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Sorbus hornadensis Mikoláš (Rosaceae, Pyreae), a new hybridogenous species from eastern Slovakia

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Abstract: *Sorbus hornadensis* sp.nov., a new hybridogenous species of the genus *Sorbus* is described. It evolved probably from hybridization of *S.thaiszii* (Soó) Kárpáti s.l. and *S. aucuparia* L. It is stabilized by means means of apomixis. The species (s.s.) occurs in xerothermous habitats of forest-steppe and adjacent forests between villages Trebejov and Kysak. The species is related to *Sorbus hazslinskyana* (Soó) Májovský, however, it is different by leaves and fruits. It has deep red, shortly cylindric fruits with small number of relatively big lenticels and leaves the most broad in their lower third. The species is a tetraploid one. On S, W, NW and SW of its area of distribution is substituted by a sligthly different individuals (width of leaves, seeds and fruits, length of fruits) that I designate *Sorbus hornadensis* s.l.

Keywords: *Sorbus hornadensis*, *Sorbus hazslinszkyana*, central Hornád Valley, taxonomy, ecology, protection, Slovakia.

Introduction

In 1989 I firstly found *Sorbus* species similar to *S.hazslinszkyana* in Trebejov (central Hornád valley). Another research revealed that it is really different from this species and it is a new species for science. It is a member of the subgenus *Soraria* Májovský et Bernátová (MÁJOVSKÝ & BERNÁTOVÁ 2001), including hybridogenous species from hybridization of the *Sorbus subgenus Sorbus* and the species of the subg. *Aria*. Later I found similar, however, not identical individuals (from Hradová hill at Košice, Bigarová hill, Nová Vieska village, in the range from Hrad Mt. at Kysak to Ružínske skaly rocks, Humenec Mt., Sivec Mt. – all in the central Hornád valley and from Folkmarská skala Mt. – Slovenské

Rudohorie Mts). They are *Sorbus hornadensis* s.l. I describe new species of *Sorbus* from Trebejov village (also from Kysak village), which has numerous fertile individuals here.

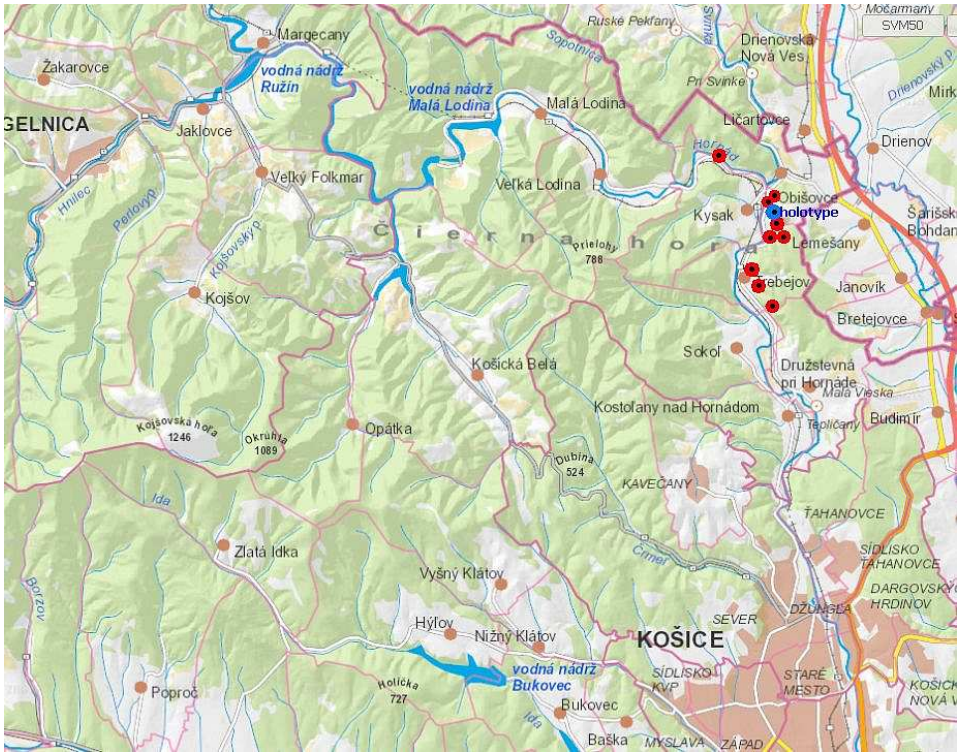

Fig.1. Map of distribution of Sorbus hornadensis s.s.

Sorbus hornadensis Mikoláš, sp.nov. (Fig. 2, holotype)

Diagnosis: Tree-like shrubs, leaves ovate, the broadest in low 1/3, on base cutting off, rounded or especially widely cuneate, leaf blades with 8-10 pairs of nerves and with 5-7 lobes, petioles 15-18 mm long, inflorescence enough dense, flowers with calyx 2.2-2.3 x 2.3-2.4 mm, erect to patent and petals 7.0-8.5 x 5.5-6 mm. Styles 2-3, to 1/3 connate or free. Fruits shortly cylindric, 11.0-13.5 x 10-12.5 mm, dark red, dispersely covered with rather big lenticels, mesocarp heterogenous, endocarp hard membranaceous, seeds 2-3, deep brown to black-brown, 5.5-6.3 x 2-2.3 mm. 2n = 68.

Holotypus: Eastern Slovakia, Kysak village, ca. 0.5-0.6 km to (S)EE in forest-steppe near little rocks, western exposition, ca. 335 m a.s.l. , 48˚51´06˝N, 21˚13´50˝E, leg. V.Mikoláš, 15.5.2012 (KO 31 137).

Fig. 2. Scan of holotypus of *Sorbus hornadensis* s.s.

Up to 7-8 m alt, relative slender tree-like shrubs, rarely trees, with rather erect branches, forming rather narrow crown. Grey bark of trunk is smooth, longitudinally chapped in places and crosswise flecked by numerous clinogonal cicatrices. Young shoots brown, 2-year old ones grey to violet-grey, old branches grey. Leaf buds rather acute, ovate or broadly elliptic, (3.0)-5.5-7.0-(8.0) x (1.0)-3.0-3.5-(4.2) mm, flower buds (7.2)-9.0-11.0-(11.5) x (3.0)-3.5-5.0-(5.5) mm, scales olivaceous brownish to orange-brown, with 0.7-1.0 mm broad deep-brown margin, on above margins sparsely hirsute. Leaves broadly ovate, (3.0)-6.5-8.0-(10.5) x (2.5.)-4.5-6.0-(7.5) cm, the broadest usually in low 1/3 of leaf, rare in base and in little leaves in 1/2 of leaves, with (8)-9-10-(11) pairs of veins, white tomentose on lower surface, glabrous to disperse tomentose on upper surface, shallowlly lobed, with (4)-5-7 pairs of lobes, the most long incision (usually on 2nd lobe) 10-18-(25) mm, rather blunt (obtuse), serration edge (on low 1/5-1/6 of leaves integre), lobes reaching to 1/3-1/4 of breadth of leaves. Petioles (12)-15-18-(20) mm long, on little leaves longer. Leaves in autumn (October) becoming deep yellow and in November completely brown, central veins yellow-green, later brown. Inflorescence rather dense corymbothyrsus with tomentose pedicels, later pedicels glabrous, with (14)-18-26-(44) flowers, with conspicuous, sweet smell. Flowers 15-18 mm in diameter. Hypanthium upside-down cylindrical (turbinate), tomentose. Trigonal sepals tips (2.1)-2.2-2.3-(2.6) x (2.1)-2.2-2.5-(2.7) mm, erect to patent, persistent, on both surfaces tomentose, concave petals broadly ovate, sometimes slightly cutting on apex, (6.5)-7.0-8.5-(9) x (4.5)-5.5-6.0-(8.5) mm, whitish, with 0.5 mm long claw at base and here on inner surface tomentose. Stamens 14-20, with yellowish to ochre yellow anthers, (1.0)-1.1-1.2-(1.5) mm long, filaments (3.5)-5.0-6.5-(7) mm long, ovary semi-inferior, styles 2-3, 3.5-4.5 mm long (some styles in flower shorter), villose at the base, almost completely free or connate to 1/4-1/3 (rarely 1/2) of length. Infrutescence with (3)-8-13-(18) fruits. Fruits shortly cylindric, tomentose at erect sepals and apex, (10.0)-11.0-13.5-(14.5) x (8.0)-9.5-12.5-(13.5) mm, deep red, with usually small number of middle big to big (0.15-0.5 mm in diameter) lenticels, mesocarp heterogenous, endocarp more or less hard membranaceous, with (1)-2-3-(4) seeds. Seeds (deep) brown to black-brown, (4.5)-5.5-6.3-(7.0) x (1.0)-2.0-2.3-(2.8) mm. Tetraploid species with 2n = 68 (Mártonfiová 2007, locality: Trebejov, ca. 0.5 km E).

Distribution

Sorbus hornadensis (s.s.) is formed by ca. 150-200 individuals. *S. hornadensis* s.s., as described here, grows on left side of the Hornád river at Kysak and Trebejov village. Another populations (*Sorbus hornadensis* s.l) have maximum 70-80 individuals. I do not include these populations in the distribution. *Sorbus hornadensis* (s.s.) localities: Kysak, 0.5 km E, 48˚51´11˝N, 21˚13´47˝E, leg. V.Mikoláš, 19.9.1999 (KO 24 216), Kysak, 1.2 km SE, 48˚50´48˝N, 21˚14´07˝E, leg. V.Mikoláš, 13.2.1999 (KO 26 387), Kysak, 0.8 km SE, SW exposition, 48˚51´00˝N, , 21˚13´55˝E, leg.V.Mikoláš, 17.5.1997 (KO 18 577), Kysak, 0.5 km NEE, at road on left side of river Hornád, 48˚51´18˝N, 21˚13´43˝E,

leg. V.Mikoláš, 22.9.2002 (herbarium Mikoláš, without number), Kysak, 1.1 km SSE, 48˚50´47˝N, 21˚14´00˝E, leg. V.Mikoláš, 13.9.1997 (KO 19 218), Kysak, between Kysak village and children camp „Pri skale“, 48˚51´47˝N, 21˚12´49˝E, leg. V.Mikoláš, 15.3.1997 (KO 28 863), Trebejov, 0.4 km E, S slopes, ca. 335 m a.s.l., 48˚50´07˝N, 21˚13´32˝E, leg. V.Mikoláš, 16.10.2012 (herb. Mikoláš, 1386/12), Trebejov, 1.5 km SE, 48˚49´30˝N, 21˚13´59˝E, leg. V.Mikoláš, 14.9.1998 (KO 19 286), Trebejov, 0.8 km SE(E), 48˚49´54˝N, 21˚13´50˝E, leg. V.Mikoláš, 1.11.1997 (KO 18 880).

Notes on variability

Sorbus hornadensis is close to *S. hazslinszkyana* (Soó) Kárpáti. Little variability (or plasticity ?) was found in populations with rare occurrence of very little different indiviaduals (from holotype specimen). Possible molecular reasearch would reveal another information. *S.hornadensis* (s.s.) is different from *S. hazslinszkyana* by cuneate leaves, the widest on 1/3 of leaves on fertile brachyblasts and shortly cylindric fruits. *Sorbus hazslinszkyana* has cutting-off base of leaves, the most broad on base of leaves and globose fruits. It was described as a variety by Soó (*S. austriaca* (Beck) Hedl. var. *hazslinszkyna* Soó). KÁRPÁTI (1960) evaluated it as *S. austriaca* subsp. *hazslinszkyana* (Soó) Kárpáti. Májovský (in MÁJOVSKÝ & UHRÍKOVÁ 1990) combined it as *S.hazslinszkyana* (Soó) Májovský (in MÁJOVSKÝ & UHRÍKOVÁ 1990). It is probably an endemic of Aggtelek/Slovak Karst. KÁRPÁTI (1960) writes that the species (subspecies) developed from *Sorbus austriaca* by adaptation to xerothermous, pannonic climate, however, *S. austriaca* is an endemic of Eastern Alps. Májovský (in MÁJOVSKÝ & UHRÍKOVÁ 1990) evaluated *S. hazslinszkyana* as a product of hybridization of *Sorbus graeca* ((Spach)Lodd. ex Schauer and *S. aucuparia*. However, *S.graeca* probably does not grow in Slovakia at all and the leaves of *S. hazslinszkyana* are rather big (in comparison to little leaves of *S.graeca*). My hypothesis is that *S. hazslinszkyana* is the product of hybridization of *S. thaiszii* (Soó)Kárpati s.l. with *S. aucuparia*. Similarly, *S. hornadensis* is probably a product of hybridization of *Sorbus thaiszii* (however, different microspecies) with *S. aucuparia*. *S. hornadensis* (s.s.) is an apomictic microspecies of the vicinity of Kysak and Trebejov villages, however, many local, a little different populations exist (*S. hornadensis* s.l.). In the central Hornád valley they are growing on Hradová hill (ca. 6 individuals), Bigarová hill (1 sterile exemplar), at Malá Vieska village (ca. 2 individuals), on Hrad Mt. s.l. (at Kysak village) to Ružínske skaly rocks (Hrad Mt.-Janošíkova bašta Mt., Janošíkova bašta Mt., Bokšov Mt., Holica Mt., Ružínske skaly rocks – ca. 10-20 individuals), Humenec Mt. (2 fertile individuals), Sivec Mt. (ca. 10 individuals) and in Slovenské Rudohorie Mts. (Folkmarská skala Mt. – ca. 30 individuals) and Murovaná skala Mt. (up to 10 individuals). These populations (*S. hornadensis* s.l.) that are not included in the description of *S. hornadensis* (s.s.) and its distribution, are slightly different from *S. hornadensis* s.s. by globose fruits in Humenec Mt., by slightly little cylindric fruits (almost globose ones), the narrower seeds and slightly narrower leaves in Sivec Mt, by the narrower seeds in Folkmarská skala Mt. and

Murovaná skala Mt.. Other populations of *S.hornadensis* s.l. (very little exemplars) have not been carefully researched, so far. *S. hornadensis* s.l. populations are very close to *S. hornadensis* s.s. and they can be either included in *S. hornadensis* s.s. in future or described as specific microspecies (especially some bigger populations). Another research in future may clear and correct information (especially morphometry and molecular systematics). In Slovenský raj Mts., Drevenik Mt., Slovenské Rudohorie Mts.-Kojšovká hola Mt. and Muráňska planinina Mts. another populations close to *S. hazslinszkyana* occur. Some of them are very different from *S. hazslinszkyana* and *S. hornadensis*.

Notes on nature protection of the populations and ecology of the species.

Sorbus hornadensis s.s. has relatively many individuals that grow usually on places probably not endangered by human activity. They grow in vegetation of *Festuco-Brometea*, *Quercion pubescenti-petrae*, edge of *Fagetum* and *Prunetum spinosae*. These populations grow on southern, northern and western slopes that are relatively steep. I suppose that these populations will not be destroyed by human activity. Only S and N slopes at quarry at Trebejov village (and plateau) are endangered and many individuals have already been destroyed by mining of dolomite and further ones will be destroyed in near future. Therefore it would be good to protect the populations in the vicinity of Kysak village to save the species. On these localities, another two endemic *Sorbus* species grow (*S. dolomiticola* Mikoláš, *S.amici-petri* Mikoláš, cf. MIKOLÁŠ 1997, 2004), too.

Individuals of another populations are protected (with exception of localities on Holica Mt., Janošíkova bašta Mt., Hrad Mt. s.l. and Ružínske skaly rocks) – these are populations of Mt.Bokšov, Humenec Mt., Folkmarská skala Mt. and Sivec Mt. These populations belong to *S. hornadensis* s.l. and at least some of them probably belong to other microspecies. Some of these populations consist of few exemplars and it is questionable if they should be considered microspecies at all. However, their undescribing can be the cause of their extinction in future. These may be e.g. young populations which are therefore very little. In my opinion, at least some of them merit the formal taxonomic description in future. The protection is needed also for S edge populations in Malá Vieska village, on Bigarová hill and Hradová hill and at least the population from Hradová hill can be a considered as a new microspecies. It is, however, unclear, if small populations (e.g., in Malá Vieska village) can be evaluated as a new microspecies or only as evolving populations related to *S. hornadensis* (*S. hornadensis* s.l.).

As it has already been emphasized, the protection of all populations is needed, because they are in the process of continual evolution (hybridization between various taxa is continuing, cf., e.g., LUDWIG et al. (2013), MÁJOVSKÝ & UHRÍKOVÁ (1990), ROBERTSON et al. (2004a), ROBERTSON et al. (2004b), ROBERTSON et al. (2010)). Only the protection which protects also the evolutionary process, not only its products – microspecies, is complex. Populations 1.3-1.8 km SSE of Trebejov village on the rocks are already

protected with the evolutionary processes, it would be useful to protect also very rich populations of the vicinity of Kysak village (*Sorbus hornadensis* s.s.).

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