kiss (1966). Both of these combinations, however are invalid for formal reasons (basionyms were not given). The latest historical collection of *R. balatonicus* identified accurately is dated 1936 and apart from the recent findings reported by the authors in the present study,

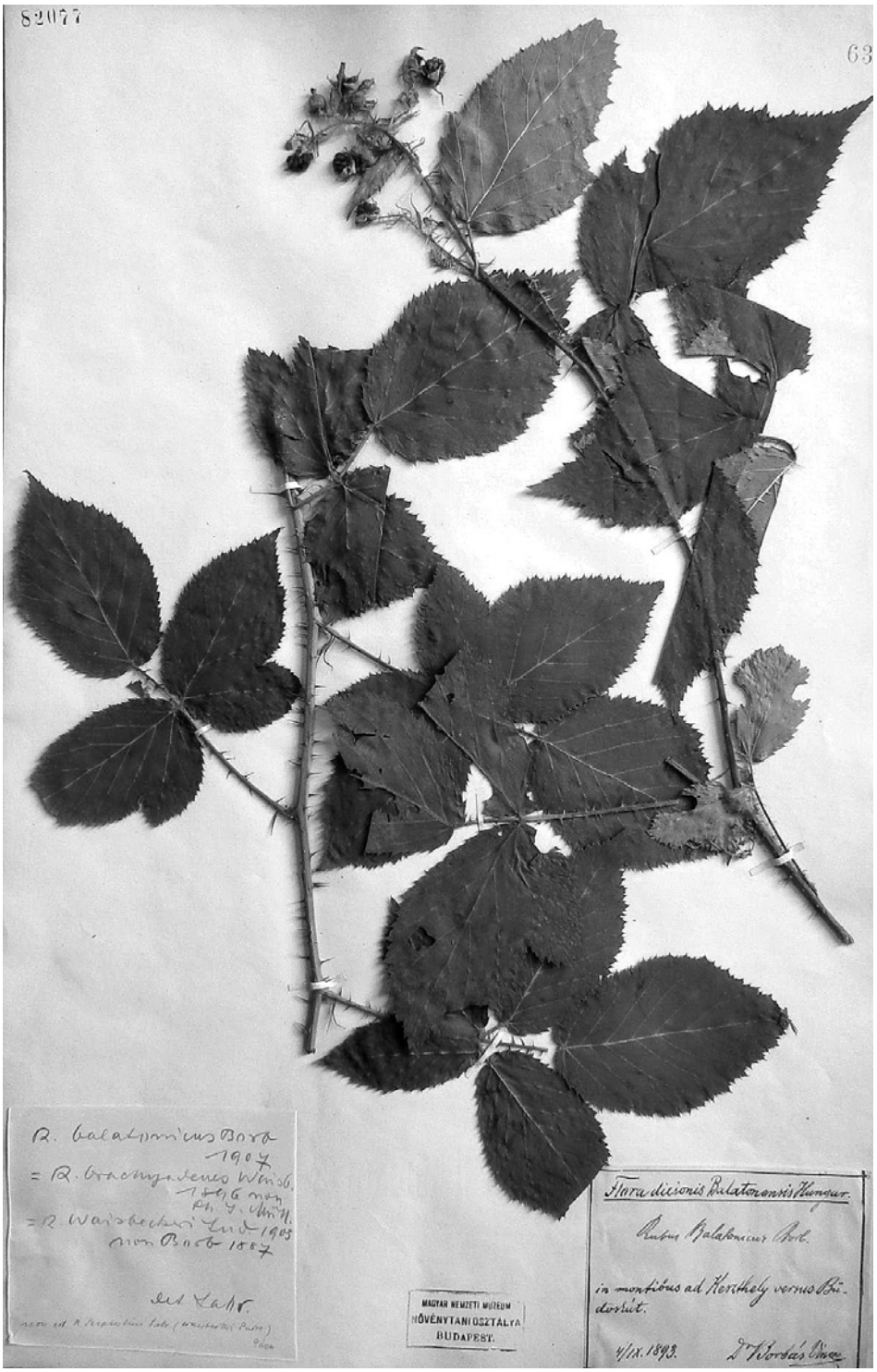

Fig. 1. – *Rubus balatonicus* Borbás, lectotype (BP82077).

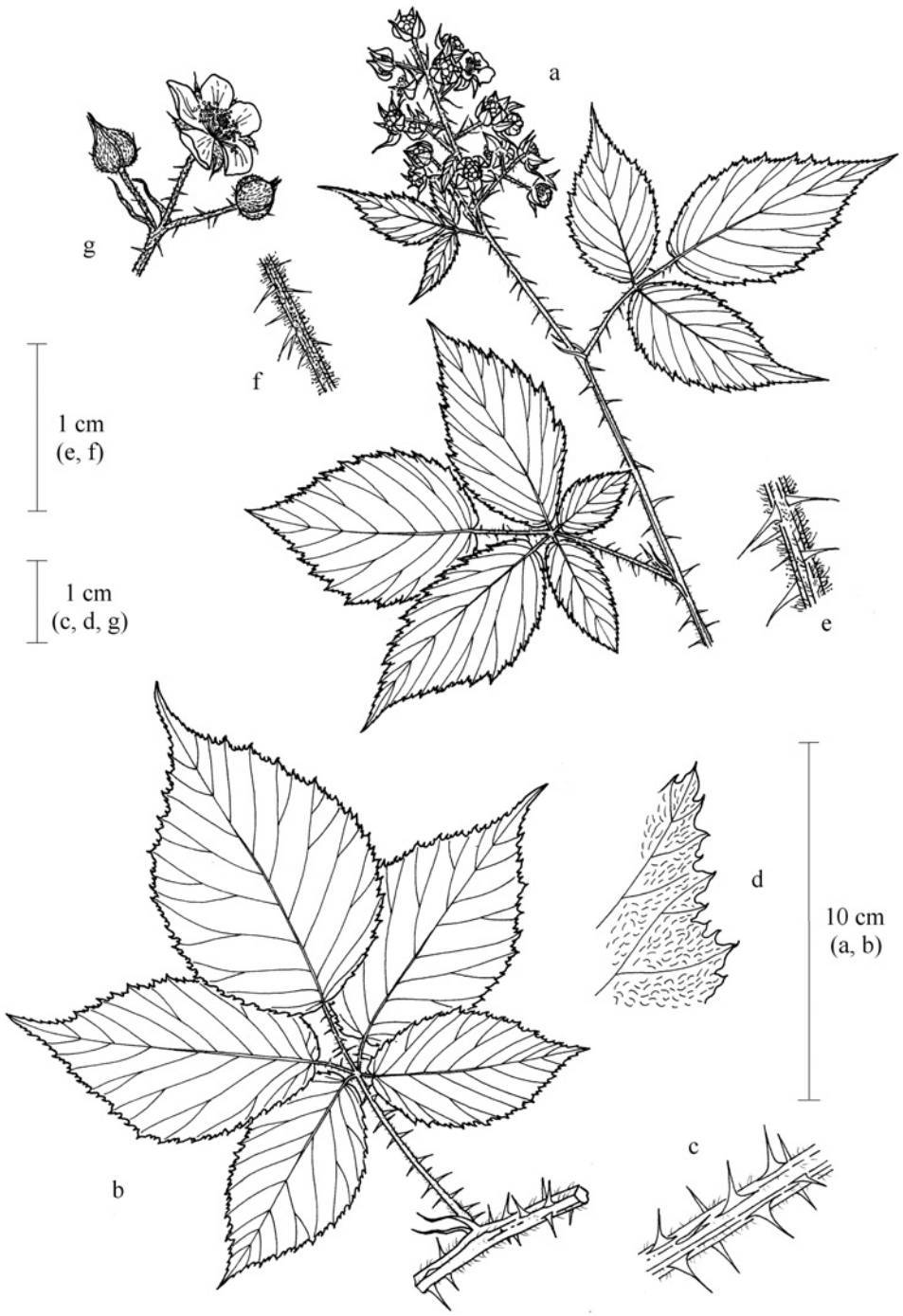

Fig. 2. – *Rubus balatonicus*: a – inflorescence, b – leaf, c – detail of first-year branch with prickles, d – margin of terminal leaflet, e – axis of inflorescence, f – peduncle, g – detail of flowers. Del. J. Táborská.

Fig. 3. – *Rubus balatonicus*: First-year branch with typical crispate leaves (loc.: Transdanubian Mts, Kab-hegy near Nagyvázsony village).

only a single (originally misidentified) specimen collected in 1978 is known. Due to the lack of batological research in Hungary, *R. balatonicus* was consigned to oblivion and was last classified by Kurtto et al. (2010) as a "valueless or doubtful" taxon. The importance of the newly found original herbarium sheets is increased because this material enabled the (still missing) designation of a lectotype and verified the identity of *R. balatonicus* and of a taxon that was repeatedly found by the authors in the Transdanubian Mts. On the basis of the original material of Borbás and that collected in recent field studies, we ascertained that *R. balatonicus* is an authentic endemic species of the Transdanubian Mts. We completed and refined the description of *R. balatonicus* (Borbás 1900) and provide the first complete set of illustrations of this species (Figs 2–5, Electronic Appendix 1).

Diagnostic characters of the species: Shrub, usually up to 100 cm tall. First-year stems mainly low-arching, rooting at apex, angular with ± flat sides, mostly 4.5–7(–9) mm in

Fig. 4. – *Rubus balatonicus*: Detail of first-year stem with prickles (loc.: Transdanubian Mts, Kab-hegy near Nagyvázsony village).

diameter, at sunny sites suffused distinctively vinaceous, with 4–10(–20) distant hairs (0.8–1.2 mm long) per 1 cm of stem side. Stalked glands usually lacking on the stem, exceptionally 1–2 glands (up to 0.8 mm long) per 1 cm of stem side. Prickles (8–)13–25(–35) per 5 cm length of stem, ± uniform, straight or slightly declining, (3–)5–8 mm long, with a base 3–6 mm broad, suffused red, with a yellowish tip. Leaves palmate or nearly pedate, 5-foliolate, ± flat, glabrous above (rarely with appressed hairs up to 15 per cm^2), dark green beneath, patently hairy to the touch, without stellate hairs. Terminal leaflet with petiolule 24–32% as long as its lamina, broadly acuminate-ovate, rounded or slightly cordate at the base, narrowing into a 15–30 mm long apex. Leaf margins crispate (strikingly when young), indentation periodic, with incisions 1–3(–4) mm deep. Petiolules on the lower leaflets 2.5–6 mm long. Petioles usually 5–9 cm long, (65–)70–95(–110)% as long as the lower leaflets, with 14–28 slender, straight or slightly curved, declining prickles.

Fig. 5. – *Rubus balatonicus*: Inflorescence with typical affiliated sepals on fruits (loc.: Transdanubian Mts, Kab-hegy near Nagyvázsony village).

Inflorescence paniculate, narrowly pyramidal, with erecto-patent to (in upper part of inflorescence) ± patent branches, distal (2–)5–10 cm leafless. Inflorescence leaves predominantly ternate (or the uppermost 1–4 leaves simple), dark green beneath, without stellate hairs. Inflorescence axis flexuous, densely hairy, with 10–40 stalked glands and 10–30 prickles per 5 cm length; prickles slender, straight to slightly curved, declining, (2–)4–8 mm long. Pedicels densely pubescent, with 12–45 stalked glands (longer than hairs) and 7–25 acicular prickles. Flowers are 1.8–2.5 cm in diameter. Sepals 8–15 mm long (inclusive of the conspicuous darkish linear appendix), erect after anthesis, greyish green, with a white tomentum of flexuous hairs and short yellowish prickles on the back, and on the margins occasionally with stalked glands, retrospectively. Petals white, 8–12 mm long, not touching each other. Stamens are longer than styles, filaments white; anthers glabrous. Carpels are glabrous, styles reddish at the base; receptacle sparsely hairy. Fruit

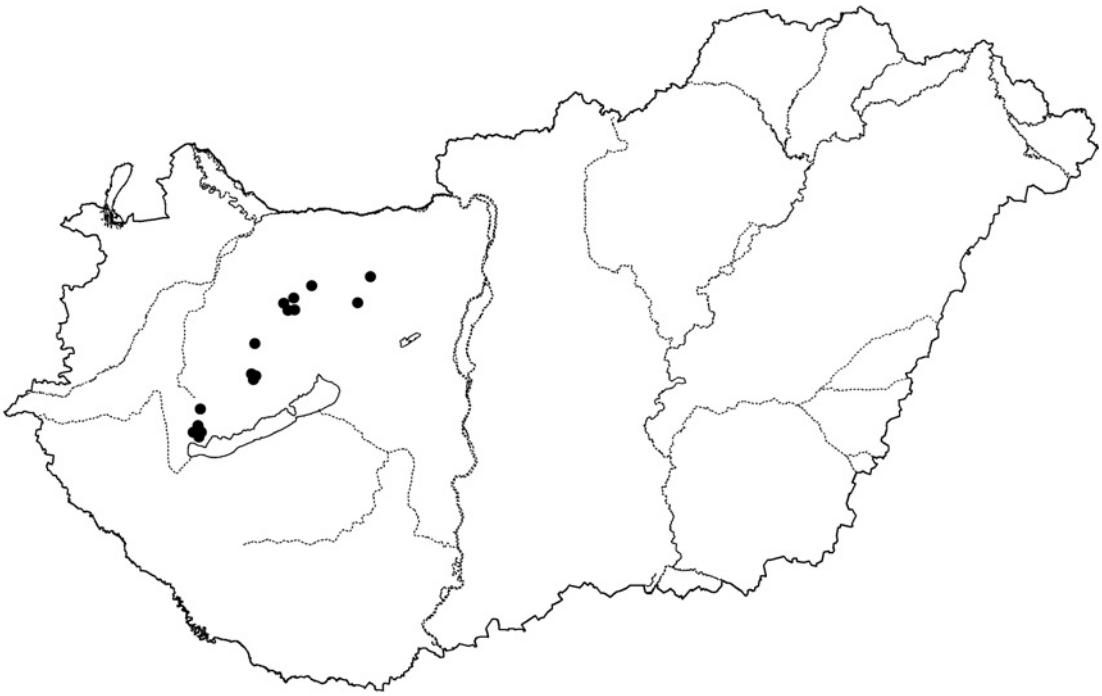

Fig. 6. – Distribution of *Rubus balatonicus*.

Table 1. Main distinctive features of *Rubus balatonicus*, *R. clusii* and *R. ferox*.

Character	*Rubus balatonicus*	*Rubus clusii*	*Rubus ferox*
No. of stalked glands on first-year stem (per 1 cm side of stem)	0(–2)	(3–)5–20	0(–10)
Ratio (%) of petiole length and length of lower leaflets	(65–)70–95(–110)	(70–)85–115(–120)	(80–)90–110(–115)
Number and structure of prickles on petiole	14–28, slender, straight or slightly curved	17–30, stout, strongly curved	10–17, stout, strongly curved
Number of prickles per 5 cm length of the axis of the inflorescence	13–30	8–12(–20)	11–24
Length of prickles on pedicels (mm)	(1–)1.5–3(–4)	1–2(–2.5)	1–3
Number of stalked glands per pedicel	(1–)3–20(–40)	30–100	0–1(–3)
Length (mm) and position of sepals after anthesis	8–15; erect	5–7(–8); reflexed	6–9; reflexed
Ovarium	glabrous	sparsely hairy	sparsely hairy

semiglobose to globose, encased by the extended calyx. Flowering VI–VIII. Illustrations: Jávorka & Csapody (1929–1934: 240, 1975: 240, same drawings; fragments of leafy stem and inflorescence).

Rubus balatonicus can be regarded as a typical member of subgen. *Rubus* sect. *Rubus* ser. *Micantes*. It resembles *R. clusii* (within a small range, the distribution of both species overlaps in the Keszthely Mts) and *R. ferox* Vest, ser. *Sylvatici* (P. J. Müller) Focke (with the main distribution in SE Austria and an isolated locality in the Kőszeg Mts, W Hungary). The similarity is particularly in the shape of the leaves on the first-year stems and the inflorescences. However, *R. balatonicus* differs from both species by having glabrous ovaries and long, erect sepals after anthesis (*R. clusii* and *R. ferox* have sparsely hairy ovaries and short, reflexed sepals; see Table 1 for distinctive characters of these species).

Based on recent field studies and herbarium revisions, *R. balatonicus* occurs in 12 quadrants of the central European grid (Fig. 6, Electronic Appendix 2). All the localities are situated in the colline and submontane altitudinal belts in the Bakonyicum phytogeographical region (Pócs 1981); in terms of altitude, the localities range from 200 to 570 m a.s.l. The species is widespread in the southern parts of the Keszthely Mts, namely, in forests on dolomite between Keszthely and Vállus, and at a more isolated locality in the northern basaltic region ("Tátika-csoport") of the mountains. In the Bakony Mts, *R. balatonicus* is scattered along the northern periphery and is absent in the closed inner basins, though also occurring in large valleys (e.g. Cuha Valley) in the central parts of the mountains. The species extends eastwards in a narrow strip in the foothills of the Transdanubian Mts to the Vértes Mts but does not occur in the southern and eastern part of the mountains, which are dominated by thermophilous oak woods. It occurs in an area that extends approximately 110 km in an east-west direction and (at the broadest) 25 km in a north-west direction, thus it can be classified as a "regionally distributed" species (Holub 1992, Weber 1996, Kurtto et al. 2010). In terms of the grid system used in the Atlas Florae Europaeae (AFE), *R. balatonicus* occurs in the following units: 33TXM3, 33TXN4, 33TYN1, 33TYN2 and 34TCT1.

Rubus balatonicus belongs to a thermophilous group of brambles preferring nutrient-rich, slightly basic, semi-dry or moist and not water-logged soils. As a nemophilous plant, it prefers high relative air humidity and usually occurs in half-shaded sites, such as along forest roads and in the fringes of forest, and in openings and clearings in deciduous forests. In sunny locations *R. balatonicus* is found only above 400 m a.s.l. on northern slopes. It often grows together with other rather basiphilous species of bramble: on dolomite with *R. bifrons* Vest, *R. canescens* DC., *R. praecox* Bertol. and members of *Rubus* sect. *Corylifolii* Lindley, and on basalt with numerous species of *Rubus* ser. *Discolores* (P. J. Müller) Focke and ser. *Glandulosi* (Wimmer et Grab.) Focke, sometimes accompanied by *R. wimmerianus* (Sudre) Spribille, a nemophilous plant of ser. *Sylvatici*. As for other members of ser. *Micantes*, *R. clusii* only occurs with *R. balatonicus* at one locality. Based on the shape of its distribution area, *R. balatonicus* belongs to a group of species that are characteristic of the western part of the Transdanubian Mts. This fact, is in accordance with its phytosociological behaviour (occurrences are mostly confined to *Fagion* and *Carpinion* forest communities and it is markedly absent in the *Quercetalia pubescentis* alliance) clearly indicates the Sub-Atlantic character of this species. Several Sub-Atlantic–Sub-Mediterranean vascular plants (e.g. *Daphne laureola* L., *Lathyrus venetus* (Mill.) Wohlf. and *Primula vulgaris* Huds.), which have an important role in determining the geo-botanical characteristics of the Transdanubian Mts, have similar regional distributions and occupy similar habitats (Jávorka 1940, Fekete et al. 1961, Barina 2004).

Rubus clusii Borbás, Erdészeti Lapok 24: 401, 1885.

Synonymy:
≡ *R. gremlii* subsp. *clusii* (Borbás) Hayek, Fl. Steierm. 1: 782, 1909.
= *R. gremlii* f. *austriacus* Focke ex Dichtl, Deutsche Bot. Monatsschr. 3: 132, 1886.
– *R. elongatispinus* subsp. *clusii* (Borbás) Dostál, Květ. ČSR p. 600, 1948, nom. illeg.
– *R. gremlii* auct., non Focke, Syn. Rub. Germ. p. 266, 1877.

Diagnostic characters of the species: Shrub, usually up to 100 cm tall. First-year stems most often low-arching, rooting at apex, angled, mostly 5–8(–10) mm in diameter. Sides usually flat, greenish or suffused brownish, with scattered simple and tufted hairs; largest prickles 8–12 per 5 cms of stem, straight, declining or slightly curved, 4–7 mm long, yellowish or reddish, often mixed with few (to numerous at sunny sites) needle-shaped pricklets, acicles (sometimes tipped with glands) and stalked glands. Leaves on first-year stems digitate or subpedate, (3–)5-foliolate, usually dark green, glabrous or with scattered appressed hairs above, rather densely patent-hairy beneath, without stellate hairs. Leaflets ± contiguous to slightly imbricate, terminal ones with medium long petiolules (petiolule 30–37% as long as its lamina), ovate to triangular broadly ovate, cordate at base, with a gradually acuminate apex 8–15 mm long, ± periodically serrate, serration 2–4 mm deep; teeth broad, apiculate, principal ones straight. Basal leaflets with petiolules 3–5 mm long. Petioles rather densely pubescent with numerous stalked glands and 17–30 curved prickles; stipules filiform. Inflorescence paniculate, usually narrow, almost cylindrical, leafy almost to the apex, with 3-foliolate leaves below. Axis of inflorescence with numerous simple and tufted patent hairs and rather numerous stalked glands, often with acicles. Larger prickles 8–12(–20) per 5 cm of axis length, usually slightly curved, declining, (4–)5–7 mm long, often reddish-brown at the base. Pedicels 1–2 cm long, densely pubescent, with spreading hairs and 30–100 stalked glands ± as long as hairs, prickles 6–13, slightly curved to straight, 1.5–2.5 mm long, yellowish. Sepals are grey-green, with spreading hairs and numerous stalked glands, often with acicles, reflexed after anthesis. Petals white, ± elliptical, 10–13 mm long. Stamens are white, somewhat longer than greenish styles; anthers glabrous. Young carpels with hairs; receptacle sparsely hairy. – 2n = 28 (Krahulcová & Holub 1997: 247). Flowering VI–VII(–VIII). Illustrations: Jávorka & Csapody (1929–1934: 242, 1975: 242), Leute & Maurer (1977: 296, as *R. gremlii* Focke), Holub (1995: 151), Weber (1995: 512, Tafel 18), Maurer & Drescher (2000: 166), Trávníček & Havlíček (2002: 361), Matzke-Hajek (2004: 26).

Rubus clusii is a widely distributed species occurring in the south-eastern part of central Europe, from eastern Bavaria through Austria to the Czech Republic (except for the northern parts of Bohemia and Moravia), Slovenia and the western part of Hungary and Slovakia (Holub 1991, 1995, Weber & Maurer 1991, Maurer & Drescher 2000, Kurtto et al. 2010, Fürnrohr 2012). An isolated area of the distribution of *R. clusii* was recently discovered in south-eastern part of Poland (Oklejewicz et al. 2013). Conversely, the presence of *R. clusii* is doubtful in Croatia (Matzke-Hajek 2004, Kurtto et al. 2010) and Italy (Kurtto et al. 2010). We presume the south-eastern foothills and basins of the Alps (East Styria, southern and central Burgenland in Austria and western Hungary) is the hypothetical centre of its origin and the posterior north-south expansion is well correlated with the autumn migration routes and post-breeding dispersal of fruit-consuming songbirds (Gyurácz & Bánhidi 2008, Csörgő et al. 2009).

Rubus clusii is the only species described by Borbás that is accepted universally by the majority of experts, though it remained under discussion for a long time due to its complicated history of being confused with *R. gremlii* Focke (Gáyer 1929, Weber 1998, Matzke-Hajek 2004, Fürnrohr 2012). Moreover, some authors (e.g. Danner & Fischer 2008) still confuse *R. clusii* and *R. gremlii*. The lectotype of this species was designated by Weber (1998) from a Moravian collection of A. Oborny. The major difficulty was caused by the total absence of the appropriate original material of Borbás: only fragmented specimens and specimens designated by him as other infraspecific units within *R. clusii* are available (Weber 1998). No specimens collected by Borbás are known from present-day Hungary. For its completeness, it is notable that the protologue (Borbás 1885) is in accordance only with the minimum requirements of a description. A most precise description with a diagnosis and clear designation of the intended locus classicus in Vas County (at that time in western Hungary; the western part of historical Vas County has belonged to Austria and Slovenia since 1920) was composed by Borbás in 1883 but validly published only later (Borbás 1887). Thus, the typification by Weber (1998) is proper from the perspective of nomenclature, though it does not answer the clear intention of the species author, Borbás.

Although it is likely the species was described by Borbás from Hungary, only a few occurrences have been recorded from there over many years (Borbás 1887, Gáyer 1929); additionally, the number of known older herbarium specimens is low (see Electronic Appendix 2). Gáyer (1921, 1924–25) mentions *R. clusii* as "abundant in the western border regions to Austria" but without specification of individual localities. Because the later Hungarian sources (e.g. Kiss 1951, 1966) confuse *R. clusii* with *R. gremlii* and other members of *Rubus* ser. *Micantes* and ser. *Radula*, they are unreliable. Kiss (l. c.) also reports *R. clusii* (as "*R. gremlii*") from the Bükk Mts, which presumably can be attributed to confusion with *R. tabanimontanus*. Matzke-Hajek (2004) documents the occurrence of *R. clusii* only near Kőszeg, whereas Maurer & Drescher (2000) map the Austrian distribution of this species in the border zone very precisely and do not designate any Hungarian localities. In AFE, *R. clusii* is shown as occurring in four 50×50-km UTM squares in Hungary (Király et al. 2010).

On the basis of recent field studies, *R. clusii* is widespread in western Hungary, west of the Rába river (particularly abundant in the Kőszeg and Sopron Mts), in the Kemeneshát region (between the Rába, Zala and Marcal rivers) and in the Őrség region (bordering Austria and Slovenia) (Fig. 7, Electronic Appendix 2). This species has a scattered distribution in the central and southern parts of Zala County and extends to the east as far as the Kisalföld lowland (the Kemenesalja region) and the Transdanubian Mts. In terms of altitude, the localities where it is recorded range from 140 to 800 m a.s.l. On the basis of the grid system of AFE, it is present in the following units: 33TWM3, 33TWN4, 33TXM1, 33TXM2, 33TXM3, 33TXM4, 33TXN1, 33TXN2, 33TXN3 and 33TXN4.

Rubus clusii belongs to a group of brambles preferring nutrient-rich, slightly acidic, semi-dry to wet and occasionally water-logged soils. As a nemophilous plant, it prefers areas with a high relative humidity and usually occurs in half-shaded or shaded sites (in the fringes of forests and openings and clearings); sunny localities are conspicuously avoided. The specimens found at the peripheries of the distribution area in the direction of subcontinental regions (e.g. Kisalföld and hilly areas south of Lake Balaton) were typically sterile. The species is originally connected with beech-dominated and mixed deciduous forests but has recently expanded abundantly into degraded woodlands with a nitrophilous herba-

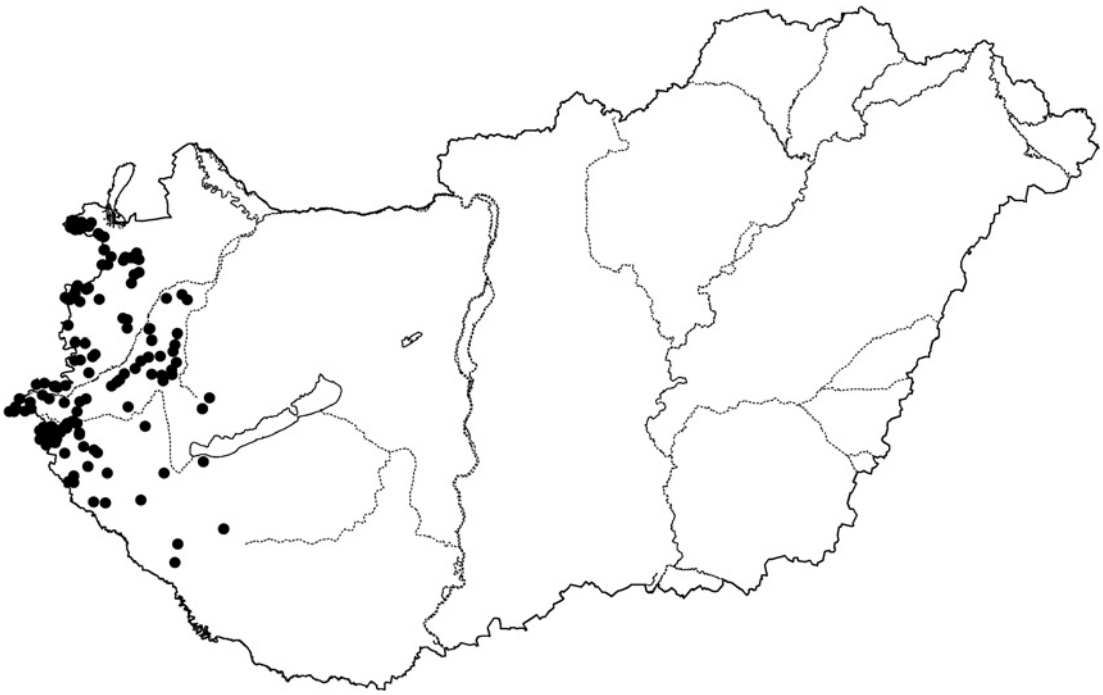

Fig. 7. – Distribution of *Rubus clusii* in Hungary.

ceous plant layer and black locust and pine plantations, and is clearly tolerant of disturbance. On acidic soils in western Hungary, *R. clusii* often grows together in a regionally characteristic *Rubus* community with *R. holosericeus* Vest, *R. montanus* Lej., *R. radula* Weihe, *R. styriacus*, *R. sulcatus* Vest and *Rubus* ser. *Glandulosi*; in secondary woods, it is commonly accompanied by *R. bifrons*, *R. praecox* and members of *Rubus* sect. *Corylifolii*.

Rubus styriacus Halácsy, Österr. Bot. Z. 40: 432, 1890.

Diagnostic characters of the species: Shrub, usually up to 80 cm tall. First-year stems mainly low-arching, rooting at apex, angled, mostly 4–6 mm in diameter. Sides ± flat, purplish or vinaceous, with scattered simple and tufted hairs (stems infested by fungi often with dense hair-ledges). Stalked glands (up to 0.4 mm long) usually 3–10 per 1 cm side of stem. Prickles 15–25 per 5 cm length of stem, uniform or unequal, slightly or strongly declining, stout, compressed at base, (3–)4–6 mm long, suffused red, with a yellowish tip; often mixed with few pricklets and acicles. Leaves ternate or pedate, 4–5-foliolate, ± flat, dark green above with appressed hairs up to 20 per cm^2, greyish green beneath, patently hairy to the touch, tomentose. Terminal leaflet with petiolule 33–55% as long as its lamina, acuminate-ovate to nearly triangular, rounded or slightly cordate at the base, narrowing into a 15–25 mm long apex; leaf margins with periodic incisions 2–4(–5) mm deep. Petioles usually 4–9 cm long, (110–)130–170(–200)% as long as the lower leaflets, with 15–30 strongly declining prickles; petiolules of lower leaflets 2–5 mm long. Inflores-

Fig. 8. – *Rubus styriacus*: Pedate leaf with 5 leaflets (loc.: western Hungary, near Hernyék).

cence few-flowered, paniculate, pyramidal, with erecto-patent to patent branches, foliated nearly to the tip; leaves tomentose beneath, lower ones ternate, the uppermost 1–3 leaves simple. Inflorescence axis densely hairy, with 20–80 stalked glands and 10–30 prickles per 5 cm of inflorescence length; prickles straight to strongly curved, declining, 3–6 mm long. Pedicels densely pubescent, without glands or with few stalked glands (not longer than hairs) and 5–20 acicular prickles; bracts densely covered by stalked glands. Sepals greyish, with stalked glands and often also acicles, reflexed after anthesis. Petals bright pink, ± elliptical, 8–11 mm long. Stamens distinctly longer than styles; anthers and carpels grabrous; receptacle glabrous or sparsely hairy. Flowering VI–VII. Illustrations: Jávorka & Csapody (1929–1934: 242, 1975: 242), Leute & Maurer (1977: 312), Weber (1995: 465, 466). Since there are only a few published photographs of this species we present pictures of its main characters (Figs 8–10, Electronic Appendix 1).

Fig. 9. – *Rubus styriacus*: Typical few-flowered, pyramidal inflorescence (loc.: western Hungary, near Kőszeg).

Rubus styriacus is a regionally distributed species with some tendency to a wide distribution, occurring in south-eastern Austria, northern and central Slovenia and western Hungary (Weber & Maurer 1991, Maurer & Drescher 2000). This species is reported from a single locality in Croatia (Varaždin; Maurer & Drescher 2000); however, it is not listed for this country in AFE (Kurtto et al. 2010). It is also likely that this species occurs in north-eastern Italy.

Although this species is mentioned in early publications (Gáyer 1921, 1924–25) as occurring in the western part of historical Sopron and Vas Counties (today partly in Austria), first evidence of its existence in present-day Hungary are the collections of Gáyer between 1919 and 1923 (see Electronic Appendix 2). Similar to *R. clusii*, *R. styriacus* is reported by Gáyer (1924–25) as "abundant in the western border regions to Austria", but no localities are specified. Kiss (1951, 1966) only repeats the previous records (some of

Fig. 10. – *Rubus styriacus*: Detail of first-year stem with prickles (loc.: western Hungary, near Röjtökmuzsaj).

his revisions of BP indicate he had no knowledge of this species). Much later on *R. styriacus* was found by Maurer & Drescher (2000) near Kőszeg in NW Hungary. In AFE, this species is recorded in three of the 50 × 50 km UTM squares of Hungary (Király et al. 2010).

Based on the results of recent field studies, the Hungarian distribution of *R. styriacus* is similar to that of *R. clusii*, with minor differences (Fig. 11, Electronic Appendix 2). This species does not occur in the Sopron Mts and the northernmost point of its range is located near Sopronkövesd (together with two occurrences in Austria, they mark the northernmost limit of the entire distribution area). *Rubus styriacus* is common in the Őrség and Kemeneshát regions, though only a few isolated localities are known from Zala and Somogy Counties. A remarkable, highly isolated occurrence in the Bakony Mts (as the easternmost point of the total range) is verified by the collection of Gáyer. In terms of

Fig. 11. – Distribution of *Rubus styriacus* in Hungary.

altitude, the localities range from 140 to 440 m a.s.l. On the basis of the grid system of AFE, *R. styriacus* is present in the following units: 33TWM3, 33TWN4, 33TXM1, 33TXM3, 33TXM4, 33TXN1, 33TXN2, 33TXN4 and 34TYN2.

Although *Rubus styriacus* often grows together with *R. clusii*, its ecological behaviour is distinctly different: at the same locality, these species usually occupy different parts of the habitat. *R. styriacus* is less thermophilous and often strikingly suffers from heat stress and low relative air humidity in summer. It prefers nutrient-poor, acidic, semi-dry to moist and occasionally water-logged soils and is most abundant in hilly areas covered by tertiary clayey and gravelly sediments. The absence of this species from some parts of western Hungary is supported by the soil features: it is rare at higher altitudes due to the dominance there of nutrient-rich, moist soils, whereas the soils on loess areas are to base-rich for this plant. This behaviour is clearly different from that in Austria where *R. styriacus* is also reported growing in basic soils (Maurer 1984). It is less nemophilous and also grows in sunny locations if the air is sufficiently moist. Originally, it was connected with open, acidophilous oak-dominated and oak-hornbeam deciduous forests and forest fringes, expanding later to base-poor spruce and Scots pine plantations where abundant stands were recently reported. Secondary coniferous woods with rich soils and a dense layer of herbaceous plants are avoided by this species. The phytosociological connections to other *Rubus* species are similar to those of *R. clusii*, though the co-existence of *R. styriacus* with some thermophilous elements (e.g. *R. praecox*) is not as rare.

Rubus tabanimontanus Figert, Allg. Bot. Z. Syst. 11: 178, 1905.

Synonymy:
≡ *R. silesiacus* var. *tabanimontanus* (Figert) Sudre, Batotheca Eur., p. 72, 1907.
≡ *R. silesiacus* subf. *tabanimontanus* (Figert) Hruby, Verh. Naturforsch.Vereins Brünn 74 (suppl.): 63, 1943.
= *R. venedicus* Kinscher, Repert. Spec. Nov. Regni Veg. 23: 210, 1906.
– *R. silesiacus* auct., non Weihe in Günther et al., Sched. Cent. Pl. Siles. Exsicc. 14 (sine no.), 1827.

Diagnostic characters of the species: Shrub, usually up to 100 cm tall. First-year stems usually low-arching, rooting at apex, bluntly angled, mostly 5–8 mm in diameter. Sides ± flat, dark red-violet, almost black-violet on the side exposed to the sun, glabrous or with very few hairs, without or with very few short-stalked glands. Prickles 5–13 per 5 cm length of stem, usually on angles, slender, mostly straight and declining, 5–7 mm long, dark violet with yellowish tip. Leaves pedate, (4–)5-foliolate, on weaker stems 3-foliolate, usually dark green, glabrous or with scattered appressed hairs above, lighter (greyish green at sunny sites) and loosely hairy beneath, with simple and tufted hairs, in sunnier places also with a few stellate hairs. Leaflets slightly imbricate, terminal ones with average length petiolules (petiolule 28–35% as long as its lamina), ovate or almost obovate, cordate at the base, with a gradually acuminate apex 12–20 mm long and undulating margins, distinctly periodically serrate, serration 3–4(–5) mm deep; principal teeth broad, prominent, straight or slightly recurved; basal leaflets with petiolules 1–3(–4) mm long. Petioles sparsely hairy, without or with few short-stalked glands and with 8–13 slender, curved prickles; stipules ± filiform, narrower than 1 mm. Inflorescence paniculate, short, rather compact, ovate or obovate, leafless above, with 3-foliolate leaves below; upper leaves usually with stellate hairs beneath, greyish. Inflorescence axis sparsely pubescent with simple and stellate hairs and with very few stalked glands; prickles 3–8 per 5 cm length of axis, very slender, subulate, slightly curved or straight, declining. Pedicels 1–1.5 cm long, densely pubescent, with spreading hairs and with (0–)1–10 stalked glands; prickles 3–10, ± straight, 1.5–2.5 mm long. Sepals are grey-green, hairy and glandular like pedicels, unarmed or with a few slender prickles, reflexed after anthesis. Petals white, ± elliptical, 10–13 mm long. Stamens white, somewhat longer than greenish styles; anthers glabrous. Carpels glabrous or with few hairs; receptacle sparsely hairy. – 2n = 28 (Krahulcová & Holub 1997: 247). Flowering VI–VII.

Illustrations: Weber (1991: 151, 1995: 461), Holub (1995: 143), Trávníček & Maurer (1998: 97), Trávníček & Havlíček (2002: 361), Zieliński (2004: 138, 139).

Rubus tabanimontanus is a widely distributed species occurring mainly in south-western Poland (Silesia), the Czech Republic and western Slovakia (Holub 1992, Zieliński et al. 2004). It is documented both from single localities in Germany (Saxonia; Weber 1995) and Austria (Waldviertel; Trávníček & Maurer 1998), and only more recently in Hungary (Király et al. 2010). In earlier sources, this species was generally identified as *R. silesiacus* Weihe, which overlaps with the distribution area of *R. tabanimontanus* in the west, but in fact does not occur in Slovakia and Hungary (Holub 1992). The related *R. gliviciensis* (Sudre) Spribille (a species differing from *R. tabanimontanus* in having pink petals and longer prickles on the first-year stems) occurs in Slovakia (Slovak Karst) not far from the state border, but has not yet been reported from Hungary.

The Hungarian occurrences (Fig. 12, Electronic Appendix 2) are located in the highest regions, the Bükk and Mátra Mts, of the North Hungarian Mts (Északi-középhegység) at

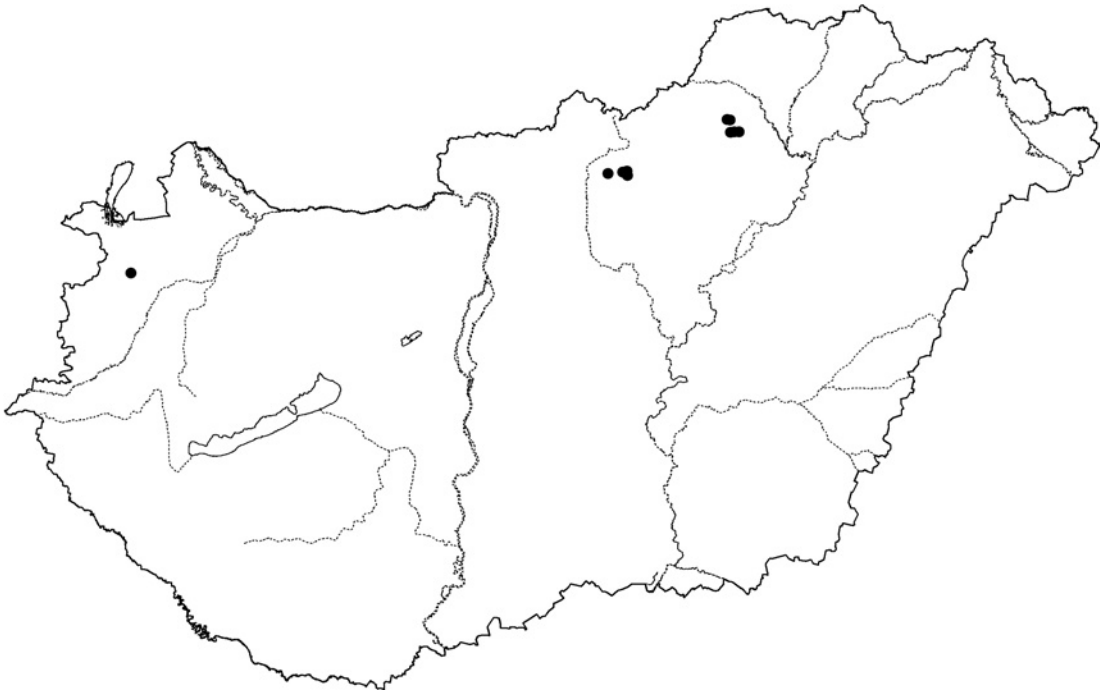

Fig. 12. – Distribution of *Rubus tabanimontanus* in Hungary.

455 to 710 m a. s. l. In this area, *R. tabanimontanus* is a typical but rare element of submontane and montane fringe communities of beech forests and clearings, usually accompanied by *R. austroslovacus* Trávníček, *R. grabowskii* Weihe and other representatives of *Rubus* ser. *Discolores* and *Rubus* ser. *Glandulosi*, respectively. The single lowland locality in western Hungary (Újkér) is the southernmost point of the distribution area of this species; it occurs there in a degraded, *Rubus* species-poor oak forest, in all likelihood the result of secondary colonization. In terms of the grid system of AFE, *R. tabanimontanus* is present in the following units: 33TXN1, 34UDU2 and 34UDU4.

Further taxa

The occurrence of *R. caflischii* Focke, *R. melanoxylon* P. J. Müller et Wirtgen, *R. micans* Godron, *R. schlickumii* Wirtgen, *R. silesiacus* Weihe and *R. thelybatos* Focke ex Caflisch in Hungary reported by Kiss (1951, 1966) and followed by Flora Europaea (Heslop-Harrison 1968) is omitted on the basis of the revised distribution area of these species presented by Kurtto et al. (2010). We also did not find any voucher specimens for these species from Hungary.

See www.preslia.cz for Electronic Appendices 1–2

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Souhrn

Byla provedena revize rozšíření zástupců ser. *Micantes* Sudre rodu *Rubus* L. v Maďarsku, založená na rozsáhlém terénním výzkumu, doplněném studiem herbářů. Vedle druhů udávaných z této země v nedávno vyšlém 15. svazku díla Atlas Florae Europaeae (Kurtto et al. 2010), tj. *R. clusii* Borbás, *R. styriacus* Halácsy a *R. tabanimontanus* Figert, byl studován další taxon, *R. balatonicus* Borbás, popsaný sice již na konci 19. století, avšak v současné literatuře dosud opomíjený kvůli nedostatečným znalostem o jeho rozšíření i taxonomických vztazích. Ve studii jsou charakterizovány všechny čtyři maďarské druhy ser. *Micantes* po stránce morfologické, ekologické i geografické, přičemž jejich rozšíření v Maďarsku je detailně zpracováno. Zatímco *R. clusii* a *R. styriacus* jsou druhy omezené pouze na západní Maďarsko, kde jsou však dosti časté, *R. tabanimontanus* je podstatně vzácnější a známý dosud pouze z několika oblastí v severním Maďarsku. Areál druhu *R. balatonicus* zaujímá maďarské území severně od jezera Balaton, kde se vyskytuje roztroušeně.

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