

Localities and sites of protected and endangered species *Bellevalia romana* (L.) Reichenb. (*Hyacinthaceae*) in Slovenia

Nahajališča in rastišča zavarovane in prizadete vrste *Bellevalia romana* (L.) Reichenb. (*Hyacinthaceae*) v Sloveniji

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Abstract: The article describes three new localities of a rare and endangered species of lowland meadows *Bellevalia romana* in Slovenia: at Ankaran in Slovenian Istria (confirmed in 2002, but not found yet in 2011) and at Golo Brdo and between Golo Brdo and Mišček in the Idrija valley (Goriška Brda). Only a total of four localities of this species can be confirmed in Slovenia in the year 2011 – in the Goriška region also under Sv. Katarina above Kromberk and in Istria on more places at Sečovlje. As regards their sites, the localities in the Goriška region on flysh and riparian meadows differ from those in Istria, where it grows on wet meadows and in reed and tall herb communities, on trampled soil in the immediate vicinity of the sea. The endangered species can be preserved through adequate protection of its sites. That usually means annual, but not too early, mowing of the meadows on which it grows.

Keywords: *Bellevalia romana*, *Hyacinthaceae*, new localities, endangered species, *Scorzonero-Chrysopogonetalia*, Goriška Brda, Istria, Slovenia

Izveček: V članku opisujemo tri nova nahajališča v Sloveniji zelo redke in prizadete vrste nižinskih travnikov *Bellevalia romana*: pri Ankaranu v Slovenski Istri (najdba iz leta 2002, v letu 2011 ni več potrjena), pri Golem Brdu in med Golim Brdom in Miščkom v dolini Idrije (Goriška Brda). Skupno v Sloveniji v letu 2011 lahko potrdimo samo štiri nahajališča te vrste, na Goriškem še pod Sv. Katarino nad Kromberkom in v Istri pri Sečovljah. Po rastiščih se nahajališča na Goriškem na flišnih in obrečnih travnikih nekoliko razlikujejo od tistih v Istri, kjer raste na vlažnih travnikih in v trstičju, na zbitih tleh v neposredni bližini morja. Prizadeto vrsto lahko ohranimo z ustreznim varovanjem njenih rastišč, to pa je pogosto vsakoletna in ne prezgodnja košnja travnikov, na katerih raste.

Ključne besede: *Bellevalia romana*, *Hyacinthaceae*, nova nahajališča, ogrožene vrste, *Scorzonero-Chrysopogonetalia*, Goriška Brda, Istria, Slovenija

Introduction

In Slovenia, the Mediterranean species *Bellevia romana* is a protected (Skoberne 2007: 75) and endangered species (En) – Anon. (2002: 8896). The chronology of the knowledge on its sites in the territory of today's Slovenia was described by T. Wraber (1990: 154) and Seljak (2001: 88–89). With his find of *Bellevia romana* on a flysh meadow under Sv. Katarina above Kromberk, the latter substantially supplemented the knowledge of its distribution in Slovenia. T. Wraber (ibid.), Seljak (ibid.) and Skoberne (ibid.) all agreed that for the past two decades only one more locality could be confirmed in Slovenian Istria, the one in the vicinity of the airport at Sečovelje. Its growth in this locality was last confirmed by B. Dolinar (Bavcon & al. 2011: 45) and by our research in 2011. The locality in Graviže near Koper, where it was found in 1864 by A. Loser, is historic and there are no contemporary confirmations. The find near Ankaran is the result of floristic mapping in the spring of 2002 and has not been published until now, so this species was missing from the conspectus of the flora from the vicinity of Ankaran, which was published two years ago (Glasnović & Jogan 2009). During our phytosociological survey of dry and semi-dry meadows of western Slovenia in early spring 2010 and 2011 we found *Bellevia romana* also on two places in the Idrija valley between Golo Brdo and Mišček (Goriška Brda). It was noticed only after the third repeated inventory, which was first conducted in the summer of 2008 and once again in the spring of 2009.

Materials and methods

Floristic records and phytosociological relevés were made according to the established Central European methods (Ehrendorfer & Hamann 1965, Braun-Blanquet 1964) and entered into the FloVegSi database (T. Seliškar et al. 2003). This application was used also in the preparation of the distribution map. When processing the relevés we transformed the combined cover-abundance values with numerical values (1–9) according to van der Maarel (1979). Numerical comparisons were performed with the SYN-TAX 2000 program package (Podani 2001). The relevés were com-

pared by means of “(unweighted) average linkage method” – UPGMA and principal coordinates analysis (PCoA). Wishart's similarity ratio was used in both methods. A census approach (complete population counts) was used to estimate population size of *Bellevia romana* on three localities (two in Idrija valley, one at Kromberk). On fourth, the largest locality (at Sečovelje), the population size of the species was estimated by quadrat sampling. Twenty-one 1x1m plots were chosen randomly in the study site of 2600 m². The number of individuals was counted in each plot. Because of a not-normal distribution of the data, the non-parametric statistic was used to estimate the population size. It was expressed as a median number of individuals per plot within the study site. A large sample ($n \geq 20$) confidence interval for median was calculated according to Campbell & Gardner (1988).

The nomenclature source for the names of vascular plants is the Mala flora Slovenije (Martinčič et al. 2007). Geoelemental, ecological and phytosociological designation of the studied species and syntaxonomic nomenclature follow the Flora alpina (Aeschimann et al. 2004a, b, c), the names of the syntaxa also according to the conspectus prepared by Šilc and Čarni (2011).

Results and discussion

New localities and the description of the Bellevia romana sites

9947/1(UTM 33T UM80): Primorska, Goriška Brda, Golo Brdo, the Idrija valley, along the road towards Mišček, Zagrad, (semi)dry meadow on river alluvia on the left bank of the Idrija, 100 m a.s.l. Leg. & det. I. Dakskobler, 21. 4. 2010, Herbarium LJS (SRC SASA) and author's photo shots.

9947/1(UTM 33T UM80): Primorska, Goriška Brda, the Idrija valley between Golo Brdo and Mišček, Travnik, pioneer wood on the edge of the abandoned meadow, 135 m a.s.l. Det. I. Dakskobler, 4. 4. 2011 and I. Dakskobler & A. Trnkoczy, 8.4.2011, photo shots of A. Trnkoczy.

10448/1(UTM 33T VL04): Primorska, Slovenian Istria, Ankaran, the swamp at Sv. Katarina, 7 m a.s.l. Det. B. Vreš, 24. 5. 2002, floristic relevé.

Distribution of *Bellevaia romana* supplemented with the new finds is presented on Fig. 1 and two larger scale maps with three new localities in Fig. 2.

The first site in Goriška Brda is a species-rich, semi-dry riparian meadow (Tab. 1, relevés 1 and 2). More than 90 species were determined there, some of them protected (*Orchis morio*, *O. militaris*, *O. tridentata*, *Ophrys holosericea*, *O. sphegodes*, *Anacamptys pyramidalis*) and some vulnerable (*Muscari comosum*, *M. neglectum*, *Equisetum ramosissimum*). The number of detected specimens of *Bellevaia romana* was only 6. According to phytosociological affinity this meadow is dominated by the species of dry and semi-dry meadows of the class *Festuco-Brometea* and is therefore for the time being classified into the association *Danthonio-Scorzoneretum villosae*. There are very similar riparian meadows also downstream towards Golo Brdo and slightly upstream towards Mišček. These were recorded too, but for now the Roman squill has not been noticed in these meadows, except for one locality

on their wooded edge (relevé 9 in Tab. 1, only three recorded specimens of *Bellevaia romana*, pioneer community has elements of two syntaxa, *Galantho-Coryletum* (*Berberidion*, *Rhamno-Prunetea*) and *Ornithogalo-Carpinetum betuli* (*Erythronio-Carpinon*, *Quercu-Fagetea*). There is, however, also a known locality on the right, Italian bank of the Idrija, in the vicinity of the hamlet Kras (Seljak 2001: 89, Poldini 2002: 75). In the neighbouring Friuli, the species is known to grow even further north, in the foothills of the Julian Alps. Most riparian meadows on the Slovenian side upstream of the Idrija towards Mišček (further away from the hamlet of Kras on the other bank) have been abandoned and are overgrown with tall herbs (including anthropophytes, e.g. *Solidago gigantea*, *Robinia pseudacacia*, *Fraxinus excelsior*, *Ulmus minor* and other woody plants. Although rather late in the summer (end of June), the researched meadow at Golo Brdo is still mowed for now, even though only vineyards in the immediate vicinity still have any economic significance in these parts.

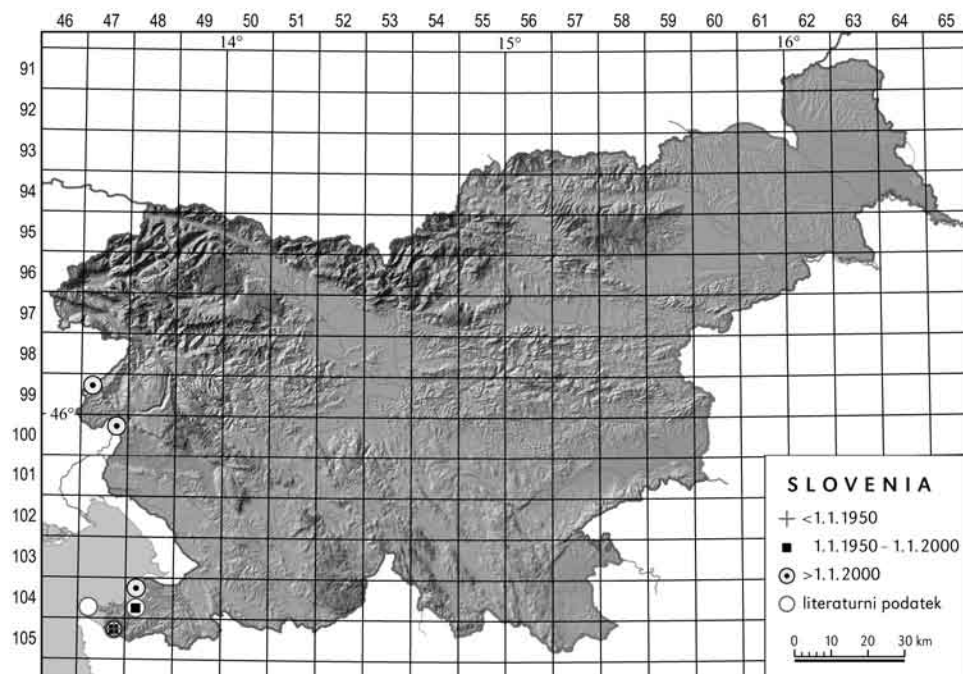


Figure 1: Distribution of *Bellevaia romana* in Slovenia.

Slika 1: Razširjenost vrste *Bellevaia romana* v Sloveniji.

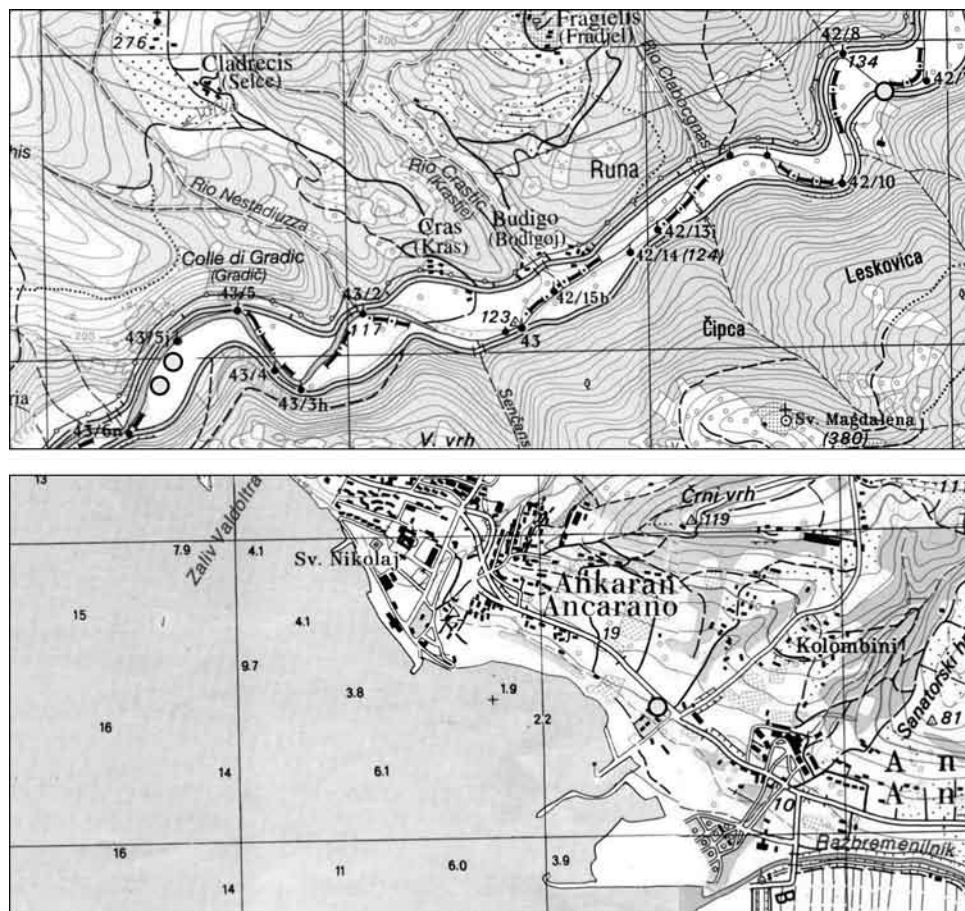


Figure 2: Location of the three new localities of *Bellevalia romana* at Golo Brdo (upper map) and one at Ankaran (lower map).

Slika 2: Lokacija treh novih nahajališč vrste *Bellevalia romana* pri Golem Brdu (zgornji zemljevid) in enega pri Ankaranu (spodnji zemljevid).

The third locality of *Bellevalia romana* in the Goriška region above Kromberk was phytosociologically researched in the year 2011 (relevés 3–8 in Tab. 1). The studied species, a total of 46 specimens, was recorded in six spots in an enclosed estate that measures a total of 0.7 hectare and is covered mainly by a meadow (first mowed in the second half of April) and an orchard. As the recorded communities are subject to early mowing they are for the time being not incorporated in the syntaxonomic system at the rank of associations. The relevés are dominated by the species of (semi) dry and cultivated meadows (*Festuco-Brometea*, *Molinio-*

Arrhenatheretea); *Bellevalia romana* was frequent also in fringe communities and robinia shrubs.

The site of *Bellevalia romana* near Sv. Katarina at Ankaran is in a swamp of anthropogenic origin undergoing spontaneous afforestation where it was found during our inventory of marsh flora in May 2002. We missed its flowering when we repeated the inventory on the same site in the following years (10.6.2004, 3.6. and 30.6.2005, 14.4.2011) and have not seen it since, so it cannot be said with certainty that the plant still grows there. The following threatened species also grew on this site: *Carex distans* L., *Scirpoides holoschoenus*

[illegible]

(L.) Soják subsp. *australis* (Murray) Soják and *Juncus maritimus* Lam.; later we recorded also *Carex extensa* Good., *Equisetum ramosissimum* Desf. and *Equisetum variegatum* Schleicher ex Weber & Mohr. Seliškar (in litt.), who made several relevés in the afforested swamp, determined the associations *Holoschoenetum romani* Tchou 1948 and *Phragmitetum australis*, and in the open area the presence of some species, characteristic for the class *Isoëto-Nanofunceteta* (e.g. *Plantago intermedia*, *Centaureum minus*). Despite its anthropogenic origin, the marsh is an important habitat for several threatened plant species of both the Primorska region and Slovenia.

Our comparison (Tab. 1, Figs. 3 and 4) demonstrates that the grassland, fringe and mantle communities above Kromberk (KB) on a flysh bedrock are much more similar to the meadow community and pioneer woods along the Idrija river (GB) than to the weed, ruderal, and wet meadow communities at Sečovlje (SE, relevés 10–20 in Tab. 1). The locality of *Bellevallia romana* on the edge of the Sečovlje saltpans and at the Portorož international airport is undoubtedly the biggest in Slovenia (median number of individuals per m² was 16 with 95% confidence interval from 10 to 23 individuals/m²; min = 0, max = 71) and for the time being also the least threatened. The

studied species in this locality grows in ruderal communities along cart tracks, in the vineyard, on wet meadows largely overgrown with *Cornus sanguinea* and *Prunus spinosa*, on mowed wet meadows and in marsh communities with dominant *Phragmites australis*, *Carex riparia* and *Carex divisa*. In terms of phytosociology, these communities cannot be classified at the rank of associations as of yet.

Potential new localities of *Bellevia romana* in Slovenia can therefore be expected at least on the sites of seven phytosociological classes – preferential on the sites of semi-dry meadows from the class *Festuco-Brometea* and order *Scorzonero-Chrysopogonetalia*, of wet meadows from the class *Molinio-Arrhenatheretea* and order *Molinietalia caeruleae*, and of reed and tall herb communities from the class *Phragmiti-Magnocaricetea* (and order *Phragmitetalia communis*), on some places also in thermo- and mesophilous shrub communities from the classes *Rhamno-Prunetea* and *Quercu-Fagetea*, ruderal and weed communities from the

class *Stellarietea mediae* and coastal marshes of the class *Juncetea maritimi*. While the meadow communities are threatened mainly by abandonment of mowing and afforestation, the wetlands along the Slovenian coast, on the other hand, are exposed above all to drainage, accumulation of material and building developments.

Conclusions

Four reliable localities can be confirmed for the rare and endangered species of Slovenian flora, *Bellevia romana*, for the past two years (2010, 2011). One of them, the biggest, is in Slovenian Istria (at Sečovlje, on the surface area of 2600 m² the median number of individuals per m² was 16) and three are in the Goriška region (at Kromberk, on a 0.7 ha large enclosed estate with 46 counted specimens in 2011, and on two places in the Idrija valley between Golo Brdo and Mišček with a total of only 9 specimens counted in 2010 and 2011).

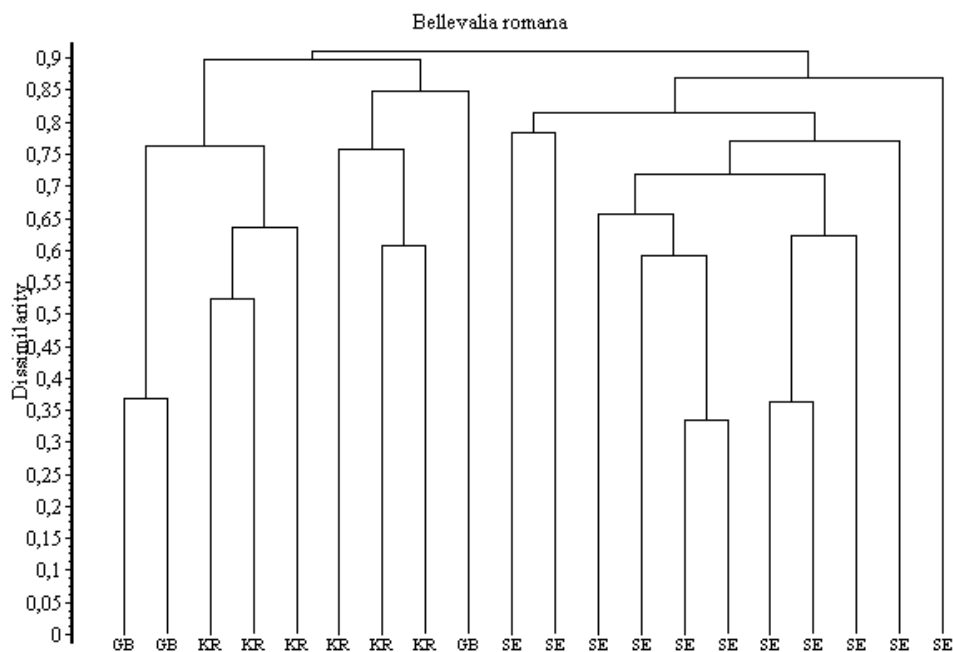


Figure 3: Dendrogram of the communities with *Bellevia romana* in Slovenia (UPGMA, similarity ratio): GB (the Idrija valley), KR (Kromberk), SE (Sečovlje).

Slika 3: Dendrogram preučenih združb z vrsto *Bellevia romana* v Sloveniji (UPGMA, similarity ratio): GB (dolina Idrije) KR (Kromberk), SE (Sečovlje).

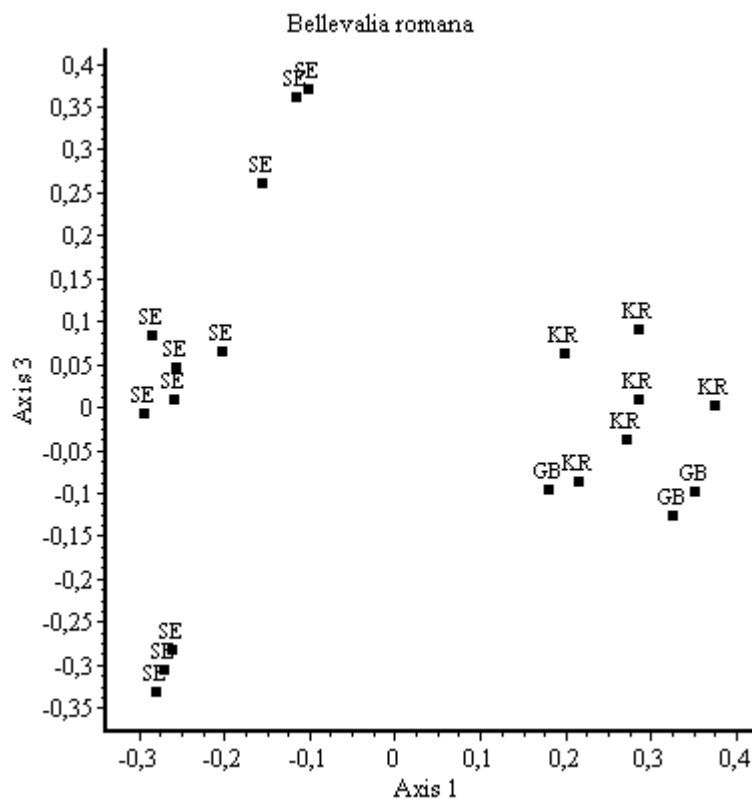


Figure 4: Two-dimensional scatter-diagram of the communities with *Bellevalia romana* in Slovenia (PCoA, similarity ratio): GB (the Idrija valley), KR (Kromberk), SE (Sečovlje).

Slika 4: Dvorazsežni ordinacijski diagram združb z vrsto *Bellevalia romana* v Sloveniji (PCoA, similarity ratio): GB (dolina Idrije) KR (Kromberk), SE (Sečovlje).

The locality at Ankaran, found in 2002, could not be confirmed in the spring of 2011. According to their sites, the Istrian locality and wet meadows, marsh and even weed communities immediately next to the sea, are slightly different from the semi-dry flysh and riparian meadows and shrubs in the Goriška region. In both cases, the threat to the habitats is considerable. The new localities on river alluvia along the Idrija between Golo Brdo and Mišček (9947/1) are so far the northernmost in Slovenia and the smallest in terms of the size of its population. We propose that the species-rich, and at present still mowed meadow at Golo Brdo, which is also the site of six protected orchids, is protected by the authorised services and that its current role is preserved.

Povzetek

Kronologijo poznavanja nahajališč redke mediteranske vrste *Bellevalia romana* na ozemlju zdajšnje Slovenije sta opisala T. Wraber (1990: 154) in Seljak (2001: 88–89). Po njunih spoznanjih sta bili do nedavna znani le dve recentni nahajališči – pri Sečovljah v Slovenski Istri in nad Kromberkom na Goriškem. Z našimi raziskavami, ki smo jih opravili po ustaljenih srednjeevropskih metodah, smo v letih 2002 in 2010 našli in popisali tri nova nahajališči te prizadete vrste, dve v dolini Idrije med Golim Brdom in Miščkom (9947/1m UTM 33T UM80), na rečnih nanosih na levem bregu Idrije (100 m nm. v. in 130 m nm.

v.9) in pri Ankaranu v Slovenski Istri (10448/1, UTM 33TVL04), pri Sv. Katarini (7 m nm. v.). Rastišče v Goriških Brdih je vrstno bogat polsuh obrečni travnik (popisa 1 in 2 v Tab. 1) in mejica (grmišče) na njegovem robu (popis 9 v Tab. 1). Na še košenem (konec junija) travniku smo določili več kot 90 vrst, med njimi še nekaj zavarovanih (*Orchis morio*, *O. militaris*, *O. tridentata*, *Ophrys holosericea*, *O. sphagodes*, *Anacamptys pyramidalis*) in nekaj ranljivih (*Muscari comosum*, *M. neglectum*, *Equisetum ramosissimum*). Število opaženih primerkov belvalovke v dolini Idrije je bilo le 9. Po fitocenološki pripadnosti v dveh popisih pri Golem Brdu prevladujejo vrste suhih in polsuhih travnikov razreda *Festuco-Brometea*, zato ta travnik za zdaj uvrščamo v asociacijo *Danthonio-Scorzoneretum villosae*, grmišče na njegovem robu pa vsebuje elemente sintaksonov *Galantho-Coryletum* in *Ornithogalo-Carpinetum*. Drugo nahajališče belvalovke na Goriškem, nad Kromberkom, smo fitocenološko popisali aprila 2011. Na okoli 0,7 ha veliki ograjeni posesti, na kateri prevladujeta travnik in sadovnjak, smo belvalovko našli na šestih krajih in skupno opazili 46 primerkov. Mezobrometalni travnik, mejica in grmišče na robu posesti so vsaj nekoliko podobni rastiščema belvalovke ob reki Idriji (Tab. 1, Sl. 3 in 4). Rastišče belvalovke pri Ankaranu je v zaraščajočem močvirju antropogenega nastanka pri Sv. Katarini, kjer smo jo našli pri popisovanju močvirske flore v maju 2002. Pri ponovitvah popisov na istem nahajališču v kasnejših letih (10.6. 2004, 3.6. in 30.6. 2005, smo njeno cvetenje zamudili in je nismo več videli, prav tako je bil neuspešen obisk 14. 4. 2011. Na rastišču so skupaj z belvalovko rasle naslednje ogrožene vrste: *Carex distans* L., *Scirpoides holoschoenus* (L.) Soják subsp. *australis* (Murray) Soják in *Juncus maritimus* Lam., kasneje pa smo zabeležili še vrste *Carex extensa* Good., *Equisetum ramosissimum* Desf. in *Equisetum variegatum* Schleicher ex Weber & Mohr. Seliškar (in litt.), ki je v zaraščajočem močvirju naredil nekaj fitocenoloških popisov, je ugotovil asociaciji *Holoschoenetum romani* Tchou 1948 in *Phragmitetum australis*, na odprtih tleh pa tudi prisotnih nekaj vrst, značilnih za razred *Isoëto-Nanojuncetea* (npr. *Plantago intermedia*, *Centaureium minus*). Kljub antropogenemu nastanku je močvirje pomemben habitat za več ogroženih rastlinskih vrst Primorske in Slovenije.

Edino v letu 2011 potrjeno in hkrati najboljše slovensko nahajališče je pri Sečoveljah (Slovenska Istra), v mejicah na robu Sečoveljskih solin, v bližnjem vinogradu in na vlažnih travnikih mednarodnega letališča Portorož. Na površini okoli 2600 m² smo pri vzorčenju (štetju primerkov) na 21 naključno izbranih vzorčnih ploskvah velikosti 1 m² ugotovili povprečno populacijsko gostoto (izraženo kot vrednost mediane) 16 osebkov/m² (minimum = 0, maksimum = 71; 95% interval zaupanja: 10 – 23 osebkov/m²).

Morebitna nova nahajališča belvalovke v Sloveniji lahko pričakujemo na rastiščih vsaj sedmih fitocenoloških razredov, prednostno na obrečnih in flišnih travnikih iz razreda *Festuco-Brometea* in reda *Scorzonero-Chrysopogonetalia*, na mokrotnih travnikih iz razreda *Molinio-Arrhenatheretea* in reda *Molinietalia caeruleae* ter v trstičevju iz razreda *Phragmiti-Magnocaricetea* (in reda *Phragmitetalia communis*), ponekod tudi v toplih in vlažnih grmišč in pionirskih gozdičih iz razredov *Rhamno-Prunetea* in *Quercu-Fagetea*, v plevelnih združbah vinogradov iz razreda *Stellarietea mediae* ter v obmorskih močvirjih iz razreda *Juncetea maritimi*. Travniske združbe ogroža predvsem opuščanje košnje in zaraščanje, mokrišča ob naši obali pa izpostavljena izsuševanju, nasipanju in pozidavam. Novi nahajališči na rečnih nanosih ob Idriji pri Golem Brdu sta doslej najbolj severno v Sloveniji (v sosedni Furlaniji to vrsto poznajo še bolj severno, v prigorju Julijskih Alp) in po velikosti populacije najmanjši. Za še košeni vrstno bogat travnik, na katerem uspeva tudi šest zavarovanih kukavičevk, predlagamo, da ga pristojne službe poskušajo ustrezno zavarovati in na njem ohraniti obstoječo rabo.

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References

- Aeschimann, D., Lauber, K., Moser, D. M. & Theurillat, J.-P., 2004a. Flora alpina. Bd. 1: *Lycopodiaceae-Apiaceae*. Haupt Verlag, Bern, Stuttgart, Wien, 1159 pp.
- Aeschimann, D., Lauber, K., Moser, D. M. & Theurillat, J.-P., 2004b. Flora alpina. Bd. 2: *Gentianaceae-Orchidaceae*. Haupt Verlag, Bern, Stuttgart, Wien, 1188 pp.
- Aeschimann, D., Lauber, K., Moser, D. M. & Theurillat, J.-P., 2004c. Flora alpina. Bd. 3: Register. Haupt Verlag, Bern, Stuttgart, Wien, 322 pp.
- Anonymous, 2002. Pravilnik o uvrstitvi ogroženih rastlinskih in živalskih vrst v rdeči seznam 2002: Priloga 1: Rdeči seznam praprotnic in semenk (Pteridophyta & Spermatophyta). Uradni list RS 12 (82), 8893–8910.
- Bavcon, J., Dakskobler, I., Dakskobler, L., Dolinar, B., Marinček, A., Fišer, S., Makše, J., Seliškar, A., Vreš, B., Ravnjak, B., 2011. Semina e plantis spontaneis in loco natali annis 2010 et 2009 lecta. In: Bavcon, J. (ed.): Franc Hladnik: founder of the Ljubljana Botanic Garden. Index seminum anno 2010 collectorum. Hortus Botanicus Universitatis Ljubecensis Slovenia, Ljubljana, pp. 44–54.
- Braun-Blanquet, J., 1964. Pflanzensoziologie. Grundzüge der Vegetationskunde. 3. Auflage. Springer, Wien – New York, 865 pp.
- Campbell, M. J. & Gardner, M. J., 1988. Calculating confidence intervals for some non-parametric analyses. *British Medical Journal*, 296: 1454–1456.
- Ehrendorfer, F., Hamann, U., 1965. Vorschläge zu einer floristischen Kartierung von Mitteleuropa. *Berichte der Deutschen Botanischen Gesellschaft* 78, 35–50.
- Glasnović, P., Jogan, N., 2009. Flora okolice Ankarana (kvadranta 0448/1 in 0448/2). *Scopolia (Ljubljana)* 67, 1–86.
- Jogan, N., Bačič, T., Frajman, B., Leskovar, I., Naglič, D., Podobnik, A., Rozman, B., Strgulc – Krajšek S., Trčak, B., 2001. Gradivo za Atlas flore Slovenije. Center za kartografijo favne in flore, Miklavž na Dravskem polju, 443 pp.
- Maarel van der, E., 1979. Transformation of cover-abundance values in phytosociology and its effects on community similarity. *Vegetatio* 39 (2), 97–114.
- Martinčič, A., Wraber, T., Jogan, N., Podobnik, A., Turk, B., Vreš, B., Ravnik, V., Frajman, B., Strgulc Krajšek, S., Trčak, B., Bačič, T., Fischer, M. A., Eler, K., Surina, B., 2007. Mala flora Slovenije. Ključ za določanje praprotnic in semenk. Četrta, dopolnjena in spremenjena izdaja. Tehniška založba Slovenije, Ljubljana, 967 pp.
- Podani, J., 2001. SYN-TAX 2000. Computer Programs for Data Analysis in Ecology and Systematics. User's Manual, Budapest, 53 pp.
- Poldini, L. (with collaboration of G. Oriolo & M. Vidali), 2002. Nuovo Atlante corologico delle piante vascolari nel Friuli Venezia Giulia. Regione Autonoma Friuli Venezia Giulia, Azienda Parchi e Foreste Regionali & Università degli Studi di Trieste, Dipartimento di Biologia, Udine, 529 pp.
- Seliškar, T., Vreš, B., Seliškar, A., 2003. FloVegSi 2.0. Fauna, Flora, Vegetation and Paleovegetation of Slovenia. Computer programme for arranging and analysis of biological data. Jovan Hadži Institute of Biology SRC SASA, Ljubljana.
- Seljak, G., 2001. Rimska belvalovka (*Bellevalia romana*) tudi na Goriškem. *Proteus (Ljubljana)* 64 (2), 88–89.
- Skoberne, P., 2007. Zavarovane rastline Slovenije. Narava na dlani. Žepni vodnik. Mladinska knjiga, Ljubljana, 116 pp.
- Šilc, U., Čarni, A., 2011. Pregled sintaksonomskega sistema rastlinskih združb Slovenije. Biološki inštitut Jovana Hadžija ZRC SAZU, Ljubljana.
- Wraber, T., 1990. Sto znamenitih rastlin na Slovenskem. Prešernova družba, Ljubljana, 239 pp.