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Sorbus dolomiticola MIKOLÁŠ, a new hybridogenous species of the genus *Sorbus* s. l. from eastern Slovakia

VLASTIMIL MIKOLÁŠ

Botanical Garden, P. J. Šafárik University, Mánes Str. 23, SK-043 52 Košice, Slovakia; tel.: +42 95 6331556; fax: +42 95 6337353; e-mail: mikolas@kosice.upjs.sk

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ABSTRACT: *Sorbus dolomiticola* sp. nov., a new hybridogenous species of the genus *Sorbus* (s.l.), which evolved from hybridization between *Sorbus torminalis* and *S. danubialis* agg., is described. It is a species stabilized by means of apomixis. The species is limited to a stenotopical occurrence on xerothermous habitats of forest and forest-steppe coenoses near Trebejov village and Kysak village in central Hornád valley, north from Košice town in Eastern Slovakia. The species belongs to an informal group of species with white tomentose lower side of leaves and orange-red globose fruits. It is a triploid species.

KEYWORDS: *Sorbus dolomiticola*, taxonomy, hybridogenous species, Slovakia

Introduction

Researching the flora of central Hornád valley in 1989 I found a new, conspicuous morphotype of the genus *Sorbus*, probably of hybrid origin. In 1990, when I found another specimen, it was evident that it is a hybrid from hybridization of *Sorbus aria* agg. and *S. torminalis* (L.) CRANTZ. In 1991, after discovery of further individuals, it was obvious that they belong to one taxon, a hybridogenous species, stabilized by apomixis. Research realized in 1992-1995 contributed to discovery of further individuals and thus the total number of known individuals is approaching one hundred. Their considerable homogenity and existence of their various size from ca. 1 m shrub to robust high tree shows that is really the hybridogenous species, that I describe below.

Sorbus dolomiticola **MIKOLÁŠ, sp. nov. (fig. 1)**

Diagnosis: Insignis corona angusta, gemmis acribus, foliis late ovatis usque fere rhombicis, 80-100 × 50-70 mm, basi late usque anguste cuneatis, laminis cum 5-7 sublobis utrobique et 10-12 venis lateralibus utrimque, petiolis 20-25 mm, corymbothyrsis sat densifloris, floribus cum sepalis 2.0-2.8 × 1.6-2.2 mm, erectis usque patentibus et petalis 6.0-6.8 × 3.8-4.2 mm, stylis 2 ad 1/3-2/3 coalescentibus, fructibus sphaericis, 10.5-12.5 × 10.5-12.5 mm, in statu maturo aurantiaco-rubris, lenticellis parvis satis densis, mesocarpio heterogeno, endocarpio cartilagineo, seminibus (1)-2 castaneis usque atro-castaneis, 4.2-4.4 × 1.9-2.4 mm. 2n=51.

Holotypus: Slovakia orientalis, Trebejov, ca. 1 km situ orientali in silvo-steppa, V. MIKOLÁŠ, 6.10.1993 (KO 11 377).

Up to 7 m alt, rather slender trees (or shrubs) with narrowly ascending branches, forming rather narrow crown. Grey bark of trunk is smooth, longitudinally chapped in places and crosswise flecked by numerous clinogonal cicatrices (lenticells). Young shoots (pale) brown, 2 year old ones greyish-black-brown coloured, older branchets grey. Leaf buds ovoid, acute at apex, (6.5)-8.0-10.0-(11.2) × 3.0-4.5-(5.5) mm, flower buds (11.0)-12.0-15.0 × (6.0)-7.5 - 8.5 mm, scales light olivaceous, with 0.4-1.2 mm broad deep-brown margin, sparsely hirsute, locally tomentose. Leaves broadly ovate to nearly rhombic, rarely narrowly ovate or broadly elliptic, (45)-80-100-(110) × (40)-50-70-(80) mm, with (8)-10-12-(13) pairs of veins, white tomentose on lower surface, glabrous on upper surface, narrowly to broadly cuneate at base, shallowly lobed, with, (4)-5-7-(8) pairs of lobes, the longest lobes up to 15 mm, acute, serrate and upper 1/2 to 2/3 of leaves usually biserrate and somewhat irregularly serrate, in lower part of leaves entire to separately serrate, the narrowest leaves more or less only biserrate and irregularly serrate. Petioles (8)-20-25-(32) mm, on the most narrow leaves longer, tomentose. Leaves in autumn becoming deep yellow and later (November) brown, central vein of leaves becoming reddish-purple to purplish coloured in autumn. Inflorescence subdense to dense corymbothyrsus with markedly tomentose pedicels, partly becoming glabrous, with (15)-25-50-(62) flowers, with conspicuous, sweet smell. Hypanthium turbinate, conspicuously tomentose. Trigonal sepal tips (1.8)-2.0-2.8-(3.2) mm long and (1.2)-1.6-2.2-(2.5) mm broad, erect to patent, persistent, on both surfaces considerably tomentose, concave petals broadly ovate to circular, (5.0)-6.0-6.8-(7.2) mm long and (3.2)-3.8-4.2-(5.0) mm broad, greenish -yellowish, with short clow at base and here (on inner surface) hirsute. Stamens 20, with pale yellow, in youth rosy coloured anthers, (0.9)-1.0-1.2-(1.6) mm long, filaments (3.0)-3.5-4.5-(6.0) mm long, ovary semi-inferior, style 2, villose at the base, connate to 1/3-2/3 lenght, stigmas flat. Infrutescence with (6)-8-12-(18) fruits. Fruits globose, tomentose at erect sepals and apex, (8.5)-10.5-12.5-(14.0) × (8.5)-10.5-12.5-(14.2) mm, orange-red, often with red face, with enough frequent to frequent small lenticels, mesocarp heterogenous, endocarp more or less cartilagineous, with (1)-2 seeds in fruit. Seeds deep brown to black-brown, (4.0)-4.2-4.4-(5.6) × (1.7)-1.9-2.4-(2.8) mm. Triploid species with 2n=51 (MÁRTONFIOVÁ, unpubl. data).

Holotypus: Trebejov, cca. 1 km E., in forest-steppe vegetation, leg. V. MIKOLÁŠ, 6.10.1993 (KO 11377).

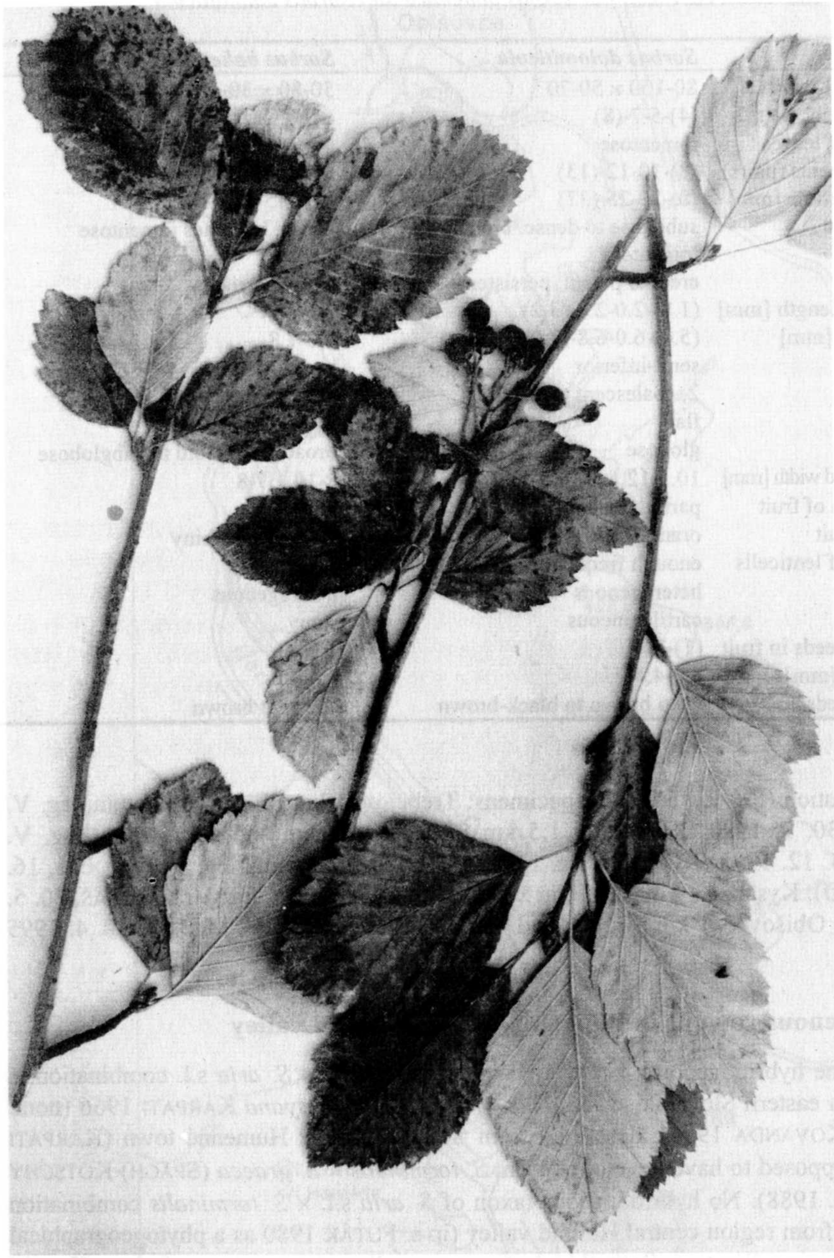

Fig. 1. *Sorbus dolomiticola* MIKOLÁŠ. Holotype.

Tab. 1: The diacritical characters of *Sorbus bohemica* and *Sorbus dolomiticola*

Character	*Sorbus dolomiticola*	*Sorbus bohemica*
Leaves [mm]	80-100 × 50-70	50-80 × 30-40
Number of lobe pairs	(4)-5-7-(8)	6-7
Underside of leaves	tomentose	tomentose
Number of veins (pairs)	(8)-10-12-(13)	8-9-(10)
Length of petiole [mm]	(8)-20-25-(32)	(11)-15-18-(24)
Inflorescence	subdense to dense, branches expres. tomentose	dense, branches tomentose
Calyx teeth	erect to patent, persistent	erect, persistent
Calyx teeth length [mm]	(1.8)-2.0-2.8-(3.2)	2.6-3.0
Petal length [mm]	(5.0)-6.0-6.8-(7.2)	6.0-7.8
Ovary	semi-inferior	semi-inferior
Styles	2, coalescent to 1/3-2/3	2(3), coalescent to 1/3-2/3
Stigma	flat	flat
Fruit	globose	broadly ellipsoid to subglobose
Fruit length and width [mm]	10.5-12.5 × 10.5-12.5	8-10 × 7-8
Indumentum of fruit	partly present	absent
Colour of fruit	orange-red, shiny	orange-red, shiny
Frequency of lenticells	enough frequent to frequent	very sparse
Mesocarp	heterogenous	heterogenous
Endocarp	cartilagineous	stony
Number of seeds in fruit	(1)-2	1-(2)
Seed length [mm]	4.2-4.4	3.4-4.0
Colour of seeds	deep brown to black-brown	chestnut brown

Distribution (Fig. 2): selected specimens: Trebejov, 1 km SE in Carpinetum, leg. V. MIKOLÁŠ, 30. 9. 1990 (KO); dtto, 1.5 km SE, in hornbeam and oak forests, leg. V. MIKOLÁŠ, 3. 12. 1995 (KO); dtto, ca. 1.5 km NO, forest clearing, leg. V. MIKOLÁŠ, 16. 5. 1994 (KO); Kysak, ca. 1 km SEE, in xerothermous oak forest, leg. V. MIKOLÁŠ, 20. 5. 1995 (KO); Obišovce, 1 km SE, oak and hornbeam forests, leg. V. MIKOLÁŠ, 8. 4. 1995 (KO).

Hybridogenous rowans in region of central Hornád valley

Only one hybridogenous species of *Sorbus torminalis* × *S. aria* s.l. combination is known from eastern Slovakia so far. This species, *S. magocsyana* KÁRPÁTI 1966 (nom. inval., cf. KOVANDA 1996), described from Sokol Mt. near Humenné town (KÁRPÁTI 1966), is supposed to have developed from *S. torminalis* × *S. graeca* (SPACH) KOTSCHY (cf. DOSTÁL 1988). No hybridogenous taxon of *S. aria* s.l. × *S. torminalis* combination was known from region central Hornád valley (in s. FUTÁK 1980 as a phytogeographical district of region Western Carpathian's flora, including the territory of river Hornád valley north of Košice town with Branisko Mts., but excluding Galmus Mts; westwards bordering with phytogeographical district Spiš basin and Slovenské rudohorie Mts.).

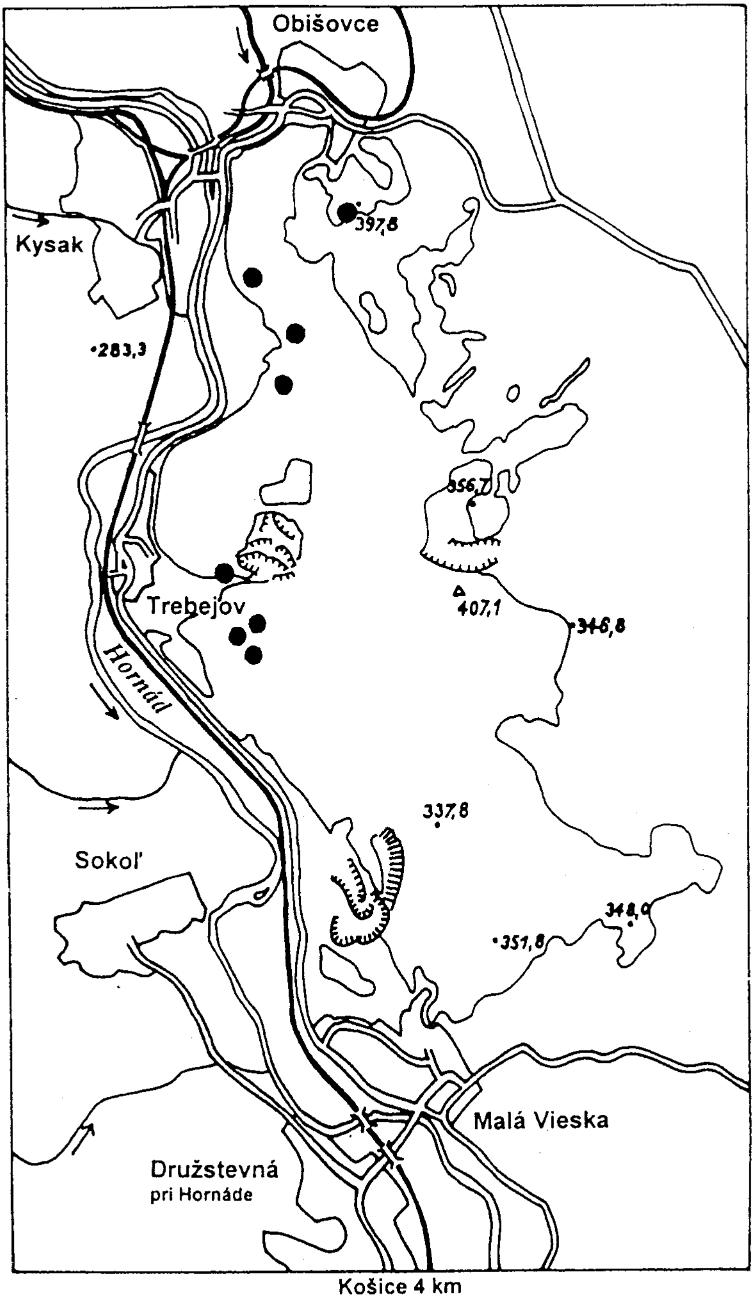

Fig. 2: Distribution of *Sorbus dolomiticola* MIKOLÁŠ

In central Hornád valley phytogeographical district the following rowan species grow: basic species *S. aucuparia* L., *S. aria*, *S. graeca* (MIKOLÁŠ, unpubl. data), *S. torminalis* and numerous transitus (for explanation, see KÁRPÁTI 1960) and hybridogenous species of *S. aucuparia* × *S. aria* s.l. combination. The former ones include *S. thaiszii* (SOÓ) KÁRPÁTI, *S. danubialis* (JÁV.) PRODAN agg., later ones *S. buekkensis* (SOÓ) SOÓ em. KÁRPÁTI, *S. tuzsoniana* KÁRPÁTI and *S. hazslinszkyana* (SOÓ) MÁJOVSKÝ in MÁJOVSKÝ et UHRÍKOVÁ (KÁRPÁTI 1960, MÁJOVSKÝ 1992). Taxonomic value of some of them is not sufficiently known and call for verification by biosystematic research.

In addition, primary hybrids (or individuals from *S. aria* agg. x *S. torminalis* hybridization) are given from the territory. Thus DOMIN (1936) gives occurrence of these hybrids below Sivec Mt. and on Sivec range, JURKO (1951) gives occurrence of similar (analogical) hybrids near Trebejov village, KÁRPÁTI (1966) mentions one specimen from limestone rocks near Velká Lodina village and MÁJOVSKÝ (1992) 2 fruiting trees also near V. Lodina village. It is not clear, if the material of JURKO (1951) is related to newly described species or primary hybrids (MÁJOVSKÝ 1992 doesn't mention this datum in Flora of Slovakia 4/3 any longer).

Many hybridogenous taxa of *S. aria* agg. x *S. torminalis* were described from Europe (cf. KUTZELNIGG 1994 for territory of central Europe, MIKOLÁŠ 1995 for Hungary and Slovakia etc.). Some of them are somewhat morphologically similar to *S. dolomiticola*, e.g. *S. futakiana* KÁRPÁTI (nom.inval., cf. KOVANDA 1996) from SW Slovakia (KÁRPÁTI 1966), *S. karpatii* BOROS or *S. barthae* KÁRPÁTI from NW Hungary (cf. KÁRPÁTI 1960), *S. badensis* DÜLL from S. Germany (cf. DÜLL 1961), or. *S. subcuneata* WILMOTT from the British Isles (cf. SELL 1989).

KOVANDA described one triploid species, *S. bohemica* KOVANDA from Czech republic, especially morphologically reminiscant of *S. dolomiticola* (KOVANDA 1961, JANKUN & KOVANDA 1987). This neoendemic species of České středohoří (Czech Central Mts.) of NW part of Bohemia evolved from hybridization of *S. danubialis* × *S. torminalis* (op. cit.), of identical or close parental combination as in *S. dolomiticola*. *S. bohemica* differs from the central Hornád valley taxon by more characters, e.g. smaller fruits, seeds, stony endocarp, sparse occurrence of fruit lenticells, somewhat ellipsoid fruits, usually narrower and smaller leaves etc. (cf. tab. 1). It is interesting that both species are triploid, while parental species are (both) exclusively (?) diploid entities (JANKUN & KOVANDA 1987). Populations of both parental species, however, were not studied karyologically in the central Hornád valley region so far.

With regards to the complexity of *S. danubialis* agg., but also to the great variability of *S. torminalis*, it is sure that different microtaxa (forms or microspecies) participated in origin of *S. dolomiticola* and *S. bohemica*. It is very probable, that both *S. dolomiticola* and *S. bohemica* are products of back hybridization of primary hybrid *S. danubialis* agg. × *S. torminalis* with *S. danubialis* agg. *S. danubialis* (JÁV.) PRODAN agg. consists of more microspecies described (*S. danubialis* s. s., *S. subdanubialis* (SOÓ) KÁRPÁTI, *S. pannonica* KÁRPÁTI, *S. pseudodanubialis* KÁRPÁTI [nom. inval., cf. KOVANDA 1996] and another ones) with insufficiently clear taxonomy. There are hybridogenous microspecies with origin in hybridization of *S. aria, S. umbellata* (DESF.) FRITSCH and *S. graeca* agg., possibly stabilized by apomixis.

Notes on reproduction in hybridogenous species of *Sorbus* s. l.

Hybridogenous taxa in the genus *Sorbus* which evolved from hybridization of two or, as the case may be, three subgenera (genera), are stabilized by apomixis. But no concrete data on genetic control of apomixis in the genus *Sorbus* (s.l.) are known. So far it was proposed more models for genetic control of apomixis, mentioning recessive or dominant genes, one or more genes (cf. e.g. short account of KOLTUNOW 1994). MOGIE (1992) pointed out that the model of one recessive gene is the most probable and that apomixis can be reached by one mutation affecting the meiosis. This new general model of genetic control of generative and aposporic apomixis by one recessive gene, lies in reaching apomixis by additive dosage of these genes in polyploids. In the case of diploids the possibility of amplification of affected locus is supposed and this is ensured by multiple copying of the locus in diploid genome (op. cit.). JANKUN & KOVANDA (1988) speculate on the origin of apomictic diploid cytotype in *S. eximia* KOVANDA by dihaploidization (parthenogenetic development of reduced egg), but it doesn't make things clear as far as correct genetic mechanism of evolved apomixis is concerned.

MOGIE (1992) supposes that the recessive gene (in amplified loci) hampers meiosis in plant with diplospory or (in case of plants with aposporic apomixis, evolved in apomictic taxa of *Sorbus*) causes degeneration of megaspore or its products, and thus initiation of aposporous embryo sacs.

Various aspects of reproduction process were evaluated in studies of JANKUN et KOVANDA (1986, 1987, 1988) and JANKUN (1993, 1994) revealing a very heterogenous picture of breeding systems of the hybridogenous species studied, the existence of apospory, diplospory, pseudogamy, nucellar polyembryony, chromosome summation, haploid parthenogenesis and autonomous development of endosperm among others. This very complicated picture of breeding systems points out possibilities of extensive evolutionary potential in hybridogenous taxa of the genus *Sorbus*, resulting in heterogenous ways of origin of new hybridogenous taxa.

On the problem of microspecies concept in hybridogenous representatives of the genus *Sorbus*

(Integrated view at time-spacial circumstances of their existence)

Problems of microspecies evaluation in taxa with apomixis point out very different concepts following partly from subjective, diverse evaluation, partly from historical background of understanding of certain microspecies groups, but also from diversity of breeding systems, species distribution and biology (cf. MIKOLÁŠ 1994). Thus, in the genus *Rubus* L. WEBER (e. g. 1981) assigns no importance to local types with areas of up to 20 km in diameter. In this genus with numerous microspecies, frequently unclear and singular populations occur and representatives of the genus are found in rich populations. Abundantly occurring vegetative spreading of the species and clones complicates the situation as well. It stimulated WEBER (WEBER 1981) to more conservative, pragmatic approach to microspecies delimitation. Reasons, why certain species occupy small areas are often nearly contradictory. On the one hand young, more or less recently evolved taxa are present, on the other hand refugial taxa with occurrence on some isolated localities. In other cases the species may not have a possibility of broader expansion, but it can be slightly increasing its distribution area. Taxa of the genus *Sorbus* are being distributed predominantly by ornithochory (or, less often by mammaliochory) (cf. MÜLLER-SCHNEIDER 1986). This can contribute (in some cases) to a rare possibility of taxon transport to remote stands. Such considerably disjunct areas of distribution are known in the genus *Rubus* (WEBER 1987), e. g. *Rubus graecensis* W. MAURER described from Austria was found ca. 350 km north in the territory of northern Moravia (= northeastern part of Czech republic) (HOLUB 1992) or *R. schnedleri* H. E. WEBER with its area of distribution in Germany and Poland, separated by disjunction of ca. 750 km (ZIELINSKI 1991)!

In the genus *Sorbus* such disjunctions are not known, following from smaller number of individuals of microspecies and considerable ecological specialization. A priori, however, the existence of such disjunctions cannot be excluded. Smaller disjunction is known e.g. in *S. bakonyensis* JÁVORKA em. KÁRPÁTI, the most frequent hybridogenous species of Keszthely Mts. (on NW edge of Balaton lake, NW Hungary) with isolated occurrences up to ca. 80 km in NEE direction in Bakony Mts. (cf. KÁRPÁTI 1960). Disjunctions in *S. latifolia* (MONNET DE LA MARCK) PERSOON (e.g. occurrence in SW Germany, cf. KUTZELNIGG 1994) are not clear regarding to confusions of many different microspecies and primary hybrids with this species.

HOLUB (1993), evaluating the problem of delimitation and sense of new species descriptions in the genus *Rubus*, underlines the importance of the role of a species in ecosysteme, and not mere mechanical evaluation according to distribution area size. Studying taxonomic evaluation, comprehension of reality must always issue from careful study of the greatest number of existing populations possible, and not only from the study of some herbarium specimens. Objective assessment of species existence in hybridogenous taxa of the genus *Sorbus*, however, doesn't remain unambiguous. Especially the question connected with the assessment of possible polytopic origin of apomictic microspecies are the problem, which can hardly be resolved once and for all. This is especially characteristic for the genus *Taraxacum* (with apomixis occurring in polyploid taxa), e.g. in *T. vindobonense* VAN SOEST, the broadly multiclonal species which consists of close and more distant clones, morphologically somewhat similar (BATTJES et al. 1993). A very similar and intricate situation is found in some apomictic *Alchemilla* species (MIKOLÁŠ 1994).

In the genus *Sorbus* with usually facultatively apomictic hybridogenous taxa and new taxa continually evolving, it will be especially inevitable in taxonomic evaluation to consider the whole dynamical picture of evolutionary relationships between them and sexual representatives of the genus. Complete evaluation of such evolving systems in space and time and consideration of their reproductive potential is also needed as well as the considerations of their roles in relatively stable climax ecosystems and developmental tendencies. Tension between static concept reflected in taxonomic evaluation and reality wrenching out of our effort (but also pragmatic necessity) to include certain more or less integrated populations within of certain taxa is a source and stimulation also for taxonomists to analyse newly the situation. It can lead to new taxonomic evaluation. Hybridogenous *Sorbus* microspecies are usually in expansion, extending their area of distribution. It also causes, of course, a transformation of existing ecosystems, in which they substitute other woody taxa to a certain extent. Progressive spreading of such species causes shifts in relatively stable ecosystems and theirs qualitative transformations a by step-by-step , evolutionary way.

Notes on distribution, ecology and protection of *Sorbus dolomiticola*

S. dolomiticola occurs in communities very well corresponding with its hybrid origin. It grows either in park forest-steppe xerothermous vegetation on southern and western slopes, or in adjacent edges of forests and range plateau, always on limestone or dolomitic bottom. It grows especially in the association *Corno-Quercetum pubescentis* MÁTHÉ & KOVÁCS, in vegetation of *Carpinion betuli* ISSLER and communities of *Festuco-Brometea* BR.-BL. & R.TX. ex KLIKA & HADAČ, resp. in shrubby communities of *Prunion spinosae* SOÓ (nomenclature according to WALLNÖFER et al. 1993, MUCINA & KOLBEK 1993, WIRTH 1993).

Some robust trees grow in forest communities, other exemplars are dwarf trees or shrubs fruiting already at a height of cca. 3 m (or less), thus reflecting the character of *S. danubialis*, one of parents. A greater part of individuals are flowering and fruiting every year. In autumn reflorescence is frequent. The most distant localities of the species are separated by 3 km distance. It can be supposed that the species is starting its expansion. With regard to the character of fruits with farinaceous (mealy), but more sweet and fruity (juicy) mesocarp its faster spreading by zoochory can be supposed (however, research of preference of particular rowan species by birds [or mammals] is needed because of the possibility of different gustatory perception in comparation with humans). Also heterose effect in hybridogenous species supports its expansion with a possibility to occupy a relatively wide spectrum of coenoses.

The species probably evolved in holocene on xerothermous slopes of hills between Kysak village and Trebejov village (with southern and western exposition) in vicinity of little valley and where it spreads from in N and S direction. This centre of origin can be supposed here according to the biggist number of exemplars with very rich fruiting here. Total number of individuals of the species on all microlocalities (i. e. from westernly exposed slopes near Kysak village to range plateau ca. 1,5 km SE from Trebejov village) is close to hundred. For comparison, in *S. eximia*, neoendemic hybridogenous species of *Sorbus* distributed in Český kras (Czech Karst) SW from Prague in Czech Republic ca. 90 indivuduals with edge localities remote 7 - 8 km from each other are known (JANKUN & KOVANDA 1988), in *S. bohemica* ca. 200 individuals with localities maximally ca. 15 km from each other are known (JANKUN & KOVANDA 1987). With the number of localities the number of individuals grows as well. Difference in area of distribution between *S. dolomiticola* and *S. eximia* with almost the same number of known individuals can be explained by very diversified terrain of Czech Karst causing evidently insufficient exploration of region for total number of individuals of the species.

The species grows in altitude of ca. 250 to 400 m above sea level with frequent occurrence of the (supposed) parental species. It can be supposed that in territory of today quarry (ca. 1 km eastern from Trebejov village) many individuals of the species became extinct. In other, rich microlocality between Kysak village and Trebejov village many individuals of the species were damaged in consequence of felling of woods because of electricity cables accross the hills. The species is able to grow from cut trunk. More southern in direction of Košice town the species didn't penetrate (and even if it could, the only suitable locality of today quarry at Malá Vieska village, was completely exploitated). The species wasn't found on slopes of right side of Hornád river opposite to Trebejov or Kysak. Evidently microlocalities suitable for ecesion are missing here and the species hasn't penetrated to more remote microlocalities so far. The species thus can be to evaluated as narrow, local neoendemic of the phytogeographical district central Hornád valley. From the point of view of Red List of Ferns and Flowering Plants (cf. MAGLOCKÝ & FERÁKOVÁ 1993) this species can be included in category R = rare species. According to IUCN Red List Categories (sec. KADLEČÍK 1995) it can be classified in the category of endangered species with regards to population size and distribution area.

The territory of occurrence of the new rowan species *S. dolomiticola* is characterized by the occurrence of a number of rare and threatened taxa (another hybridogenous neoendemic rowan *S. amici-peteri* ined., *S. graeca* (SPACH) KOTSCHY, *Limodorum abortivum* (L.) O. SWARTZ - probably one of two localities in the region central Hornád valley, *Ophrys insectifera* L., *Epipactis microphylla* (EHRH.) O. SWARTZ, *Draba lasiocarpa* ROCHEL - one of three localities in the same region, *Linum flavum* L., *Dictamnus albus* L., *Scorzonera austriaca* WILLD., *Iris graminea* L.- the only locality in the region, *Pulsatilla slavica* Reuss, *Scorzonera purpurea* L. - one of two localities in the region, *Globularia bisnagarica* L. - the only locality in the region, *Iris aphylla* L. subsp. *hungarica* (WALDST. & KIT.) HEGI - one of two existing localities in the region, one of few localities of *Aposeris foetida* (L.) LESS. in area of central Hornád valley etc.).

It is necessary to prevent another building of quarry near Trebejov and to ensure declaration of state nature reserve to save the conserved remnants of vegetation. Including of the territory of the central Hornád valley to planned Protected Landscape Territories can, perhaps, prevent it from another devastation (preventing the territory from another planting of allochthonous woods, stop chaotic building of chalets and gardening colonies, stop clear-cuttings and other forest devastations, exclusion of building of new quarries, roads among others). It is the only possibility to keep high biodiversity and stability of ecosystems in the territory in future and a way how to conserve populations of the species in area.

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Literature

BATTJES J., MENKEN S. B. J. & NIJS H. J. C. M. den (1992): Clonal diversity in some microspecies of Taraxacum sect. Palustria (Lindb.fil.)Dahlst. from Czechoslovakia. – Bot. Jahrb. Syst. 114: 315-328.

DOMIN K. (1936): Vegetační poměry Sivce [Vegetation of Sivec Mt.]. – Carpatica 1b: 217-236.

DOSTÁL Ľ. (1988): Floristické materiály z východního Slovenska II. [Floristic materials from eastern Slovakia II] – Zborn. Východoslov. Múz. Košice - Prír. Vedy, 28(1987): 61-77.

DÜLL R. (1961): Die Sorbus-Arten und ihre Bastarde in Bayern und Thüringen. – Ber. Bayer. Bot. Ges. 34: 11-65.

FUTÁK J. (1980): Fytogeografické členenie. Príloha k publikácii Flóra Slovenska IV/1. [Phytogeographical division. Addition to the publication Flora of Slovakia IV/1] – Bratislava.

HOLUB J. (1993): A preliminary checklist of Rubus species occurring in the Czech Republic. – Preslia 64 (1992): 97-132.

JANKUN A. (1993): Evolutionary significance of apomixis in the genus Sorbus (Rosaceae) [in Polish]. – Fragm. Flor. Geobot. 38: 627-686.

JANKUN A. (1994): Embryological studies in Sorbus intermedia (Rosaceae). – Pol. Bot. Stud. 8: 69-74.

JANKUN A. & KOVANDA M. (1986): Apomixis in Sorbus sudetica (Embryological studies in Sorbus 1). – Preslia 58: 7-19.

JANKUN A. & KOVANDA M. (1987): Apomixis and origin of Sorbus bohemica (Embryological studies in Sorbus 2). – Preslia 59: 97-116.

JANKUN A. & KOVANDA M. (1988): Apomixis at the diploid level in Sorbus eximia (Embryological studies in Sorbus 3). – Preslia 60: 193-213.

JURKO A. (1951): Vegetácia stredného Pohornádia [Vegetation of the central Hornád valley]. – Bratislava.

KADLEČÍK J. (1995): Kategórie IUCN pre Červené zoznamy [IUCN Red List Categories]. – Ochr. Prír. 13: 321-330.

KÁRPÁTI Z. (1960): Die Sorbus-Arten Ungarns und der angrenzenden Gebiete. – Fedd. Rep. 62: 71-334.

KÁRPÁTI Z. (1966): Adatok az északi kárpátok Sorbus-ainak ismeretéhez [Data to the recognition of northern Carpathian Sorbus species]. – Bot. Közl. 52(1965): 135-140.

KOLTUNOW A. M. (1994): Apomixis: other pathways for reproductive development in angiosperms. – In: WILLIAMS E. G., CLARKE A. E. & KNOX R. B. (eds.): Genetic control of self-incompatibility and reproductive development in flowering plants, pp. 486-512, Dorddrecht, Boston, London.

KOVANDA M. (1961): Spontaneous hybrids of Sorbus in Czechoslovakia. – Acta Univ. Carol. - Biol., 1961/1: 41-83.

KOVANDA M. (1992): 5. Sorbus L. - jeřáb [5. Sorbus L. - rowan]. – In: HEJNÝ S. & SLAVÍK B. [eds.]: Květena České republiky 3, pp. 474-484. – Praha.

KOVANDA M. (1996): Endangered names in Sorbus. – Thaiszia - J. Bot. 6: 13-14.

KUTZELNIGG H. (1994): 19. Sorbus. – In: SCHOLZ H. [ed.]: Gustav Hegi Illustrierte Flora von Mitteleuropa, Band IV, Teil 2B, Lief. 4-6, 2nd ed., pp. 328-385. – Berlin.

MAGLOCKÝ Š. & FERÁKOVÁ V. (1993): Red List of Ferns and Flowering Plants (Pteridophyta and Spermatophyta) of the Flora of Slovakia (the second draft). – Biológia (Bratislava) 48: 361-385.

MÁJOVSKÝ J. (1992): Sorbus L. emend. Crantz. Jarabina [Sorbus L. emend. Crantz. Rowan]. – In: BERTOVÁ L. [ed.]: Flóra Slovenska IV/3, pp. 401-446. – Bratislava.

MIKOLÁŠ V. (1994): Taxonomie a reprodukce hybridogenních taxónů rodu Sorbus [Taxonomy and reproduction of hybridogenous taxa of the genus Sorbus]. - Dendrol. Dni, Nitra 21.-22. 6. 1991, pp. 81 - 88. – Nitra.

MIKOLÁŠ V. (1995): Taxonomy of hybridogenous rowans (Sorbus) in Slovakia and Hungary (with attention to hybridogenous species coming from hybridization of species of the subgenera Aria and Torminaria). – Carinthia II, 53. Sonderheft: 103-105.

MOGIE M. (1992): The evolution of asexual reproduction in plants. – London, Glasgow, New York, Tokyo, Melbourne, Madras.

MUCINA L. & KOLBEK J. (1993): Festuco-Brometea. – In: MUCINA L., GRABHERR G. & WALLNÖFER S. [eds.]: Die Pflanzengesellschaften Österreichs I, pp. 420-492. – Jena, Stuttgart, New York.

MÜLLER-SCHNEIDER P. (1986): Verbreitungsbiologie der Blütenpflanzen Graubündens. – Veröff. Geobot. Inst. ETH, Stift. Rübel, 85: 1-263.

SELL P. D. (1989): Sorbus latifolia (LAM.) PERS. aggregate in the British Isles. – Watsonia 17: 385-399.

WALLNÖFER S., MUCINA L. & GRASS V. (1993): Querco-Fagetea. – In: MUCINA L., GRABHERR G. et WALLNÖFER S. [eds.]: Die Pflanzengesellschaften Österreichs III, pp. 85-236. – Jena, Stuttgart, New York.

WEBER H. E. (1981): Revision der Sektion Corylifolii (Gattung Rubus, Rosaceae) in Skandinavien und im nördlichen Mitteleuropa. – Sonderbände Naturwiss. Ver. Hamburg 4: 1-229.

WEBER H.E. (1987): Typen ornithochorer Arealentwicklung, dargestellt an Beispielen der Gattung Rubus L. (Rosaceae) in Europa. – Bot. Jahrb. Syst. 108: 525-535.

WIRTH J. M. (1993): Rhamno-Prunetea. – In: MUCINA L., GRABHERR G. & WALLNÖFER S. [eds.]: Die Pflanzengesellschaften Österreichs III, pp. 60-84. – Jena, Stuttgart, New York.

ZIELIŃSKI J. (1991): Rubus schnedleri (Rosaceae), a species new to the Polish flora. – Fragm. Flor. Geobot. 36: 273-277.

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