






Original Scientific Paper

## *Centaurea ozrenii* (Asteraceae) – a new local endemic and extremely rare species from Mt. Ozren near Sjenica in Serbia

Uroš BUZUROVIĆ<sup>1</sup>, Gordana TOMOVIĆ<sup>2</sup>, Ksenija JAKOVLJEVIĆ<sup>3</sup>, Snežana VUKSANOVIĆ<sup>4</sup>,  
Maja LAZAREVIĆ<sup>2</sup>, Snežana DRAGIĆEVIĆ<sup>5</sup> and Marjan NIKETIĆ<sup>6,7</sup>

1 Institute of Soil Science, Belgrade, Serbia

2 Institute of Botany and Botanical Garden, Faculty of Biology, University of Belgrade, Belgrade, Serbia

3 Department of Ecology, Institute for Biological Research “Siniša Stanković” - National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia

4 Natural History Museum of Montenegro, Podgorica, Montenegro

5 Montenegrin Academy of Sciences and Arts, Podgorica, Montenegro

6 Natural History Museum, Belgrade, Belgrade, Serbia

7 Serbian Academy of Sciences and Arts, Belgrade, Serbia

\* Correspondence: [ubuzurovic@bio.bg.ac.rs](mailto:ubuzurovic@bio.bg.ac.rs)

### ABSTRACT:

A new species of *Centaurea* sect. *Acrocentron* (Asteraceae) was found on the Ozren mountain in southwestern Serbia near Sjenica and named as *Centaurea ozrenii*. It inhabits xerophilous and steppe-like habitats, on ultramafic geological substrate. Morphologically, it is close to *C. calocephala*, *C. chrysolepis*, *C. orientalis*, *C. murbeckii*, *C. kotschyana* and the recently described *C. zlatiborensis*. The most distinctive morphological features of the new species are undivided to simply pinnatisect (non lyrate) subglabrous leaves, with linear segments, upper leaves with an aristate apex and cream coloured to pale yellow florets of which the outer are much longer than the inner ones. The phyllaries are intermediate in relation to *C. calocephala* and *C. kotschyana*. The chromosome number of the new species is  $2n = 22$ . Thorough field investigations confirmed the presence of *C. ozrenii* only at this localized site on Mt. Ozren with a population of 13 clusters of individuals with 23–52 flowering stems in an area of about 50 m<sup>2</sup>. Applying the IUCN Red List categories and criteria to the available data categorised *C. ozrenii* as a Critically Endangered (CR) species.

### Keywords:

Balkan flora, sect. *Acrocentron*, new species, taxonomy, chromosome number

UDC: 582.998.1:581.96(497.11)

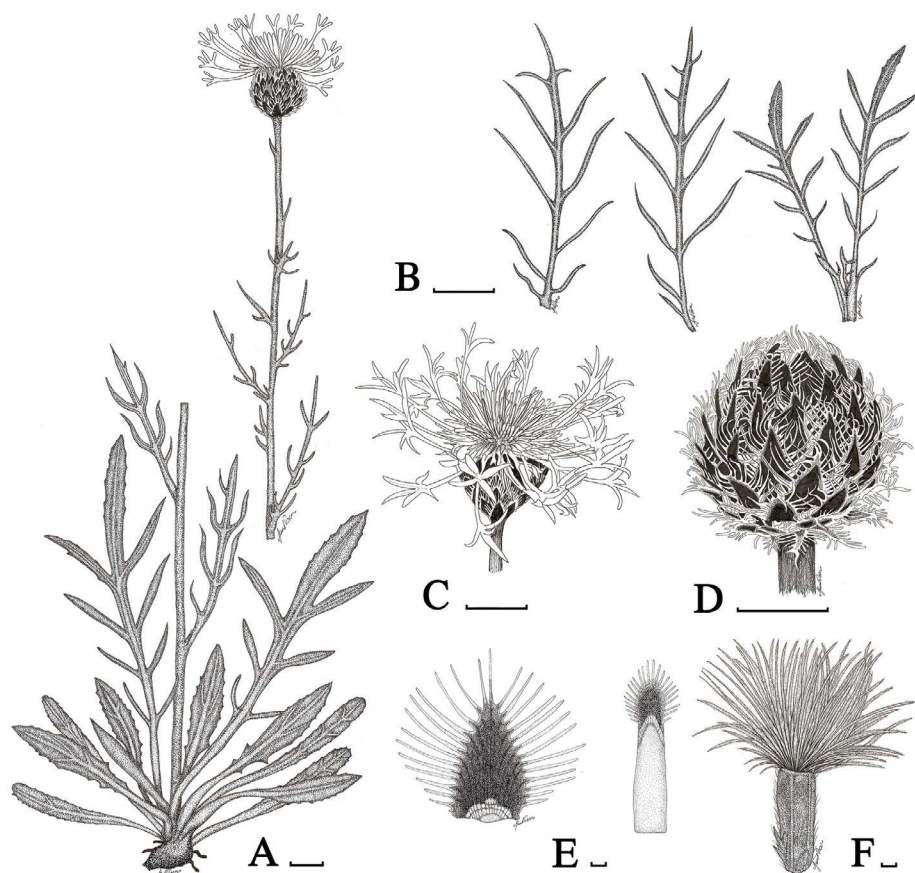
Received: 30 June 2024

Revision accepted: 10 September 2024

## INTRODUCTION

The genus *Centaurea* L. belongs to the family Asteraceae and includes about 750 species (HELLWIG 2004; POWO 2024), making it the largest genus in this family and one of the taxonomically most complex genera due to the great variability of morphological characteristics (ROMASCHENKO *et al.* 2004; BANCHEVA & GREILHUBER 2006). It is distributed in Europe, the Mediterranean

region and SW Asia (SUSANNA & GARCIA-JACAS 2007; LÓPEZ *et al.* 2011), with most species occurring in the Mediterranean and Irano-Turanian region (SUSANNA & GARCIA-JACAS 2007; HILPOLD *et al.* 2014). To date, ca. 150 species have been recorded on the Balkan Peninsula (SILJAK-YAKOVLEV 2005), many of which are endemic (TOMOVIĆ *et al.* 2014; NOVAKOVIĆ *et al.* 2018; BOGDANOVIĆ *et al.* 2022). The 32 species are listed in the flora of Serbia (GAJIĆ 1975; RANĐELOVIĆ & STAMENKOVIĆ



**Fig. 1.** The diagnostic features of *Centaurea ozrenii* – A) habitus; B) leaves; C) inflorescence; D) immature capitulum; E) phyllaries and F) achenes. Ratios: A–D – 1 cm, E–F – 1 mm. Illustration by PhD Rastko Ajtić based on type material.

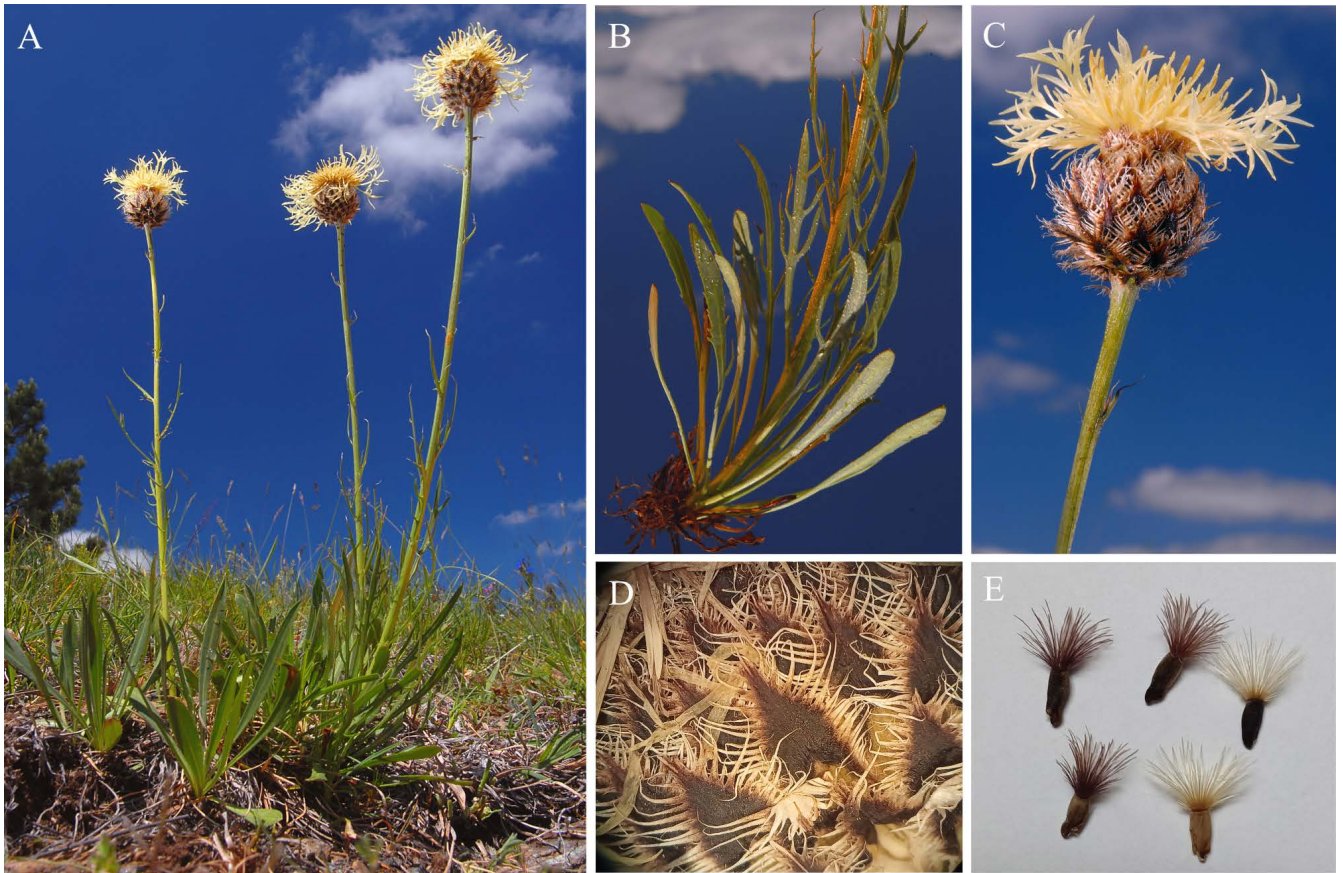
1986), including eleven representatives of one of the largest sections of the genus *Centaurea* sect. *Acrocentron* (Cass.) DC (FONT *et al.* 2009): *C. calocephala* Willd. (= *C. atropurpurea* Waldst. & Kit., non Olivier), *C. chrysolepis* Vis., *C. kotschyana* Heuff., *C. finazzi* Adamović, *C. kosaninii* Hayek, *C. melanocephala* Pančić, *C. ognjanoffii* Urum., *C. orientalis* L., *C. salonitana* Vis., *C. scabiosa* L. and *C. zlatiborensis* Zlatković, Novaković & Janačković (FONT *et al.* 2009; NOVAKOVIĆ *et al.* 2018). The involucre and the involucre bracts are the most important morphological characteristics used to distinguish closely related species in the sect. *Acrocentron* (RAHIMINEJAD *et al.* 2010; FERRER-GALLEGO *et al.* 2017). The basic chromosome number of the section is  $x = 10$  (BANCHEVA & GREILHUBER 2006; HILPOLD *et al.* 2014; SILJAK-YAKOVLEV 2022), while  $x = 11$  has also been found in some species (HILPOLD *et al.* 2014; SILJAK-YAKOVLEV 2022).

During the field work for the implementation of the bilateral project between Serbia and Montenegro “Flora and vegetation on ultramafics (serpentinites) as a basis for expanding the national lists of plants and habitats in Montenegro and Serbia, with special reference to the bioaccumulation potential of individual plants for phytoremediation”, we found a small and geographically restricted population of an unusual yellow-flowered

*Centaurea* from the section *Acrocentron* in ultramafic, xerophilous, steppe-like grasslands on Mt. Ozren in southwestern Serbia. Since the plant from Mt. Ozren shows obvious morphological differences from the other taxa of the section, we assumed that it deserves the rank of a new species. Therefore, the main aim of this work is to compare and describe the plant and to indicate its distribution and ecology, chromosome number, conservation measures and an identification key of closely related *Centaurea* species of the section *Acrocentron* in Serbia.

## MATERIALS AND METHODS

The specimens of the new species were collected during field investigations in June 2019. The plant samples (basal and upper leaves, involucre bracts and achenes – one from each specimen) of ten individuals were collected, scanned and measured using Digimizer Image Analysis Software (MedCalc Software, Belgium). Two morphological traits, the plant height and capitula width, were measured in the field. The plant height was measured with a ruler, while the width of the capitula was measured using a vernier. For the morphological comparison, the plant material of morphologically closely related taxa (*C. calocephala*, *C. kotschyana*, *C.*



**Fig. 2.** *Centaurea ozrenii* – A) habitus; B) leaves; C) inflorescence; D) phyllaries and E) achenes. Photo M. Niketić (A–C) and U. Buzurović (D–E).

*chrysolepis* and *C. orientalis*) from the BEO herbarium and data from NOVAKOVIĆ *et al.* (2018) were used. The voucher specimens of *C. ozrenii* were deposited in the BEO and BEOU. The herbarium acronyms are according to THIERS (2024). For the phytocenological relevés we used the methods proposed by BRAUN-BLANQUET (1964).

To determine the chromosome number, the root tips from germinated seeds were pretreated with 0.002M 8-hydroxyquinoline for 3.5 h at 8°C, fixed in freshly prepared Carnoy's fixative for 48 h at 4°C, then hydrolised in 1N HCl at 60°C for 11 minutes, and finally stained in Schiff's reagent for 2 h at room temperature (FEULGEN & ROSSENBECK 1924). Squashing was carried out in a drop of acetic carmin. A minimum of 100 cells from 10 microscopic slides were examined under a Leica DMLS light microscope and photographed using a Leica DCF 295 camera.

## RESULTS

### Taxonomic treatment

***Centaurea ozrenii*** Niketić, Tomović & Buzurović, **sp. nov.** (Figs. 1 & 2)

**Type.** Serbia: southwestern Serbia, Mt. Ozren, Revuša, UTM DN08, ultramafic soil, 1597 m, pastures, 29

June 2019, coll. M. Niketić, G. Tomović, K. Jakovljević (holotype: BEOU 18033, isotype: BEO 101521).

**Description.** A perennial rhizomatous caespitose plant with single to mostly several stems; stem erect, (14–) 19–37(–50) cm high, always simple, sparsely (rarely densely) arachnoid-lanate in the upper part. Outer basal leaves undivided (remotely serrate, rarely entire), linear to linear-lanceolate, 8–16 × 0.4–1 cm; inner basal leaves simply pinnatisect (non lyrate-pinnatisect, rarely undivided) with (1–)2–3(–5) linear, acuminate lateral segments on each side (often very abbreviated) and remotely serrate, acute terminal segment, 3–4(–5) mm wide and much longer than the lateral segments; all the basal leaves crowded in (pseudo)rosettes. Cauline leaves 3.5–7 cm long, gradually decreasing in size up the stem, always simply pinnatisect with (2–)3–5(–6) linear, aristate lateral segments on each side and entire, aristate to mucronate terminal segment, usually much longer than the lateral segments; uppermost leaves reduced to linear scarious and pectinate scales. All the leaves somewhat fleshy, subglabrous with sparse arachnoid-lanate hairs at the margin or in the axils. Capitula solitary, globose, 1.5–2.3 cm wide. Outer phyllaries broadly triangular to rarely ovate, acute, 14–18 mm long, 9.5–11.8 mm wide; inner phyllaries spatulate 20.6–25.3 mm long, 5–8.3 mm

Table 1. A comparison of the morphological characteristics of *Centaurea* species.

	<i>C. zlatiborensis</i> *	<i>C. calcephala</i> *	<i>C. kotschyana</i> *	<i>C. orientalis</i> *	<i>C. chrysolepis</i> *	<i>C. ozrenii</i>
Stem height (cm)	20–56	100–150	50–100	80–120	30–60	(14)19–37 (50)
Stem	Simple to sparsely branched	Sparsely branched in upper half	Usually simple	Simple to sparsely branched in upper half	Simple, or with few short branched	Simple, without branched
Leaves	Basal pinnatifid to pinnatisect, irregularly divided to undivided, more than 3 cm wide; cauline irregularly lobed, lyrate-pinnatisect to entire, with an acute apex, segments oblong to linear-lanceolate	Basal usually pinnatisect, rarely pinnatifid to undivided, more than 3 cm wide; cauline 1(2)-pinnatisect, with an sometimes lyrate, with an acute apex, segments oblong to linear-lanceolate	Basal undivided, rarely lyrate, more than 3 cm wide; cauline pinnatisect, with an acute apex, segments oblong to linear-lanceolate	Basal undivided to pinnatifid, more than 3 cm wide; cauline pinnatisect, with an acute apex, segments narrowly oblong to linear	Basal pinnatisect, rarely undivided, more than 3 cm wide; cauline pinnatisect, with an acute apex, segments narrowly oblong to lanceolate	Basal undivided to simply pinnatisect (non lyrate) subglabrous leaves, with linear segments, up to 1 cm wide; cauline pinnatisect, with an aristate apex
Capitula	Solitary or few, globose to nearly cylindrical, 16–26 mm wide	Many, sometimes solitary, globose, 20–30 mm wide	Usually solitary, globose, 20–30 mm wide	Solitary to several, $\pm$ globose, 20–25(–30) mm wide	Solitary or few, globose to widely ovate, 25–35(–40) mm wide	Solitary, globose, 15–23 mm wide
Phyllaries	Widely ovate to ovate, obtuse	Ovate to narrowly ovate, subacute	Narrowly ovate to ovate, acute	Ovate to narrowly ovate, subacute	Ovate to triangular-ovate, subacute to acute	Outer bract triangular to rarely ovate, acute; inner bract spatulate, scabrous pubescent
Appendages	Triangular, to shortly triangular-lanceolate, dark brown not completely covering the bracts, 2–4 mm wide; fimbriae 1–3 mm, brownish in the base, whitish to silvery above	Triangular to triangular-lanceolate, light brown, completely covering the bracts, 3–5 mm wide; fimbriae 3–5 mm, brownish in the base, whitish to silvery above	Ovate to ovate-triangular, dark brown to black, completely covering the bracts, 2.5–5.0 mm wide; fimbriae 3–6 mm, brownish, white at apex, unevenly distributed, arched	Widely ovate, with a pale brown central spot, mucronate at apex, completely covering the bracts, 5–7 mm wide; outer fimbriae 1–3 mm, pale yellow	Triangular-lanceolate, straw yellow, with an apical spine, completely covering the bracts, 3–5 mm wide; fimbriae 3–4 mm, yellow	Triangular to broadly triangular, acute, dark brown, without apical spine, completely covering the bracts, 4–5.5 mm wide; fimbriae 2.5–6.5 mm, silvery to brownish, unevenly distributed, arched
Achenes	5–6 mm long, dark brown, subglabrous to puberulent, pappus 5–7 mm long, brownish to slightly purplish	4–5 mm long, pale brown, puberulent, pappus 6–8 mm long, gray-brownish	5–6 mm, dark brown to purplish, subglabrous, pappus 5–7 mm long, gray-purplish	5–6 mm long, pale brown, appressed-hairy, pappus 5–7 mm long, gray-brownish	5–6 mm, brown, pubescent to very rarely glabrous; pappus 6–9 mm length, grayish, becoming dark purplish	4.5–6.5 mm length, blackish, pubescent to very rarely glabrous; pappus 6–9 mm length, grayish, becoming dark purplish
Corollas	Dark purple; the outer florets not conspicuously radiate, scarcely longer than the inner	Dark purple, sometimes yellow; the outer florets not conspicuously radiate, scarcely longer than the inner	Dark purple, sometimes yellow; the outer florets not conspicuously radiate, scarcely longer than the inner	Cream to yellow; the outer florets not conspicuously radiate, scarcely longer than the inner	Pale yellow, sometimes purple; the outer florets not conspicuously radiate, scarcely longer than the inner	Cream to pale yellow; outer florets conspicuously radiate, much longer than the inner
Chromosomes number (2n)	20	20	20, 22	20	20	22

\* Partly based on Novaković *et al.* (2018) and modified.



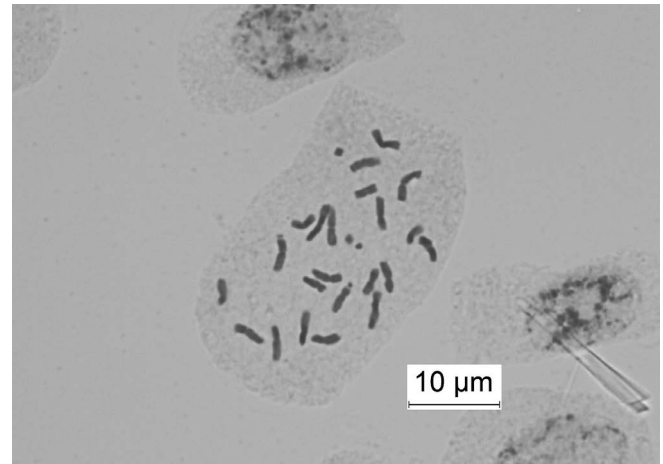
**Fig. 3.** The habitat of *Centaurea ozrenii* on Mt. Ozren. Photo U. Buzurović.

wide. Appendages triangular to broadly triangular, acute, dark brown completely covering the phyllaries, 4–5.5 mm wide, especially in inner phyllaries scabrous pubescent; fimbriae (13–)15–18(–20) on each side, 3–6.5 mm long, arising gradually from appendages, unevenly distributed, arched, silvery to brownish, shortly scabrous ciliate. Achenes blackish, pubescent or rarely glabrous, 4.5–6 mm long; pappus 6–9 mm long, greyish, becoming dark purplish. Corollas cream to pale yellow, the outer florets radiate, (27–)34–37 mm, much longer than the inner ones.

**Etymology.** The specific epithet “ozrenii” refers to Mt. Ozren near Sjenica, where the species was found. This is the only known locality of the species.

**Phenology.** Flowering in June (–July) and fruiting in July.

**Distribution and ecology.** This species grows in a single micro locality on ultramafic (serpentinized harzburgite) geological substrate, which was confirmed as the only habitat by a comprehensive and multi-year survey both of Mt. Ozren as well as other mountains in southwestern Serbia. It inhabits dry grasslands on deep soils over ultramafic bedrocks (*Chrysopogono-Danthonion calyciniae* Kojić 1959, *Brachypodietalia pinnati* Korneck 1974 – Fig. 3, Relevé 1 in Supplementary Table 1) and xerophilous and steppe-like habitats of the Balkan ultramafic open bedrocks on shallow soils (*Potentillion visianii* Ritter-Studnička 1970, *Halacsyetalia sendtneri* Ritter-Studnička 1970 – Relevé 2 in Supplementary Table 1). The most abundant



**Fig. 4.** Mitotic metaphase plate of *Centaurea ozrenii*,  $2n = 22 + 1-4Bs$ . Photo M. Lazarević.

taxa in this habitat type are: *Bromus erectus* Huds., *Koeleria pyramidata* (Lam.) P. Beauv., *Thymus praecox* Opiz subsp. *jankae* (Čelak.) Jalas, *Linum catharticum* L., *Anthyllis vulneraria* L., *Danthonia alpina* Vest., *Festuca panciciana* (Hack.) K. Richt., *Halacsya sendtneri* (Boiss.) Dörfel. and *Carex humilis* Leyss. The phytocenological relevés are given in Supplementary Table 1. The habitat is surrounded by a European red pine (*Pinus sylvestris* L.) and Austrian pine (*Pinus nigra* J.F. Arnold) forest which provides the plant with moderate protection from wind and extreme temperature fluctuations.

**Chromosome number.** The chromosome number of *Centaurea ozrenii* is  $2n = 22 + 1-4Bs$  (Fig. 4).

**Conservation measures.** Thorough field investigations confirmed the Revuša on Mt. Ozren as the only locality for *C. ozrenii*, where it covers an area of approximately 50 m<sup>2</sup> and consists of 13 clusters of individuals with 23–52 flowering stems in total (depending on the year of observation). In addition to the small population size, the low reproductive potential of this species, grazing and the overgrowing by the surrounding species are identified as the possible threat factors for *C. ozrenii*. According to the preliminary assessment using the IUCN Red List categories and criteria (IUCN 2012), *C. ozrenii* is categorised as Critically Endangered. The site is protected by national legislative as part of the “Ozren-Jadovnik landscape of outstanding features”.

The implementation of *in situ* conservation measures began in 2019, when the species was discovered, and has continued in each subsequent year. The individuals not belonging to *C. ozrenii* were removed to reduce competitiveness (Fig. 5A) and this area was covered with mosses to maintain soil moisture (Fig. 5B). During the observation period, the number of flowering stems increased from only 23 in 2019, to 52 in 2023. Seedlings and/or juvenile plants were not observed in the habitat. Therefore, the implementation of *ex situ* propagation and subsequent population reinforcement is necessary.

### Identification key of closely related *Centaurea* species of sect. *Acrocentron* in Serbia

- 1a Florets yellow or pale yellow..... 2  
 1b Florets dark purple to purple..... 6  
 2a Appendages of outer phyllaries membranous, inflated, fimbriae 1–3 mm long..... *C. orientalis*  
 2b Appendages of outer phyllaries not membranous and inflated, fimbriae longer than 3 mm ..... 3  
 3a Appendages straw-yellow, with an apical spine ..... *C. chrysolepis* (p.p. max.)  
 3b Appendages dark brown or black, without an apical spine ..... 4  
 4a Plant up to 40(–50) cm. Basal leaves up to 1 cm wide, simply non lyrate-pinnatisect or undivided; segments of cauline leaves aristate at the apex. Corollas cream to pale yellow, the outer florets conspicuously radiate, much longer than the inner ones..... *C. ozrenii*  
 4b Plant usually more than 50 cm. Basal leaves more than 3 cm wide, 1(–2)-pinnatisect, usually lyrate; segments of cauline leaves not aristate at the apex. Corollas pale yellow to yellow, the outer florets not conspicuously radiate, scarcely longer than the inner ones ..... 5  
 5a Stem usually with a solitary capitulum. Appendages ovate to ovate-triangular; fimbriae silvery to brownish, unevenly distributed, arched..... *C. kotschyana* (p.p. min.)  
 5b Stem usually with numerous capitula. Appendages triangular to triangular-lanceolate; fimbriae silvery, ± evenly distributed..... *C. calocephala* (p.p. min.)  
 6a Appendages straw-yellow..... *C. chrysolepis* (p.p. min.)  
 6b Appendages dark brown or black ..... 7  
 7a Appendages ovate to ovate-triangular; fimbriae silvery to brownish, unevenly distributed, arched ..... *C. kotschyana* (p.p. max.)  
 7b Appendages triangular to triangular-lanceolate; fimbriae silvery, ± evenly distributed..... 8  
 8a Plant up to 60 cm; capitula solitary or few, globose to nearly cylindrical; involucre bracts widely ovate to ovate, obtuse; achenes 5–6 mm long, dark brown; pappus brownish to slightly purplish; fimbriae 1–3 mm long ..... *C. zlatiborensis*  
 8b Plant usually more than 100 cm; capitula numerous, sometimes solitary, globose to widely ovate; involucre bracts narrowly ovate, subacute; achenes 4–5 mm long, pale brown; pappus gray-brownish; fimbriae 3–5 mm long ..... *C. calocephala* (p.p. max.)

### DISCUSSION

Intensive studies of the genus *Centaurea* on the Balkan Peninsula have led to the discovery of several new species in this area in the last decade alone (NOVAKOVIĆ *et al.* 2018; BOGDANOVIĆ *et al.* 2022). Based on qualitative and quantitative morphological characteristics, *Centaurea ozrenii*, the newly discovered species of this genus, (Table 1), is similar to *C. calocephala*, *C. chrysolepis*, *C. orientalis*, *C. zlatiborensis* and *C. kotschyana*, all of which belonging to the sect. *Acrocentron*. In terms of the colour of the florets and the achenes length, the new species is morphologically similar to *C. orientalis* and *C. chrysolepis*, but differs in terms of the stem (an unbranched simple stem with only one capitulum) and in the colour of the pappus (grayish becoming dark purplish) and appendages (dark brown, without an apical spine and unevenly distributed fimbriae). The width of the capitula is smaller than in *C. chrysolepis*. The two species have a similar stem height, while the individuals of *C. orientalis* are slightly higher and have inflated appendages with short fimbriae.

According to the plant height and the length of the achenes, *C. ozrenii* is morphologically close to *C. zlatiborensis*, but differences were found mainly in the colour of the florets (yellow vs. dark purple), the involucre bracts (triangular to rarely ovate to spatulate vs. widely ovate to ovate), the length and distribution of the fimbriae (2.5–6.5 mm vs. 1–3 mm), the basal leaves (undivided to simply pinnatisect vs. pinnatifid to pinnatisect, irregularly divided to undivided) and the stems (simple without branching vs. simple to sparsely branched).

In terms of achene length, appendage length, the length and colour of the fimbriae, and pappus length, *C. ozrenii* is morphologically similar to *C. calocephala* and *C. kotschyana* (which can sometimes also have yellow flowers), but differs in the lower stem height and leaf shape (Table 1). *Centaurea ozrenii* resembles *C. kotschyana* in some morphological features – a simple stem, the form of the phyllaries including appendages and fimbriae and chromosome number.

In addition, *C. ozrenii* has much narrower basal leaves (up to 1 cm wide), aristate segments of cauline leaves and conspicuously radiate outer florets, much longer than the inner ones, which distinguishes it from all other representatives of *C.* sect. *Acrocentron* in Serbia (for example: *C. orientalis*, *C. calocephala*, *C. kotschyana*; Fig. 6).

The chromosome number of the newly discovered species with  $2n=22$  is the same as in the populations of some representatives of the section *Acrocentron* on the Balkan Peninsula: *C. grbavacensis* (Rohlena) Stoj. & Acht. from North Macedonia, *C. kotschyana* from the population in Mt. Šar-planina (Kosovo), *C. melanocephala* from Serbia, and *C. murbeckii* from Mt. Zelengora in Bosnia and Herzegovina (NOVAKOVIĆ *et al.* 2022; SILJAK-YAKOVLEV



**Fig. 5.** *In situ* conservation – A) removing the grass around the plant; B) surrounding the plant with mosses. Photo U. Buzurović.



**Fig. 6.** Capitula and florets of A) *Centaurea ozrenii*, and related species B) *C. orientalis* (Dimitrovgrad, Bačevo), C) *C. calocephala* (Mt. Veliki Stol) and D) *C. kotschyana* (Mt. Kopaonik). Photo U. Buzurović (A-C) and Bojan Zlatković (D).

2022). However, it differs from other closely related taxa from the area, e.g. *C. calocephala*, *C. chrysolepis*, *C. gjurasinii*, *C. immanuelis-loewii*, *C. orientalis* and recently described *C. zlatiborensis* (the chromosome number is  $2n = 20$ ; BANCHEVA & GREILHUBER 2006; NOVAKOVIĆ *et al.* 2018, 2022).

## CONCLUSION

*Centaurea ozrenii* is a newly described local endemic, morphologically separated from other representatives

of *Centaurea* sect. *Acrocentron*. Due to the extremely small number of individuals in a single population it should be protected by legislation, while its inclusion in the Red Book of the Flora of Serbia is in progress. In the future, more intensive *in situ* and *ex situ* conservation measures should be carried out to increase the number of individuals and protect the species from extinction.

**Acknowledgements** - This research was supported by The Ministry of Education, Science and Technological Development of the Republic of Serbia and Ministry of

Science of the Republic of Montenegro - Bilateral Project "Flora and vegetation on ultramafics (serpentinites) as a basis for expanding the national lists of plants and habitats in Montenegro and Serbia, with special reference to the bioaccumulation potential of individual plants for phytoremediation". This research was supported by the Ministry of Science, Technological Development and Innovations of the Republic of Serbia, grant No. 451-03-65/2024-03/200178, 451-03-66/2024-03/200007 and 451-03-66/2024-03/200011. The authors would like to thank PhD Rastko Ajtić for the illustration of *C. ozrenii* and PhD Bojan Zlatković for the photo of *C. kotschyana*.

## REFERENCES

- BANCHEVA S & GREILHUBER J. 2006. Genome size in Bulgarian *Centaurea* s.l. (Asteraceae). *Plant Systematics and Evolution* **257**: 95–117.
- BOGDANOVIĆ S, BORŠIĆ I, LJUBIČIĆ I, BRULLO S & GIUSSO DEL GALDO G. 2022. *Centaurea lovricii*, a new species of *C.* sect. *Centaurea* (Asteraceae) from Croatia. *PhytoKeys* **214**: 97–114.
- BRAUN-BLANQUET J. 1964. *Pflanzensoziologie, Grundzüge der Vegetationskunde* 3. Springer Wien, New York.
- FERRER-GALLEGO PP. 2017. *Centaurea inexpugnabilis*, una nueva especie de la sección *Acrocentron* para la flora ibérica. *Collectanea Botanica* **35**: e006.
- FEULGEN R & ROSSENBECK H. 1924. Mikroskopisch-chemischer Nachweis einer Nukleinsäure vom Typus der Thymonukleinsäure und die darauf beruhende selektive Färbung von Zellkernen in mikroskopischen Präparaten. Hoppe-Seyler's Zeitschr. *Physiological Chemistry* **135**: 203–248.
- FONT M, GARCIA-JACAS N, VILATERSANA R, ROQUET C & SUSANNA A. 2009. Evolution and biogeography of *Centaurea* section *Acrocentron* inferred from nuclear and plastid DNA sequence analyses. *Annals of Botany* **103**: 985–997.
- GAJIĆ M. 1975. Asteraceae. In: JOSIFOVIĆ M (ed.), *Flora SR Srbije* 7, pp. 1–465, Serbian Academy of Sciences and Arts, Belgrade.
- HELLWIG HF. 2004. Centaureinae (Asteraceae) in the Mediterranean – history of ecogeographical radiation. *Plant Systematics and Evolution* **246**: 137–162.
- HILPOLD A, GARCIA-JACAS N, VILATERSANA R & SUSANA A. 2014. Taxonomical and nomenclatural notes on *Centaurea*: A proposal of classification, a description of new sections and subsections, and a species list of the redefined section *Centaurea*. *Collectanea Botanica* **33**: e001.
- IUCN 2012. *IUCN red list categories and criteria, ver. 3.1., 2<sup>nd</sup> ed.* IUCN Species Survival Commission.
- LÓPEZ E, DEVESA JA & ARNELAS I. 2011. Taxonomic study in the *Centaurea langei* complex (Asteraceae). *Annales Botanici Fennici* **48**(1): 1–12.
- NOVAKOVIĆ J, JANAČKOVIĆ P, SUSANNA A, LAZAREVIĆ M, BORŠIĆ I, MILANOVICI S, LAKUŠIĆ D, ZLATKOVIĆ B, MARIN DP & GARCIA-JACAS N. 2022. Molecular insights into the *Centaurea calocephala* complex (Compositae) from the Balkans – Does phylogeny match systematics? *Diversity* **14**: 394.
- NOVAKOVIĆ J, ZLATKOVIĆ B, LAZAREVIĆ M, GARCIA-JACAS N, SUSANNA A, MARIN P, LAKUŠIĆ D & JANAČKOVIĆ P. 2018. *Centaurea zlatiborensis* (Asteraceae, Cardueae–Centaureinae), a new endemic species from Zlatibor mountain range, Serbia. *Nordic Journal of Botany* **36**(6): e01893.
- POWO. 2024. Plants of the world online. Available at: <https://powo.science.kew.org/results?q=centaurea> [Accessed 04 January 2024]
- RAHIMINEJAD MR, MOZAFFARIAN V & MONTAZEROLGHAEM S. 2010. A taxonomic revision of *Centaurea* section *Acrocentron* (Asteraceae) in Iran. *Botanical Journal of the Linnean Society* **163**: 99–106.
- RANĐELOVIĆ N & STAMENKOVIĆ V. 1986. Priloženje km florata v okolstva na Bosilegrad I. *Most* **100**: 80–85.
- ROMASCHENKO K, ERTUĞRUL K, SUSANNA A, GARCIA-JACAS N, UYSAL T & ARSLAN E. 2004. New chromosome counts in the *Centaurea jacea* group (Asteraceae, Cardueae) and some related taxa. *Botanical Journal of the Linnean Society* **145**(3): 345–352.
- SILJAK-YAKOVLEV S. 2022. Karyological investigation of two Balkan endemic *Centaurea* species. *Flora Mediterranea* **32**: 238–243.
- SILJAK-YAKOVLEV S, SOLIC M-E, CATRICE O, BROWN SC & PAPEŠ D. 2005. Nuclear DNA content and chromosome number in some diploid and tetraploid *Centaurea* (Asteraceae: Cardueae) from the Dalmatia region. *Plant Biology* **7**(4): 1–8.
- SUSANNA A & GARCIA-JACAS N. 2007. Tribe Cardueae Cass. (1819). In: KADEREIT K & JEFFREY C (eds.), *The families and genera of vascular plants* 8. *Flowering plants. Eudicots: Asterales*, pp. 123–146, Springer Science & Business Media.
- THIERS B. 2024. Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at: <http://sweetgum.nybg.org/ih/> [Accessed 04 January 2024]
- TOMOVIĆ G, NIKETIĆ M, LAKUŠIĆ D, RANĐELOVIĆ V & STEVANOVIĆ V. 2014. Balkan endemic plants in Central Serbia and Kosovo regions: distribution patterns, ecological characteristics and centres of diversity. *Botanical Journal of the Linnean Society* **176**(2): 173–202.





## REZIME

## *Centaurea ozrenii* (Asteraceae) – nova lokalno endemična i izuzetno retka vrsta sa planine Ozren kod Sjenice u Srbiji

Uroš BUZUROVIĆ, Gordana TOMOVIĆ, Ksenija JAKOVLJEVIĆ, Snežana VUKSANOVIĆ, Maja LAZAREVIĆ, Snežana DRAGIĆEVIĆ i Marjan NIKETIĆ

Nova vrsta iz roda *Centaurea*, sekcije *Acrocentron* (Asteraceae) pronađena je na planini Ozren kod Sjenice u jugozapadnoj Srbiji i nazvana je *Centaurea ozrenii*. Raste na kserofilnim i stepolikim staništima na ultramafitskoj geološkoj podlozi. Morfološki je slična vrstama *C. calocephala*, *C. chrysolepis*, *C. orientalis*, *C. murbeckii*, *C. kotschyana* i nedavno opisanoj vrsti *C. zlatiborensis*. Najkarakterističnije morfološke odlike novoopisane vrste su: nedeljeni do prosto perasto usečeni (ne lirasti), malo dlakavi listovi sa linearnim segmentima koji formiraju (pseudo)rozetu, gornji listovi sa osasto zašiljenim vrhom i krem-žuti do bleožuti cvetovi od kojih su spoljašnji znatno duži od unutrašnjih. Listići involukruma su intermedijarni u odnosu na *C. calocephala* i *C. kotschyana*. Broj hromozoma je  $2n = 22$ . Detaljnim terenskim istraživanjima potvrđeno je prisustvo vrste *C. ozrenii* samo na jednom lokalizovanom mestu na planini Ozren, čija populacija obuhvata 13 grupa jedinki sa ukupnim brojem cvetajućih stabljika od 23 do 52 na površini od oko 50 m<sup>2</sup>. Primenom kategorija i kriterijuma IUCN crvene liste, *C. ozrenii* je kategorisana kao kritično ugrožena vrsta.

**Ključne reči:** Flora Balkana, sekcija *Acrocentron*, nova vrsta, taksonomija, broj hromozoma

## ORCID:

Uroš BUZUROVIĆ  
Gordana TOMOVIĆ  
Ksenija JAKOVLJEVIĆ  
Snežana VUKSANOVIĆ  
Maja LAZAREVIĆ  
Snežana DRAGIĆEVIĆ  
Marjan NIKETIĆ

<https://orcid.org/0009-0000-7702-659X>  
<https://orcid.org/0000-0001-7628-4407>  
<https://orcid.org/0000-0002-1457-6807>  
<https://orcid.org/0000-0003-2735-8101>  
<https://orcid.org/0000-0001-7487-2475>  
<https://orcid.org/0000-0002-2788-5211>  
<https://orcid.org/0000-0003-2319-4488>

