

NEW LOCALITIES OF ENDEMIC *AQUILEGIA KITAIBELII* SCHOTT AND *CARDAMINOPSIS CROATICA* (SCHOTT, NYMAN ET KOTSCHY) JÁV. IN CROATIA

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New localities of two endemic, rare and floristically interesting species in the north-western Dinaric Mountains in Croatia are reported in the paper. Both species are statutorily strictly protected species in Croatia. *Aquilegia kitaibelii* Schott, as a rare, endemic species, is included in Appendix II of the Habitats Directive (NATURA 2000 Species) and in the IUCN list as a data deficient (DD) species. New localities of *A. kitaibelii* were found on Mt Obruč and the central and south sections of Mt Velebit, while new localities of *Cardaminopsis croatica* (Schott, Nyman et Kotschy) Jáv. were discovered on hills in the Gacka Region and the central section of Mt Velebit. In general, both species grow mainly from fissures on rocks together with other petrophilous plant species. It was also noted that *A. kitaibelii* grows on screes. In Gacka Region *C. croatica* grows in thermophilous habitats, that is, on rocks with different exposures, together with thermophilous sub-Mediterranean species and with some mountain species of common beech and silver fir forests. In the central section of Mt Velebit, *C. croatica* also grows in a thermophilous community of forest rocks as well as in anthropogenic habitats, like the edges of gravel roads. These observations suggest the ecological adaptability of this endemic species.

Key words: *Aquilegia kitaibelii*, *Cardaminopsis croatica*, endemic species, NATURA 2000 species, Dinaric Mountains

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U radu su navedeni novi, do sada neobjavljeni lokaliteti dviju endemičnih i floristički zanimljivih vrsta rasprostranjenih na području sjeverozapadnih Dinarida u Hrvatskoj. Obje vrste su u nas i zakonom strogo zaštićene. Jedna od njih je Kitaibelov pakujac (*Aquilegia kitaibelii* Schott) koji je kao rijetka, endemična vrsta uvrštena na popis NATURA 2000 vrsta. Nova nalazišta Kitaibelova pakujaca zabilje-

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žena su na širem području planinske skupine planine Obruč te na srednjem i južnom Velebitu, dok su novi lokaliteti hrvatske gušarke (*Cardaminopsis croatica* (Schott, Nyman et Kotschy) Jáv.) utvrđeni na području srednjeg Velebita i na padinama brežuljaka regije Gacke. Obje vrste na većini novih nalazišta rastu u pukotinama stijena zajedno s drugim petrofilnim vrstama, a Kitaibelov pakujac zabilježili smo i na točilima. Za hrvatsku gušarku posebno su zanimljiva nalazišta u regiji Gackoj, gdje raste na termofilnim stijenama različitih ekspozicija, u okruženju mješavine termofilnih submediteranskih vrsta i nekih brdskih vrsta bukovo-jelovih šuma. Uz Premužićevu stazu na srednjem Velebitu *C. croatica* se također pojavljuje u termofilnim zajednicama šumskih stijena. Opaženo je i da, osim stijena, hrvatska gušarka nastanjuje i sekundarna, antropogena staništa, kao što su rubovi šumskih cesta, što ukazuje na ekološku plastičnost ove endemične vrste.

Ključne riječi: *Aquilegia kitaibelii*, *Cardaminopsis croatica*, endemične vrste, NATURA 2000 vrste, Dinarske planine

INTRODUCTION

Aquilegia kitaibelii Schott (*Ranunculaceae*) is a perennial plant up to 40 cm tall and with 1–2 (–6) blue-violet flowers. It is distributed in Croatia and Bosnia and Herzegovina at altitudes ranging from 1200 to 1700 m a.s.l. (CULLEN & HEYWOOD, 1964; KREMER, 2008). Additionally, there are unconfirmed observations that *A. kitaibelii* grows on Mt Snežnik in Slovenia (PODOBNIK *et al.*, 2013). The literature data about the presence of *A. kitaibelii* in northeastern Italy (ŠILIĆ, 1990) also needs to be confirmed because it is possible that *A. kitaibelii* of northeastern Italy is closely related to the species *Aquilegia bertolonii* Schott s.l. (PODOBNIK *et al.*, 2013). In Croatia it can be found on Mt Obruč, Mt Risnjak, Mt Snježnik, Bijeleske stijene, Mt Velebit, Mt Plješivica, Mt Dinara, Mt Biokovo and in Plitvice Lakes National Park (DEGEN, 1938: 118; HORVAT, 1962; KUŠAN, 1969; HORVAT *et al.*, 1974; FORENBACHER, 1990; ŠEGULJA, 1994; ŠEGULJA *et al.*, 1994; ALEGRO, 2004; RANDIĆ, 2010; NIKOLIĆ (*ed.*), 2013). *Aquilegia kitaibelii* is a statutorily strictly protected species in Croatia (ANONYMOUS, 2013). As a rare, endemic species *A. kitaibelii* is included in Appendix II of the Habitats Directive (NATURA 2000 Species). The species is recognized in the IUCN list, though as DD (data deficient), so it is of importance to collect as many data as possible about distribution range, number of populations, number of plants per population, and habitat conditions. *Aquilegia kitaibelii* is also included in Appendix IV of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (ANONYMOUS, 2013). It is also included in Appendix I of the Bern Convention on the Conservation of European Wildlife and Natural Habitats as strictly protected flora species. Additionally, it is worth mentioning that *Aquilegia* species are a well-known plant model organism in the field of evolutionary biology (FIOR *et al.*, 2013).

Cardaminopsis croatica (Schott, Nyman et Kotschy) Jáv. (syn. *Arabidopsis croatica* (Schott ex Nyman et Kotschy) O'Kane et Al-Shehbaz, *Arabis croatica* Schott, Nyman et Kotschy, *Brassicaceae*) is a perennial plant up to 20 cm tall, with a glabrous, erect, flexuous, divaricately branched stem and with several white or pinkish flowers. It is a montane to subalpine plant distributed in Croatia and Bosnia and Herzegovina within an altitude ranging from 500 to 1500 m a.s.l. (ŠILIĆ, 1990; SCHMICKL *et al.*, 2012). In Croatia, it can be found on mountainous to subalpine parts of Mt Velika Kapela, Mt Senjsko bilo, Mt Velebit, and Mt Lička Plješivica. Also, it has been found at lower altitudes at some localities in Lika (DEGEN, 1938; HORVAT, 1962; HORVAT *et al.*, 1974; FORENBACHER, 1990; ŠEGULJA, 1994; ALEGRO, 2004; NIKOLIĆ (*ed.*), 2014). According to the new taxonomic point of view, *C. croatica* was removed from the genus *Cardaminopsis* and placed in the genus *Arabidopsis* (AL-SHEHBAZ and O'KANE, 2002). Being closely related to the preeminent plant model

organism *Arabidopsis thaliana* (L.) Heynh., *C. croatica* has become a very interesting species (SCHMICKL, 2012; HOHMANN et al., 2014). This is yet another reason why it is important to find as many localities of *C. croatica* as possible and reveal any differences there might be in the ecological characteristics among habitats of this endemic species. Additionally, *Cardaminopsis croatica* is a statutorily strictly protected species in Croatia (ANONYMOUS, 2013).

The aim of this paper is to present new localities of the endemic Illyrian-Balkan species *A. kitaibelii* and *C. croatica* in Croatia. Any information concerning the localities of *A. kitaibelii* and *C. croatica* helps to broaden our knowledge of their population numbers, environmental conditions, and range. Such information could help in putting in place monitoring schemes for both species, developing plans for managing protected areas and ecological networks, and ensuring *in situ* and *ex situ* conservation. Additionally, the data are important for making re-evaluations of the NATURA 2000-documents and the Croatian Red Book of Vascular Plants (KREMER et al., 2014).

MATERIALS AND METHODS

The new localities were discovered during several field trips undertaken from June 2007 to October 2014. Each locality was described via data on altitude and location obtained using Garmin eTrex Vista HCx and Gauss-Krüger coordinates system. Standard keys for identification were used (CULLEN & HEYWOOD, 1964; ŠILIC, 1990; DOMAC, 1994). NIKOLIĆ (ed.) (2014) was employed as a standard for the nomenclature of the species. A list of prevailing species which grow inside and on the border of the investigated populations of *A. kitaibelii* and *C. croatica* was added. Habitat type was determined according to the National Habitat Classification (ANONYMOUS, 2009).

Voucher specimens were deposited in the Fran Kušan Herbarium at the Department of Pharmaceutical Botany with the Fran Kušan Pharmaceutical Botanical Garden of the Faculty of Pharmacy and Biochemistry, University of Zagreb, Croatia.

RESULTS AND DISCUSSION

Tab. 1 displays a total of 39 new localities of *A. kitaibelii* and *C. croatica* in the north-western Dinaric Mountains in Croatia.

Localities of *Aquilegia kitaibelii*

New localities of *A. kitaibelii* were found in the hinterland mountains of the city of Rijeka and on Mt Velebit. HORVAT (1962) mentioned the presence of *A. kitaibelii* on Mt Risnjak and Mt Obruč, but without specific information about where it grows. SURINA (2013) also described two localities of *A. kitaibelii* on Mt Obruč. The presence of *C. croatica* on Mt Risnjak was not confirmed during these investigations although it was noted by ŠEGULJA et al. (1994).

1. Pakleno (Mt Obruč)

Several dozen plants of *A. kitaibelii* were found on the north-exposed, partly shaded calcareous rocks at the bottom of Mt Obruč in the Pakleno area. Nearby vegetation is represented by subalpine underwoods and forests of *Abies alba* Mill. developed on stone blocks. *Aquilegia kitaibelii* grows from the fissures in limestone together with *Asplenium fissum* Kit., *A. ruta-muraria* L., *Galium lucidum* All., *Cyclamen purpurascens* Mill., *Gentiana*

Tab. 1. Newly found localities of *Aquilegia kitaibelii* and *Cardaminopsis croatica* in Croatia.

Loc. no.	Taxon	x coordinate	y coordinate	Altitude (m)	Habitat type according to National habitat classification (NHC)	Date	Author
1	<i>A. kitaibelii</i>	5458497	5035922	1191	B.1.3. Alpine-Carpathian-Balcanic limestone rocks	04.09.2011.	Randić, Kremer
2	<i>A. kitaibelii</i>	5459866	5034647	1187	B.1.3. Alpine-Carpathian-Balcanic limestone rocks	04.09.2011.	Randić, Kremer
3	<i>A. kitaibelii</i>	5460125	5034529	1205	B.1.3. Alpine-Carpathian-Balcanic limestone rocks	04.09.2011.	Randić, Kremer
4	<i>A. kitaibelii</i>	5463387	5033517	1331	B.1.3. Alpine-Carpathian-Balcanic limestone rocks	03.09.2011.	Randić, Kremer
5	<i>A. kitaibelii</i>	5499003	4948357	1308	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
6	<i>A. kitaibelii</i>	5501902	4944745	1286	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
7	<i>A. kitaibelii</i>	5532350	4914041	943	B.1. Not overgrown and slightly overgrown rocks	05.05.2014.	Lukač
8	<i>A. kitaibelii</i>	5533461	4911919	1038	B.1. Not overgrown and slightly overgrown rocks	28.06.2014.	Lukač
9	<i>A. kitaibelii</i>	5533080	4911661	1004	B.1. Not overgrown and slightly overgrown rocks	18.05.2013.	Lukač
10	<i>A. kitaibelii</i>	5533489	4911265	798	B.1. Not overgrown and slightly overgrown rocks	18.05.2013.	Lukač
11	<i>A. kitaibelii</i>	5535112	4911487	952	B.1. Not overgrown and slightly overgrown rocks	18.05.2013.	Lukač
12	<i>A. kitaibelii</i>	5535641	4912450	1084	B.1. Not overgrown and slightly overgrown rocks	02.07.2014.	Lukač
13	<i>A. kitaibelii</i>	5536173	4913296	1003	B.1. Not overgrown and slightly overgrown rocks	03.06.2009.	Lukač
14	<i>A. kitaibelii</i>	5536818	4913535	1161	B.1. Not overgrown and slightly overgrown rocks	03.06.2009.	Lukač
15	<i>A. kitaibelii</i>	5538074	4913919	1402	B.1. Not overgrown and slightly overgrown rocks	06.06.2008.	Lukač
16	<i>A. kitaibelii</i>	5540018	4912747	1504	B.1. Not overgrown and slightly overgrown rocks	06.06.2008.	Lukač
17	<i>A. kitaibelii</i>	5542069	4912919	1348	B.1. Not overgrown and slightly overgrown rocks	16.06.2007.	Lukač
18	<i>A. kitaibelii</i>	5542849	4911395	1504	B.1. Not overgrown and slightly overgrown rocks	16.06.2007.	Lukač
19	<i>A. kitaibelii</i>	5543279	4911187	1535	B.1. Not overgrown and slightly overgrown rocks	16.06.2007.	Lukač
20	<i>A. kitaibelii</i>	5548811	4904414	897	B.1. Not overgrown and slightly overgrown rocks	28.05.2012.	Lukač
21	<i>C. croatica</i>	5518101	4965396	499	B.1. Not overgrown and slightly overgrown rocks	28.04.2012.	Brajković, Čulinović, Randić, Kremer
22	<i>C. croatica</i>	5517434	4965665	545	B.1. Not overgrown and slightly overgrown rocks	28.04.2012.	Brajković, Čulinović, Randić, Kremer

23	<i>C. croatica</i>	5526437	4961308	456	B.1. Not overgrown and slightly overgrown rocks	23.06.2012.	Brajković, Čulinović, Randić, Kremer
24	<i>C. croatica</i>	5518076	4964438	574	B.1. Not overgrown and slightly overgrown rocks	30.06.2012.	Kremer
25	<i>C. croatica</i>	5497663	4951861	1366	B.1. Not overgrown and slightly overgrown rocks	12.10.2014.	Kremer
26	<i>C. croatica</i>	5498129	4949988	1314	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
27	<i>C. croatica</i>	5599083	4948173	1299	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
28	<i>C. croatica</i>	5499003	4948357	1308	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
29	<i>C. croatica</i>	5499930	4947626	1352	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
30	<i>C. croatica</i>	5501902	4944745	1286	B.1. Not overgrown and slightly overgrown rocks	22.06.2013.	Randić, Brkljačić, Kremer
31	<i>C. croatica</i>	5501762	4944496	1271	B.1. Not overgrown and slightly overgrown rocks	23.06.2013.	Randić, Brkljačić, Kremer
32	<i>C. croatica</i>	5502035	4942682	1081	B.1. Not overgrown and slightly overgrown rocks	23.06.2013.	Randić, Brkljačić, Kremer
33	<i>C. croatica</i>	5504205	4939275	979	B.1. Not overgrown and slightly overgrown rocks	23.06.2013.	Randić, Brkljačić, Kremer
34	<i>C. croatica</i>	5505200	4937515	1027	B.1. Not overgrown and slightly overgrown rocks	15.06.2013.	Randić, Brkljačić, Kremer
35	<i>C. croatica</i>	5504988	4938091	986	B.1. Not overgrown and slightly overgrown rocks	15.06.2013.	Randić, Brkljačić, Kremer
36	<i>C. croatica</i>	5506898	4936280	978	E.3.5.6. As. <i>Seslerio autumnalis-Ostryetum</i> Ht. et H-ic in Ht. 1950	15.06.2013.	Randić, Brkljačić, Kremer
37	<i>C. croatica</i>	5509091	4934040	963	E.3.5.6. As. <i>Seslerio autumnalis-Ostryetum</i> Ht. et H-ic in Ht. 1950	15.06.2013.	Randić, Brkljačić, Kremer
38	<i>C. croatica</i>	5511519	4933766	982	E.3.5.6. As. <i>Seslerio autumnalis-Ostryetum</i> Ht. et H-ic in Ht. 1950	15.06.2013.	Randić, Brkljačić, Kremer
39	<i>C. croatica</i>	5512545	4933376	988	J.4.4.5. Other infrastructural areas	15.06.2013.	Randić, Brkljačić, Kremer

Note: Loc. no. – Locality number (according to the order in text)

lutea L. ssp. *symphyandra* (Murb.) Hayek, *Ligusticum lucidum* Mill., *Solidago virgaurea* L., *Carex brachystachys* Schrank, *Calamagrostis* sp., *Hieracium* sp., *Clematis alpina* (L.) Mill., *Erica carnea* L., *Daphne alpina* L., *Juniperus communis* L. ssp. *alpina* (Sm.) Čelak., *Salix appendiculata* Vill., *Rhododendron hirsutum* L.

2. Napa (Mt Obruč)

Napa is a rocky peak on Mt Obruč located in the Pakleno area near a trail leading to the Hahlić mountain lodge. Several plants of *A. kitaibelii* grow from the fissures in limestone exposed to the east. Plant species that grow together with *A. kitaibelii* are *Asplenium ruta-muraria*, *A. trichomanes* L., *Erigeron glabratus* Bluff et Fingerh., *Micromeria thymifolia* (Scop.) Fritsch, *Leontopodium alpinum* Cass., *Silene saxifraga* L., *Campanula cespitosa* Scop., *Calamagrostis* sp., *Hieracium* sp., *Juniperus communis* ssp. *alpina*, *Daphne alpina*, *Salix appendiculata*.

3. Belvedere near Špilja in the Pakleno area (Mt Obruč)

A few hundred meters from the Napa Peak and near the Špilja locality in the Pakleno area there is an unnamed lookout point located on the left side of the trail (in the direction of the Hahlić mountain lodge). Several dozen plants of *Aquilegia kitaibelii* grow from fissures in vertical limestone rock exposed to the east. Plant species that grow together with *A. kitaibelii* are *Asplenium ruta-muraria*, *Campanula cochleariifolia* Lam., *Micromeria thymifolia*, *Carex brachystachys*, *Sesleria tenuifolia* Schrad., *Clematis alpina*, *Teucrium montanum* L., *Juniperus communis* ssp. *alpina*, *Daphne alpina*.

4. Crni vrh

Crni vrh (1335 m a.s.l.) is the highest peak in the eastern section of the Mt Obruč group and it is located several kilometers from the winter resort of Platak. Several dozen plants of *A. kitaibelii* grow from fissures in limestone exposed to the east and northeast. Plant species that grow together with *A. kitaibelii* are *Campanula justiniana* Witasek, *Carex brachystachys*, *Galium lucidum*, *Genista sericea* Wulfen, *Micromeria thymifolia*, *Athamanta turbith* (L.) Brot. ssp. *haynaldii* (Borbás et Euchtr.) Tutin., *Sesleria tenuifolia*, *Hieracium* sp., *Satureja subspicata* Bartl. ex Vis. ssp. *liburnica* Šilić.

Aquilegia kitaibelii was also found in two new locations in the central section of Mt Velebit and in fourteen new localities in the southern section of Mt Velebit. The presence of *A. kitaibelii* in the southern part of Mt Velebit (Paklenica National Park, Buljma, Babin vrh, Crljeni kuk, Kom, Komić, Malovan, Segestin, Sveto Brdo, Tulove grede) was mentioned by DEGEN (1938), ALEGRO (2004) and NIKOLIĆ (ed.) (2014). In general, *A. kitaibelii* grows on rocks together with other petrophilous plants.

5. Gornje Branjevine 1

Almost at the end of the Gornje Branjevine grassland, there is a group of *Picea abies* (L.) H. Karst trees. Several dozen plants of *Aquilegia kitaibelii* grows near the Premužić Trail on limestone rocks with a north – northwestern exposure, together with *Cardaminopsis croatica*, *Sedum sexangulare* L., *Saxifraga paniculata* Mill., *Edraianthus tenuifolius* (Waldst. et Kit.) A. DC., *Campanula waldsteiniana* Shult., *Arenaria gracilis* Waldst. et Kit., *Athamanta turbith*, *Inula ensifolia* L., *Sesleria tenuifolia*, *Helianthemum nummularium* (L.) Mill. ssp. *obscurum* (Čelak.) Holub, *Thymus longicaulis* C. Presl, *Juniperus communis* ssp. *alpina*, *Satureja subspicata*, *Arctostaphylos uva-ursi* (L.) Spreng., *Rosa spinosissima* L., *Amelanchier ovalis* Medik., *Abies alba*, *Picea abies*.

6. Below Ograđenica

Several dozen plants of *A. kitaibelii* grow near the Premužić Trail, and near the crossing for the Ograđenica Mountain Shelter in the central section of Mt Velebit. *Aquilegia kitaibelii* grows on limestone rocks on both sides of the trail and is exposed to the west. Habitats are partly in the shadow of beech forests. Plant species that grow together with *A. kitaibelii* are *Cardaminopsis croatica*, *Asplenium ruta-muraria*, *Micromeria thymifolia*, *Moehringia muscosa* L., *Corydalis ochroleuca* Koch., *Arabis turrita* L., *Valeriana tripteris* L., *Thalictrum aquilegifolium* L., *Solidago virgaurea*, *Galium mollugo* L., *Athamantha turbith* ssp. *haynaldii*, *Dianthus integer* Vis., *Ligusticum lucidum*, *Melica nutans* L., *Rosa* sp., *Daphne alpina*, *Juniperus communis* ssp. *alpina*, *Cotoneaster nebrodensis* (Guss.) K. Koch, *Populus tremula* L., *Sorbus austraca* (Beck) Hedl., *Fagus sylvatica* L., *Picea abies*.

7. Rujanska kosa

Rujanska kosa is a meadow strewn with stones and located between Veliko Rujno and Malo Rujno. *Aquilegia kitaibelii* grows on rocks exposed to the southeast and southwest. Plant species that grow together with *A. kitaibelii* are *Thalictrum minus* L., *T. aquilegifolium*, *Asperula* sp., *Cornus mas* L., *Viburnum lantana* (L.) Spreng, *Pinus nigra* Arnold.

8. Milovačka gora

Milovačka gora is a rocky area located near the trail from Veliko Rujno to Bojinac. *Aquilegia kitaibelii* grows on rocks exposed to the northwest and northeast. Plant species that grow together with *A. kitaibelii* are *Genista sylvestris* Scop. ssp. *dalmatica* (Bartl.) H. Lindb, *Globularia cordifolia* L., *Teucrium chamaedrys* L., *Cotoneaster nebrodensis*, *Frangula rupestris* (Scop.) Schur, *Ostrya carpinifolia* Scop., *Fagus sylvatica*.

9. Bojinac

Bojinac is a rocky area located in the western part of Paklenica National Park. *Aquilegia kitaibelii* grows from the fissures in limestone exposed to the northwest and northeast. Plant species that grow together with *A. kitaibelii* are *Polygala nicaensis* Risso ex W. D. J. Koch, *Micromeria thymifolia*, *M. croatica* (Pers.) Schott, *Campanula waldsteiniana*, *C. pyramidalis* L., *Teucrium montanum*, *Amelanchier ovalis*, *Frangula rupestris*, *Cotoneaster nebrodensis*, *Ostrya carpinifolia*, *Fagus sylvatica*.

10. Žlibati kuk

Žlibati kuk is a peak (799 m a.s.l.) located above Veliki Vaganac in Paklenica National Park. *Aquilegia kitaibelii* grows on scree exposed to the northeast and northwest. Plant species that grow together with it are *Micromeria croatica*, *Campanula waldsteiniana*, *C. pyramidalis*, *Tulipa sylvestris* L., *Cotoneaster nebrodensis*, *Amelanchier ovalis*, *Frangula rupestris*, *Ostrya carpinifolia*, *Fraxinus ornus* L.

11. Bilig

Bilig is a peak in the western part of Paklenica National Park. Plants of *A. kitaibelii* grow on rocks and scree exposed to the southwest and southeast. Additionally, the habitat is exposed to strong northerly winds. Plant species that grow together with *A. kitaibelii* are *Tulipa sylvestris*, *Globularia cordifolia*, *Cotoneaster nebrodensis*, *Amelanchier ovalis*, *Ostrya carpinifolia*.

12. Zupkov dočić

Zupkov dočić is located below Veliki Golić Peak (1236 m a.s.l.) in Paklenica National Park. *Aquilegia kitaibelii* was found on rocks exposed to the southwest, and located at the

edge of a black pine forest. Plant species that grow together with *A. kitaibelii* are *Campanula waldsteiniana*, *C. pyramidalis*, *C. velebitica* Borbas, *Micromeria croatica*, *Cotoneaster nebrodensis*, *Teucrium chamaedrys*, *Globularia cordifolia*, *Genista sylvestris* ssp. *dalmatica*, *Fragula rupestris*, *Amelanchier ovalis*, *Pinus nigra*.

13. Zanzibar

Zanzibar is a spring between Veliko Rujno and mountain hut Paklenica. A large population of *A. kitaibelii* was found inside a beech forest on rocks exposed to the southeast. Plant species that grow together with *A. kitaibelii* are *Polygala vulgaris* L., *Knautia drymeia* Heuff., *Arabis hirsuta* (L.) Scop., *Campanula glomerata* L., *Silene vulgaris* (Moench.) Garcke, *Helianthemum nummularium* (L.) Mill. ssp. *glabrum* (Koch) Wilczek, *Chamaecytisus hirsutus* (L.) Briq., *Acer pseudoplatanus* L., *A. obtusatum* Kit., *Fraxinus ornus*, *Fagus sylvatica*.

14. Below Buljma

A large population of *A. kitaibelii* was found below Buljma Peak (1415 m a.s.l.) where it grows on rocks exposed to the southwest. Plant species that grow together with *A. kitaibelii* are *Asplenium trichomanes*, *A. ceterach* L., *Silene vulgaris*, *Scrophularia canina* L., *S. heterophylla* Willd. ssp. *laciniata* (Waldst. et Kit.) Maire et Petitm., *Sesleria tenuifolia*, *Solidago virgaurea*, *Globularia cordifolia*, *Amelanchier ovalis*, *Sorbus aria* (L.) Crantz, *Ostrya carpinifolia*, *Fagus sylvatica*.

15. Below Rapavac

Rapavac (1617 m a.s.l.) is a well-known peak in Paklenica National Park. *Aquilegia kitaibelii* grows on rocks located between a subalpine beech forest and a *Pinus mugo* forest. Plants of *A. kitaibelii* are exposed to the southwest and grow together with *Campanula waldsteiniana*, *C. velebitica*, *Cerastium dinaricum* G. Beck et Szyszył, *Achillea clavinae* L., *Drypis spinosa* L., *Paronychia kapela* (Hacq.) A. Kerner., *Rhamnus alpinus* L. ssp. *fallax* (Boiss.) Maire et Petitm., *Pinus mugo* Turra, *Fagus sylvatica*.

16. Lipa staza Trail

The Lipa staza Trail is a part of the trail from Babin Kuk (1431 m a.s.l.) to Vaganski Vrh peak (1757 m a.s.l.) in Paklenica National Park. *Aquilegia kitaibelii* grows on rocks exposed to the south, southeast and southwest together with *Campanula waldsteiniana*, *C. velebitica*, *Cerastium dinaricum*, *Linaria alpina* L., *Achillea clavinae*, *Bunium alpinum* Waldst. et Kit., *Iberis pruitii* Tineo, *Paronychia kapela*, *Biscutella laevigata* L., *Sesleria tenuifolia*, *Drypis spinosa*, *Rhamnus alpinus* ssp. *fallax*, *Pinus mugo*, *Fagus sylvatica*.

17. Below Malovan

The presence of *A. kitaibelii* on Malovan Peak was reported by DEGEN (1938). During the present investigation *A. kitaibelii* was also found below Malovan where it grows on rocks exposed to the northeast and northwest. Plant species that grow together with *A. kitaibelii* are *Asplenium trichomanes*, *A. ruta-muraria*, *A. adiantum-nigrum* L., *Primula kitaibeliana* Schott., *Cerastium dinaricum*, *Astrantia major* L., *Bupththalmum salicifolium* L., *Lamium galeobdolon* (L.) L., *Heraclium sphondylium* L., *Dryas octopetala* L., *Globularia cordifolia*, *Cotoneaster integerrimus* Medik., *Amelanchier ovalis*, *Pinus mugo*, *Fagus sylvatica*.

18. Zala Ploča

Zala Ploča is a rocky area between Čičina Dolina and Malovan. *Aquilegia kitaibelii* grows from fissures in limestone exposed to the east and southeast. Plant species that

grow together with *A. kitaibelii* are *Asplenium ruta-muraria*, *A. trichomanes*, *A. adiantum-nigrum*, *Bunium alpinum*, *Cerastium dinaricum*, *Heracleum sphondylium*, *Iberis pruitii*, *Linaria alpina*, *Paronychia kapela*, *Androsace villosa* L., *Teucrium montanum*, *Globularia cordifolia*, *Pinus mugo*.

19. Čičina Dolina

Čičina Dolina is a small pass in the southern section of Mt Velebit. *Aquilegia kitaibelii* grows on rocks exposed to the south, southeast and southwest. Plant species that grow together with *A. kitaibelii* are *Globularia cordifolia*, *Teucrium montanum*, *Campanula velebitica*, *Asplenium adiantum-nigrum*, *A. ruta-muraria*, *A. trichomanes*, *Cerastium dinaricum*, *Iberis pruitii*, *Paronychia kapela*.

20. Bukva Crossing

Bukva Crossing is a place where the trails leading to Tulove Grede and Veliko Libinje cross. *Aquilegia kitaibelii* was found on rocks nearby the gravel road, where it grows with *Asplenium trichomanes*, *A. ruta-muraria*, *A. adiantum-nigrum*, *Campanula waldsteiniana*, *C. velebitica*, *Cerastium dinaricum*, *Solidago virgaurea*, *Paronychia kapela*, *Sesleria tenuifolia*, *Globularia cordifolia*, *Rhamnus alpinus* ssp. *fallax*.

Localities of *Cardaminopsis croatica*

New localities of *Cardaminopsis croatica* were found in the Gacka Region and on Mt Velebit. During this research, *C. croatica* was not found on Mt Risnjak although this locality was mentioned by ŠEGULJA *et al.* (1994).

21. Obilje 1

Obilje is a part of the settlement of Prozor near the town of Otočac in the Gacka Region. Several plants of *Cardaminopsis croatica* grow near a gravel road in an *Abies alba* forest on limestone rock exposed to the south. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *A. ruta-muraria*, *Moehringia muscosa*, *Corydalis ochroleuca*, *Cardamine impatiens* L., *Geranium robertianum* L., *Sedum telephium* L. ssp. *maximum* (L.) Krock., *Myrcelis muralis* (L.) Dumort., *Calamintha grandiflora* (L.) Moench, *Fragaria vesca* L., *Lamium galeobdolon*, *Lamium orvala* L., *Mercurialis perennis* L., *Stellaria holostea* L., *Lilium martagon* L., *Carex sylvatica* Huds., *Teucrium chamaedrys*, *Clematis vitalba* L., *Lonicera xylosteum* L., *Euonymus verrucosa* Scop., *Euonymus latifolia* (L.) Mill., *Corylus avellana*, *Fraxinus ornus*, *Sorbus torminalis* (L.) Crantz.

22. Obilje 2

Limestone rock situated several dozen meters from a gravel road and surrounded by *Carpinus betulus* L., *Quercus petraea* (Matt.) Liebl. and an *Abies alba* forest is another new locality of *C. croatica*. Plant species that grow together with *C. croatica* are *Polypodium vulgare* L., *Moehringia muscosa*, *Corydalis ochroleuca*, *Cardamine impatiens*, *Euphorbia amygdaloides* L., *Asarum europaeum* L., *Geranium robertianum*, *Lamium galeobdolon*, *L. orvala*, *Lathyrus vernus* (L.) Bernh., *Polygonatum multiflorum* (L.) All., *Potentilla micrantha* Ramond ex DC., *Stellaria holostea*, *Veronica chamaedrys* L., *Tanacetum corymbosum* (L.) Sch. Bip. ssp. *corymbosum*, *Carex pilosa* Scop., *Lonicera xylosteum*, *Cornus mas*, *Corylus avellana*, *Ligustrum vulgare* L., *Viburnum lantana*, *Staphylea pinnata* L., *Pyrus pyraeaster* Burgsd., *Fraxinus ornus*, *Fagus sylvatica*.

23. Ličko Lešće

In Ličko Lešće there is a well-known center for the reintroduction of indigenous fish. The center is surrounded by limestone rocks with different exposures. Several plants of *Cardaminopsis croatica* was found on several rocks exposed to the northeast together with *Asplenium ceterach*, *A. ruta-muraria*, *A. trichomanes*, *Polypodium vulgare*, *Corydalis ochroleuca*, *Erophila praecox* (L.) DC. ssp. *praecox* (Steven) Walp., *Saxifraga rotundifolia* L., *Geranium macrorrhizum* L., *G. robertianum*, *G. lucidum* L., *Sedum album* L., *S. telephium* ssp. *maximum*, *S. sexangulare*, *Campanula pyramidalis*, *Arabis turrata*, *Mycelis muralis*, *Potentilla micrantha*, *Pimpinella saxifraga* L., *Lamium maculatum* L., *Melica ciliata* L., *Stachys recta* L., *Poa* sp., *Clematis vitalba*, *Rhamnus cathartica* L., *Ligustrum vulgare*, *Viburnum lantana*.

24. Crno Jezero

Crno Jezero is a settlement situated on the southern edge of the Gacka Region. A new locality of *C. croatica* was found on the outskirts of the settlement (in the direction of Kuterevo) in a forest of *Fagus sylvatica* and *Abies alba*. Several dozen meters from the road that connects Otočac and Kuterevo there is a limestone rock exposed to the southeast. Plant species that grow together with several plants of *C. croatica* are *Asplenium trichomanes*, *Asplenium scolopendrium* L., *Moehringia muscosa*, *Corydalis ochroleuca*, *Geranium macrorrhizum*, *G. robertianum*, *Pulmonaria officinalis* L., *Melica ciliata*, *Solanum dulcamara* L., *Clematis vitalba*, *Euonymus verrucosa*, *Staphylea pinnata*, *Crataegus monogyna* Jacq. emend. Lindm., *Malus sylvestris* Mill., *Tilia platyphyllos* Scop., *Acer obtusatum*, *Ostrya carpinifolia*.

25. Buljma

Buljma Peak (1421 m a.s.l.) is situated in the central section of Mt Velebit, about 25 minutes by foot from the Alan mountain lodge. A new locality of *C. croatica* is situated on the south slopes of Buljma Peak. Several dozen plants of *C. croatica* grow near the Premužić Trail on limestone rocks with a western-southwestern exposure. Plant species that grow together with *C. croatica* are *Arenaria gracilis*, *Campanula waldsteiniana*, *Inula hirta* L., *Dianthus* sp., *Pimpinella* sp., *Sesleria tenuifolia*, *Thymus acicularis* Waldst. et Kit., *Globularia meridionalis* (Podp.) Schwarz, *Satureja subspicata*, *Rubus idaeus* L., *Genista sericea*, *Juniperus communis* ssp. *alpina*, *J. sabina* L., *Daphne alpina*, *Frangula rupestris* (Scop.) Schur, *Rosa spinosissima*.

26. Border of North Velebit National park

A new locality of *C. croatica* was found in Velebit Nature Park, about 100 m from the border of North Velebit National park. Several *C. croatica* plants grow near the Premužić Trail on limestone rocks with a western-southwestern exposure. Plant species that grow together with *C. croatica* are *Campanula waldsteiniana*, *Libanotis nitida* Vis., *Laserpitium siler* L., *Sesleria tenuifolia*, *Helianthemum canum* (L.) Baumg., *Thymus acicularis*, *Globularia meridionalis*, *Genista sericea*, *Satureja subspicata*, *Daphne alpina*, *Amelanchier ovalis*.

27. Gornje Branjevine 2

Another locality of *C. croatica* is found in a *Fagus sylvatica* forest where it grows on limestone rocks with a western-southwestern exposure. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *Sedum ochroleucum* Chaix, *Mycelis muralis*, *Arabis turrata*, *Aremonia agrimonoides* (L.) DC., *Centaurea triumfetti* All., *Prenanthes purpurea*, *Pseudolysimachion spicatum* (L.) Opiz, *Geranium robertianum*, *Rubus* sp., *Sorbus aria*, *Fagus sylvatica*, *Acer pseudoplatanus*.

28. Gornje Branjevine 1

A description of this locality is given above (see locality number 5: Gornje Branjevine 1).

29. Gornje Branjevine 3

Cardaminopsis croatica was also found on another group of limestone rocks near the Premužić Trail. Plant species that grow together with *C. croatica* are *Asplenium ruta-muraria*, *Arabis turrata*, *Corydalis ochroleuca*, *Bupthalmum salicifolium*, *Mercurialis perennis*, *Mycelis muralis*, *Galium mollugo*, *Geranium robertianum*, *Scrophularia heterophylla* ssp. *laciniata*, *Heracleum sphondylium*, *Sesleria tenuifolia*, *Rubus idaeus*, *Satureja montana* L., *Fagus sylvatica*.

30. Below Ograđenica

A description of this locality is given above (see locality number 6: Below Ograđenica).

31. Premužić Trail between Ograđenica and Korita Spring

Another locality of *C. croatica* was noted between the crossing to the Ograđenica mountain shelter and Korita Spring. Plants of *C. croatica* grow near the Premužić Trail on limestone rocks with a southern-southwestern exposure. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *A. ruta-muraria*, *Micromeria thymifolia*, *Arabis turrata*, *Dianthus petraeus* Waldst. et Kit. ssp. *petraeus*, *Geranium robertianum*, *Solidago virgaurea*, *Galium mollugo*, *Stellaria holostea*, *Poa* sp., *Satureja montana*, *Sorbus aria*, *Laburnum alpinum* (Mill.) Bercht., *Fagus sylvatica*.

32. Mliništa

Near the Premužić Trail above the Mliništa grassland there is a huge limestone rock exposed to the northwest. The habitat of *C. croatica* is partly in the shadow of a *Fagus sylvatica* forest. Plant species that grow together with *C. croatica* are *Cystopteris fragilis* (L.) Bernh., *Geranium robertianum*, *Moehringia muscosa*, *Arabis turrata*, *Campanula fenestrellata* Feer, *Saxifraga rotundifolia*, *Mycelis muralis*, *Corydalis ochroleuca*, *Actaea spicata* L., *Mercurialis perennis*, *Antriscus fumarioides* (Waldst. et Kit.) Spreng., *Fagus sylvatica*.

About 500 m from the above mentioned rock there is another rock exposed to the south where *C. croatica* grows together with *Asplenium trichomanes*, *Mycelis muralis*, *Moehringia muscosa*, *Campanula fenestrellata*, *C. pyramidalis*, *Arabis turrata*, *Geranium macrorrhizum*, *Euonymus latifolia*, *Ostrya carpinifolia*, *Acer obtusatum*, *Fagus sylvatica*.

33. Skorpovac

About 100 m before the Skorpovac mountain shelter (in the direction of Dabarska Kosa or Baške Oštarije) there is another locality of *C. croatica*. *Cardaminopsis croatica* grows on rocks with a northeastern exposure together with *Asplenium trichomanes*, *Polypodium vulgare*, *Dryopteris filix-mas* (L.) Schott, *Oxalis acetosella* L., *Geranium robertianum*, *Micromeria thymifolia*, *Mycelis muralis*, *Carduus acanthoides* L., *Calamintha grandiflora*, *Melittis melissophyllum* L., *Senecio ovatus* (G. Gaertn., B. Mey. et Scherb.) Willd., *Sesleria autumnalis* (Scop.) F. W. Schultz, *Rosa pendulina* L., *Lonicera xylosteum*, *Sorbus aria*, *Abies alba*, *Fagus sylvatica*.

34. Crossing of Premužić Trail and a timber dump

About one hundred meters before the crossing of the Premužić Trail and a timber dump (in the direction of Dabarska Kosa or Baške Oštarije) there is a rocky area exposed

to the south. *Cardaminopsis croatica* grows on rocks near the Premužić Trail and along the trail together with *Asplenium trichomanes*, *A. ruta-muraria*, *Corydalis ochroleuca*, *Micromeria thymifolia*, *Mycelis muralis*, *Cnidium silaifolium* (Jacq.) Simonk., *Galium mollugo*, *Geranium robertianum*, *Solidago virgaurea*, *Sesleria autumnalis*, *Campanula pyramidalis*, *C. bononiensis*, *Satureja montana*, *Rosa pendulina*, *Viburnum lantana*, *Laburnum alpinum*, *Sorbus aria*, *Ostrya carpinifolia*, *Fraxinus ornus*, *Acer obtusatum*, *Fagus sylvatica*.

Several hundred meters before this locality (in the direction of the Skorpovac mountain shelter) there is another rock in a *Fagus sylvatica* forest. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *Biscutella laevigata*, *Campanula fenestrellata*, *Campanula pyramidalis*, *Cardamine enneaphyllos* (L.) Crantz, *C. bulbifera* (L.) Crantz, *Moehringia muscosa*, *Geranium macrorrhizum*, *Saxifraga rotundifolia*, *Sesleria autumnalis*, *Euonymus latifolia*, *Acer obtusatum*, *A. pseudoplatanus*, *Ostrya carpinifolia*, *Fagus sylvatica*.

35. Crossing of Premužić Trail and a gravel road

Some forty minutes by foot from the Skorpovac mountain shelter (in the direction of Dabarska Kosa or Baške Oštarije), the Premužić Trail crosses a gravel road. Several dozen meters before this crossing there is a group of limestone rocks with a northern-northeastern exposure. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *Polypodium vulgare*, *Geranium robertianum*, *Origanum vulgare* L., *Mycelis muralis*, *Hieracium* sp., *Prenanthes purpurea* L., *Sesleria autumnalis*, *Poa* sp., *Rosa pendulina*, *Acer pseudoplatanus*, *Ostrya carpinifolia*, *Acer obtusatum*, *Fagus sylvatica*.

36. Crossing to Budakovo Brdo

Budakovo brdo (1317 m a.s.l.) is one of the well-known peaks in the central section of Mt Velebit. *Cardaminopsis croatica* was found near the Premužić Trail and before the crossing of Premužić Trail – Budakovo brdo (in the direction of Baške Oštarije). *Cardaminopsis croatica* grows on limestone rocks exposed to the south. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *Sedum sexangulare*, *Moehringia muscosa*, *Arabis turrita*, *Campanula pyramidalis*, *Sesleria autumnalis*, *Poa bulbosa* L. var. *vivipara* (Koeler) Willd., *Allium* sp., *Arenaria* sp., *Ostrya carpinifolia*, *Acer obtusatum*, *Fraxinus excelsior* L.

37. Dabarska kosa

Another locality of *C. croatica* was situated about one kilometer from the beginning of Dabarska kosa (in the direction of the Skorpovac mountain shelter). *Cardaminopsis croatica* grows in an *Ostrya carpinifolia* forest on limestone rock exposed to the south. Plant species that grow together with *C. croatica* are *Asplenium trichomanes*, *A. ceterach*, *Corydalis ochroleuca*, *Saxifraga tridactylites* L., *Sedum ochroelucum*, *Moehringia muscosa*, *Geranium robertianum*, *Sanguisorba minor* Scop. ssp. *muricata* Briq., *Arabis turrita*, *Allium fuscum* Waldst. et Kit., *Micromeria thymifolia*, *Melica ciliata*, *Asperula* sp., *Satureja montana*, *Prunus mahaleb* L., *Ostrya carpinifolia*, *Acer monspessulanum* L., *A. obtusatum*, *Fraxinus ornus*.

Several hundred meters in the direction of the Skorpovac mountain shelter there is rock that looks like a table. Near this unusual rock, situated in an *Ostrya carpinifolia* forest, there is another locality of *C. croatica*. *Cardaminopsis croatica* grows on rock exposed to the south together with *Asplenium ruta-muraria*, *Sedum ochroelucum*, *Moehringia muscosa*, *Geranium robertianum*, *Galium purpureum* L., *Micromeria thymifolia*, *Lamium maculatum*, *Mycelis muralis*, *Arabis turrita*, *Crocus vernus* (L.) Hill, *Valeriana officinalis* L., *Sesleria autumnalis*, *Melica uniflora* Retz., *Genista januensis* Viv., *Satureja montana*, *Acer monspessulanum*, *Fraxinus ornus*.

38. Premužić Trail below Badanj 1

Badanj (1164 m a.s.l.) is another well-known peak in the central section of Mt Velebit. *Cardaminopsis croatica* grows on rocks near the Premužić Trail as well as among rocks on the very trail. Plant species that grow together with *C. croatica* are *Asplenium ruta-muraria*, *Corydalis ochroleuca*, *Campanula waldsteiniana*, *Arabis turrita*, *Sesleria autumnalis*, *Peltaria alliacea* Jacq., *Convallaria majalis* L., *Cruciata glabra* (L.) Ehrend, *Platanthera bifolia* (L.) Rich., *Iris graminea* L., *Valeriana tripteris*, *Carex flacca* Schreb., *Daphne mezereum* L.

39. Premužić Trail below Badanj 2

Several dozen plants of *C. croatica* grow on limestone gravel along the gravel road in a *Fagus sylvatica* forest. Plant species that grow together with *C. croatica* are a mix of forest, ruderal and grassland species: *Arenaria serpyllifolia* L., *Moehringia trinervia* (L.) Clairv., *Clinopodium vulgare* L., *Plantago major* L., *Galium mollugo*, *Medicago lupulina* L., *Trifolium pratense* L., *Mycelis muralis*, *Aremonia agrimonioides*, *Prunella vulgaris* L., *Leucanthemum ircutianum* (Turcz.) DC., *Mercurialis perennis*, *Cardamine bulbifera*, *Scrophularia heterophylla* ssp. *laciniata*, *Acer pseudoplatanus*, *Stachys sylvatica* L., *Verbascum* sp., *Rubus idaeus*, *Satureja subspicata*, *Fagus sylvatica*.

In conclusion, 20 new localities of *Aquilegia kitaibelii* and 19 new localities of *Cardaminopsis croatica* on the Dinaric Mountains in Croatia are described. The information gathered helps to broaden our knowledge of the population numbers, and environmental conditions of both these endemic species and on the distribution range of *C. croatica*. Additionally, *A. kitaibelii* is included in the list of NATURA 2000 Species. Accordingly, any information about new localities of *A. kitaibelii* is important because it enables a more reliable evaluation of the threat level, population numbers, and population health of this endemic species. The second species, *C. croatica*, is also a floristically interesting endemic, closely related to the preeminent plant model organism *Arabidopsis thaliana*. Our investigation has shown that neither of the studied chasmophytes (plants that grow in fissures in rock) is endangered at this moment. A potential threat could be the overgrowing of rock habitats by forest. However, because both species can exist in open, sunny habitats as well as in the shadow of forest, the degree of this threat is still rather low for now. Moreover, it was noticed that *C. croatica* is spreading on secondary, anthropogenic habitats on the edges of gravel roads. It is interesting to point out that the species were found together only at two localities on Mt Velebit. Once data on the many populations of *A. kitaibelii* and *C. croatica* are available, it will be possible to establish their ecological differentiation and the demarcation of the phytocenological communities where these species grow. Also, it will be possible to make more accurate conclusions about how they thrive within their area of natural distribution. This type of study can make valuable contributions to our knowledge about the NW Dinarides as an ancient refuge area rich in endemic and subendemic species.

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SAŽETAK

Novi lokaliteti endemičnih vrsta *Aquilegia kitaibelii* Schott i *Cardaminopsis croatica* (Schott, Nyman et Kotschy) Jáv. u Hrvatskoj

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U razdoblju od svibnja 2010. do listopada 2014. godine na području sjeverozapadnih Dinarida u Hrvatskoj utvrđeni su novi, do sada u literaturi nezabilježeni lokaliteti dviju endemičnih, razmjerno rijetkih i floristički zanimljivih biljnih vrsta: Kitaibelova pakujca (*Aquilegia kitaibelii* Schott) i hrvatske gušarke (*Cardaminopsis croatica* (Schott, Nyman et Kotschy) Jáv.). U nas su obje vrste zakonom strogo zaštićene. Kitaibelov pakujac je rijetka, endemična vrsta rasprostranjena na području Hrvatske te Bosne i Hercegovine gdje raste u planinskim područjima na nadmorskoj visini između 1200 i 1700 m. Noviji podaci navode prisutnost ove vrste i na planini Snežnik u Sloveniji. Kitaibelov pakujac je uvršten i na popis NATURA 2000 vrsta, dok je prema IUCN kategorizaciji označen kao DD (data deficient) vrsta. Kitaibelov pakujac se navodi i u Prilogu IV Direktive 92/43/EEZ o zaštiti prirodnih staništa i divljih biljnih i životinjskih vrsta. Kao strogo zaštićenu vrstu nalazimo ga i u Dodatku I Konvencije o zaštiti europskih divljih vrsta i prirodnih staništa (tzv. Bernska konvencija). Zbog svega navedenog potrebno je nastaviti rad na prikupljanju svih relevantnih podataka o rasprostranjenosti i ekološkim zahtjevima ove vrste, brojnosti i stanju njenih prirodnih populacija, pa i u svrhu uspostave eventualnog monitoringa. Hrvatska gušarka također je endemična vrsta prirodno rasprostranjena u planinskim područjima Hrvatske i Bosne i Hercegovine na nadmorskoj visini između 500 i 1500 m. Prema novijim shvaćanjima vrsta je iz roda *Cardaminopsis* premještena u rod *Arabidopsis*. Činjenica da je hrvatska gušarka taksonomski bliska vrsti *Arabidopsis thaliana*, koja se kao biljka model koristi u brojnim znanstvenim istraživanjima, samo je dodatni razlog zašto je potrebno nastaviti prikupljanje svih dostupnih podataka i o ovoj vrsti.

Cilj rada je predstaviti po dvadesetak novih nalazišta Kitaibelova pakujca i hrvatske gušarke na području sjeverozapadnih Dinarida u Hrvatskoj.

Nova nalazišta Kitaibelova pakujca zabilježena su na širem području planinske skupine Obruča u zaleđu grada Rijeke te na području srednjeg i južnog Velebita. Do sada u literaturi nezabilježeni lokaliteti hrvatske gušarke utvrđeni su na području srednjeg Velebita i na padinama brežuljaka i brda u regiji Gackoj. Obje vrste na većini novih nalazišta rastu u pukotinama stijena zajedno s drugim petrofilnim vrstama, a Kitaibelov pakujac zabilježen je i na točima. Zanimljivo je da su obje vrste zajedno na istom staništu utvrđene samo na lokalitetima Gornje Branjevine i podno Ograđenice uz Premužićevu stazu na području srednjeg Velebita. I jedna i druga vrsta oblikuju male, trenutno stabilne prirodne populacije na mjestima gdje je konkurentnost drugih vrsta znatno slabija. Za hrvatsku gušarku posebno su zanimljiva nalazišta u regiji Gackoj, gdje raste na termofilnim stijenama različitih ekspozicija, u okruženju mješavine termofilnih submediteranskih vrsta i pojedinih brdskih vrsta bukovo-jelovih šuma. Uz Premužićevu stazu na srednjem Velebitu hrvatska gušarka se također pojavljuje u nekim termofilnim zajednicama šumskih stijena. Opaženo je da, osim stijena, hrvatska gušarka nastanjuje i neka sekundarna, antropogena staništa, kao što su rubovi šumskih cesta, što ukazuje na ekološku plastičnost ove endemične vrste sjeverozapadnih Dinarida.

Jednom kada budu poznati podatci o većem broju populacija ovih dviju vrsta biti će moguće napraviti i fitocenološku karakterizaciju biljnih zajednica u kojima se one pojavljuju. Isto tako, biti će moguće dati preciznije prijedloge o njihovoj *in situ* zaštiti, ali i o eventualnoj potrebi za poduzimanjem mjera *ex situ* zaštite. Ovo istraživanje predstavlja i doprinos poznavanju biljnog svijeta sjeverozapadnih Dinarida u Hrvatskoj, području poznatom po više endemičnih i subendemičnih vrsta.