

DISTRIBUTION OF THE ENDEMIC AND CRITICALLY ENDANGERED *DRABA SIMONKAIANA* JÁV. IN THE SOUTHERN CARPATHIANS

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Abstract: *Draba simonkaiana* Jáv. is a critically endangered, Southern Carpathian endemic species, distributed only in Parâng, Retezat and Cozia Mountains. As an European endemic, and restricted to a single European country, *D. simonkaiana* is treated as a “species of European concern”. Although of great international significance, the distribution of *Draba simonkaiana* is slightly known, without any georeferenced records on GBIF. Based on field studies, analyses of herbarium material and literature data, the authors managed to record the occurrence of *D. simonkaiana* in Southern Carpathians and determined the threatened status according to criteria and categories of IUCN. Unfortunately, the species has not been found in locus classicus (Badea Hill) but the authors have discovered two new localities (in Parâng Mountains) of this important endemic species.

Keywords: *Draba simonkaiana* Jáv., endemic species, Southern Carpathians, Romania, threatened species, Red Book, chorology

Introduction

The species was discovered by Jávorka Sándor on 20th of July 1910 in the Parâng Mountains (Southern Carpathians), on the siliceous Badea Rocks (Piatra Crinului) (approximate 1,700 m altitude). On 23rd of November 1910 he published this species in “Botanikai Közlemények”, a Hungarian botanical journal [JÁVORKA, 1910].

Based on a herbarium material (Hungarian Natural History Museum) (the plant collected by Hugó Lojka, a Hungarian botanist, on 26 of July 1880, in Retezat Mountains (Southern Carpathians), Râușor valley and determined as *Draba carinthiaca*) Jávorka described one new form, namely *Draba simonkaiana* Jáv. f. *retyezátensis* Jáv. [JÁVORKA, 1918].

Draba simonkaiana Jáv. (Bot. Közl. IX (1910) 281, tab. III. A.) is a perennial, densely rosulate species. Stem up to 7 cm. Basal leaves 3-12 x 1-2 mm, oblanceolate, mostly entire, stellate-canescens and ciliate; cauline leaves 0-3, stem and pedicels with simple and branched hairs. Inflorescence 3- to 16- flowered. Petals 3-4 mm, white. Silicula 5-6 mm loosely covered with short simple and branched hairs. Stigma 0.7-1 mm, 2-lobed, filamentous [WALTER & AKEROID, 1996]. Flowering time: June. The habitat of the species is mostly siliceous rock crevices in the Southern Carpathians.

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Draba simonkaiana Jáv. differs from *Draba stellata* Jacq. principally in its shorter petals (3-4 mm), 2-lobed stigma (0.7-1 mm), and a chromosome number of $2n = 32$.

Draba simonkaiana Jáv. is mentioned in volume I of Flora Europaea as microspecies under *Draba stellata* (of Alps). For this reason Beldie [BELDIE, 1977] appreciated it (illegitimately) as subspecies (*Draba stellata* Jacq. subsp. *simonkaiana* (Jáv.) Beldie).

In "The Plant List" version 1.1. (www.theplantlist.org) the accepted name of the species is *Draba simonkaiana* Jáv.

In "Euro+Med Plantbase" (www.emplantbase.org) also the accepted name of the species is *Draba simonkaiana* Jáv. In the same database, distribution of the species is not limited to Romania. Species is also cited in Armenia (without any bibliographical reference) [MARHOLD, 2011]. Consulted botanical literature concluded that the species it is a South Carpathians endemite present only in Romania.

Draba simonkaiana Jáv. is included in the list of endemic species of Romania by DIHORU & PARVU (1987) and by COLDEA [COLDEA & al. 2009].

In the complete list of pancarpathian and Southeastern Carpathians endemic species and their distribution per country along the Carpathians, *Draba simonkaiana* Jáv. is included by HURDU [HURDU & al. 2012; HURDU, 2012] in above mentioned list.

In the Carpathian List of Endangered Species [WITKOWSKI & al. 2003], *Draba simonkaiana* Jáv. is considered local endemic for Romanian Carpathians.

Also other authors such as: Borza [BORZA, 1931], Buia [BUIA, 1959], Țopa [ȚOPA, 1960], Beldie [BELDIE, 1967], Buttler [BUTTLER, 1967], Pawłowski [PAWŁOWSKI, 1970], Heltmann [HELTMANN, 1985], Junk [JUNK, 1985], Dihoru & Pârvu [DIHORU & PÂRVU, 1987], Negrean & Oltean [NEGREAN & OLTEAN, 1989], Oprea [OPREA, 2005], Zachos & Habel [BÁLINT & al. 2011], Simon & Pócs [SIMON & PÓCS, 2012] consider that the species is endemic to Southern Carpathians.

In Romanian flora, *Draba simonkaiana* Jáv. is a rare species [OPREA, 2005]; [CIOCÂRLAN, 2009]; [SÂRBU & al. 2013], found in the Red list of superior plants of Romania as vulnerable/rare (VU/R) [OLTEAN & al. 1994], placed in the rare zoological category (R) [BOȘCAIU & al. 1994] and in vulnerable (VU) zoological category [DIHORU & DIHORU, 1994]. Species was also included in the Red book of vascular plants of Romania [DIHORU & NEGREAN, 2009], in the "Critically Endangered" (CR) category, but without indicating IUCN criteria. The threatened status of the species allocated by different authors is shown in Tab. 1.

Tab. 1. Threatened status of *Draba simonkaiana* Jáv. allocated by different authors

Sources	Threatened status
DIHORU & PÂRVU, 1987	VU
OLTEAN & al. 1992	V/R
DIHORU & DIHORU, 1994	VU
BOȘCAIU, 1994	R
WALTER & GILLETTE, 1998	VU
WITKOWSKI & al., 2003	VU
BUORD & LESOËUF, 2006	CR
DIHORU & NEGREAN, 2009	CR

Materials and methods

Our investigation was based on recent field studies, analysis of herbarium material, as well as literature data.

The identification of the taxa has been done using the following “floras” and papers: *Magyar Flóra (Flora Hungarica)* [JÁVORKA 1925]; *Flora R. P. Române*, vol. III [NYÁRÁDY, 1955]; *Flora Europaea*, vol. 1 [WALTER & AKEROYD, 1996]; *Flora ilustrată a României – Pteridophyta et Spermatophyta* [CIOCÂRLAN, 2009]; *Plante vasculare din România: determinator ilustrat de teren* [SÂRBU & al. 2013].

The distribution of *D. simonkaiana* in Romania, has been made based on data from the herbarium collections (Herbarium abbreviation follows Index Herbariorum, except Personal Herbarium) (BP, CL, B, EGR, GZU, BUCA, BUCA) [THIERS, 2012], Personal Herbarium “A. Bartók” (HAB) and also different bibliographical sources.

The collected materials were stored in the Eszterházy Károly College Eger – Department of Botany Herbarium (EGR) and in the Personal Herbarium A. Bartók (HAB).

To determine the conservation status we used IUCN category and criteria (IUCN Red List Categories and Criteria: Version 3.1. Second edition, 2012).

Results

During field trips over the last 134 years (since it was found for first time), *Draba simonkaiana* was collected from six localities, only in Southern Carpathians.

We hereby list all the known specimens, including those traced by us in herbarium collections (BP; CL; B; EGR; GZU; BUCA; HAB), arranged in the chronological order of gathering. It is worth mentioning that no voucher specimen was found in some herbaria (BVS; I; BUAG; SIB; CRAI).

1880 (BP): *Lojka H.*, Retezat Mountains, Râușor valley

1910, 1918 (BP; CL; B; GZU): *Jávorka S.*, Parâng Mountains, Badea hill

1932 (BP): *Vajda L.*, Parâng Mountains, Badea hill

1935 (BP): *Kárpáti Z.*, Parâng Mountains, Badea hill

1956 (BP): *Pócs T.*, Parâng Mountains, Badea hill

1956 (BP): *Pócs T., Simon T.*, Parâng Mountains, Groapa Mândrii valley

? (BUCA): *Negrean G.*, Cozia Mountains, Bulz peak

2013 (HAB): *Bartók A. & Bartók S. I.*, Parâng Mountains, Zănoaga Stănei lake

2013 (EGR): *Pócs T., Vojtkó A.*, Parâng Mountains, E ridge of Mt. Cărbunele

Altogether 13 voucher specimens were deposited in (BP, B, CL, GZU, BUCA, EGR, HAB) from 6 different localities.

Herbarium data

Herbarium materials found by the authors is shown in Tab. 2.

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Tab. 2. Herbarium sheets with *Draba simonkaiana* Jáv. in Southern Carpathians

Geographical region/ Mountains	Locality	Date	Collected by	Source	Observation
Transylvania/ Retezat	"In fissuris rupium umbrosarum vallis Kolcváriensis infra alpem Retezát, com. Hunyad," "Transsylyv."	26/VII/1880	H. Lojka (as <i>Draba carinthiaca</i>)	(BP)	<i>Draba simonkaiana</i> Jáv. f. <i>retezátensis</i> Jáv. [JÁVORKA, 1918]
Transylvania/ Parâng	"Comit. Hunyad: montes Pareng infra Petrozsény: in rupibus Dealu Badea in altit. ca. 1,700 m, una cum <i>Potentilla haynaldiana</i> ."	20/VII/1910	S. Jávorka	(BP72536)	Lectotypus (IX/1999, D. Kováts) [KOVÁTS, 1999]
Transylvania/ Parâng	"Comit. Hunyad: in fissuris rup. granit. montis Dl. Badea, alp. Pareng, alt. 1,700 m."	20/VII/1910	S. Jávorka	(BP)	Isolectotypus (IX/1999, D. Kováts) [KOVÁTS, 1999]
Transylvania/ Parâng	"Kom. Hunyad: in rupestr. Mtis. Dealu Badea alp. Pareng, 1,700-1,750 m. Granit."	20/VII/1910	S. Jávorka	(B0241589)	Note in herbarium label: "Original!"
Transylvania/ Parâng	"Comit. Hunyad, in fissuris rupium jugi "Virf Badea" alpium Pareng, in saxo unico in alt. ca. 1,750 m."	20/VII/1910	S. Jávorka	(GZU)	Isotypus [BUTTLER, 1967]
Transylvania/ Parâng	"Cott. Hunyad: in fissuris rupium mt. Badea in alpe Pareng ad opp. Petrozsény – locus classicus!"	20/VII/1910	S. Jávorka	(CL)	Duplicata
Transylvania/ Parâng	"Comit. Hunyad: in fissuris saxi granitici loco "Badea" dicto in alpe Pareng ad opp. Petrozsény."	12/VI/1918	S. Jávorka	(BP238189)	Isolectotypus (IX/1999, D. Kováts) [KOVÁTS, 1999]
Transylvania/ Parâng	"Comit. Hunyad: in fissuris rupium loci „Badea” dicti in alpe Pareng ad opp. Petrozsény – locus classicus."	12/VI/1918	S. Jávorka	(CL)	Duplicata

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Geographical region/ Mountains	Locality	Date	Collected by	Source	Observation
Transylvania/ Parâng	“Parenghas, Petrozsénynál, Hunyad m., Badea.”	23/VI/1932	L. Vajda	(BP287704)	-
Transylvania/ Parâng	“Comit. Hunyad. In rupestribus graniticis montis Badea alpium Pareng supra opp. Petrozsény; alt. cca. 1,600 m.”	17/VII/1935	Z. Kárpáti	(BP388318)	-
Transylvania/ Parâng	“In Carpat. Merid. In montibus Parîng. In rupibus schist. Badea, in decl. S montis Parîng. Alt. 1,860 m. (Locus classicus!)”	25/VII/1956	T. Pócs	(BP202151)	[PÓCS, 1961]
Transylvania/ Parâng	“In Carpat. Merid. In montibus Parîng. In rupibus schist. in decl. SE supra vallem glacialeam Groapa Mândrii, in alt. 2,060 m s.m.”	1/VIII/1956	T. Pócs, T. Simon	(BP202150)	[PÓCS, 1961]
Oltenia/ Cozia	“Versantul de nord al Muntelui Bulzu.”	?	G. Negrean	(BUCA)	[NEGREAN & OLTEAN, 1989] [DIHORU & NEGREAN, 2009]
Transylvania/ Parâng	“In fissuris rupium prope lacum Zănoaga Stănei. Solo granitico-schistoso.”	17/VI/2013	A. Bartók, S. I. Bartók	(HAB)	-
Transylvania/ Parâng	“On calciphyllite cliff of the E ridge of Mt. Cărbunele, at 2,020-2040 m alt.”	8/IX/2013	T. Pócs, A. Vojtkó	(EGR)	-

The chorological map of *D. simonkaiana* Jáv. is shown in Fig. 1.

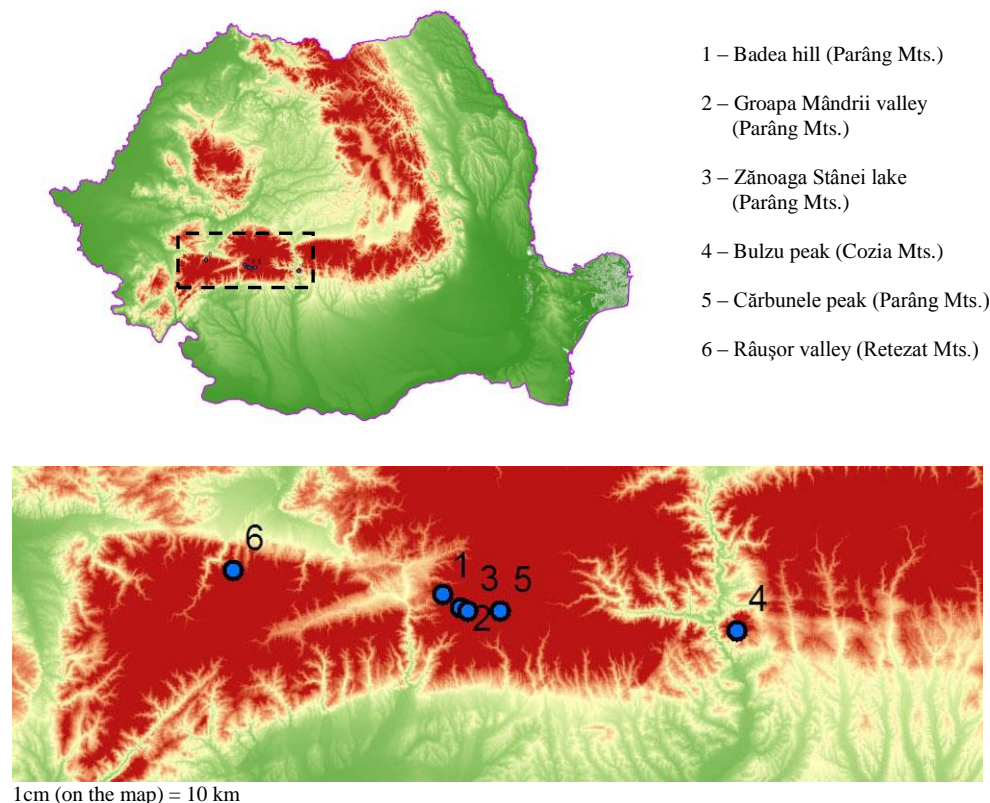


Fig. 1. The chorological map of *Draba simonkaiana* Jáv. in the Southern Carpathians

Field observation

1. During the floristical investigation performed in Parâng Mountains on 17 June 2013, we discovered one small population (10 individuals) of *Draba simonkaiana* Jáv. (Fig. 2), on a rocky cliff with granitic substrate.

Locality: Romania, Southern Carpathians, Parâng Mountains, Zănoaga Stânei lake, 2,076 m a.s.l., exp. SE, incl. 90°, rock cliffs, area 3 m², in a phytocoenosis of ass. *Silene lerchenfeldiana* – *Potentilletum haynaldiana* Horvát, Pawł. et Walas 1937, leg. A. Bartók & S.I. Bartók; date: 17/VI/2013 with the following floristic composition: *Thymus praecox* subsp. *polytrichus* 1, *Juncus trifidus* 1, *Silene lerchenfeldiana* 1, *Draba simonkaiana* +, *Saxifraga pedemontana* subsp. *cymosa* +, *Potentilla haynaldiana* +, *Symphandra wanneri* +, *Phyteuma confusum* +, *Campanula alpina* +, *Sedum alpestre* +.

2. During a trip to obtain *Pinus cembra* material for molecular investigation in the company of Maria Höhn and Endre Tóth, we discovered a small population (9 individuals forming small cushions) of *Draba simonkaiana* Jáv. (photo in Fig. 2) in a calciferous

Seslerio haynaldianae – *Caricetum sempervirentis* Puşcaru et al. 1956 community, accompanied by *Cerastium lanatum* 2, *Dianthus tenuifolius* 1, *Phyteuma nanum* 1, *Rhododenron myrtifolium* 1. *Saxifraga bryoides* +, *Saxifraga paniculata* 2.

Locality: Romania, Southern Carpathians, Parâng Mountains, E ridge of Cărbunele summit at 2,020-2,040 m a.s.l., on E exposed calciphyllite cliffs, incl. 90°, in an area of about 4 m², leg. T. Pócs & A Vojtkó; date 8/IX/2013.

In Romania only three very small populations of *Draba simonkaiana* were known which grow on a restricted area in Retezat, Parâng and Cozia Mountains (Southern Carpathians).

On the basis of chorological data and estimation of the geographical range (extent of occurrence) we can define *Draba simonkaiana* as IUCN CR B1ac (http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf).

Conclusions

Based on field studies, analyses of herbarium material and literature data, the authors managed to record the occurrence of *D. simonkaiana* Jáv. in Southern Carpathians and determined the threatened status according to categories and criteria of IUCN: CRB1ac(iii).

Unfortunately, the species has not been found in its typically locality (Badea hill) but the authors have discovered two new localities (in Parâng Mountains) of this important endemic species: Zănoaga Stânei lake and Cărbunele Peak.

In the newly discovered locations the species is very rare.

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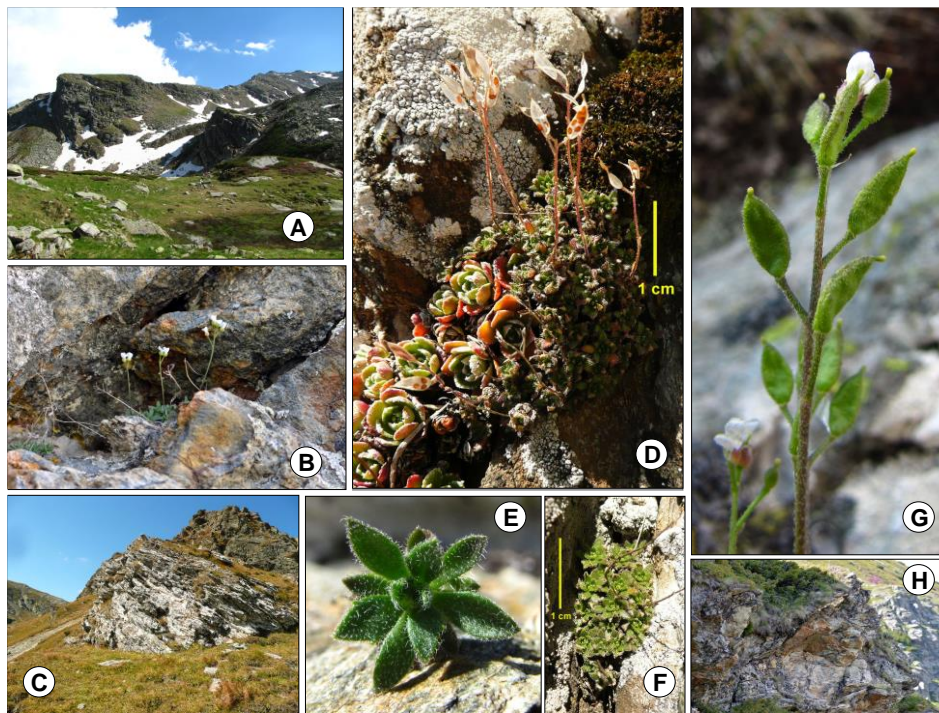


Fig. 2. A – Location lanscape near Zănoaga Stănei lake. B – Habitus of *Draba simonkaiana* on rocky cliff near Zănoaga Stănei lake. C – Natural habitat of *Draba simonkaiana* near Cărbunele peak. D – Habitus of *Draba simonkaiana* on rocky cliff near Cărbunele peak. E, F – Basal leaves of *Draba simonkaiana*. G – Silicles of *Draba simonkaiana*. H – Natural habitat of *Draba simonkaiana* near Zănoaga Stănei lake.

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