

***CERASTIUM SUBTETRANDRUM (CARYOPHYLLACEAE),
A NEW SPECIES TO THE FLORA OF SERBIA***

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During field studies of saline meadows and salt marshes carried out in the vicinity of Apatin (Serbia: Vojvodina), an interesting specimen of the genus *Cerastium* L. (*Caryophyllaceae*) was collected and identified as *Cerastium subtetrandrum* (Lange) Murb. This annual species has never before been recorded in Serbia. The newly recorded plant grows in open grassland communities [*Peucedano-Asteretum punctati* (Rapcs.) Soó and *Artemisio-Festucetum pseudovinae* (Magyar) Soó] on saline-alkaline pasture near forest edging, on moderately risen flattened solonetz polygons between saline microdepressions and their slopes. The population in Vojvodina represents the southernmost point in the species range. The current IUCN threatened status of the species in Serbia is estimated as Critically Endangered (CR).

Key words: *Cerastium subtetrandrum*, floristic, distribution, threatened status, Serbia, Vojvodina.

INTRODUCTION

The genus *Cerastium* L. (*Caryophyllaceae*) comprises ca. 200 species with the centre of diversity in the Balkan Peninsula (Niketić 2007). The majority of taxa belongs to perennials, which are also characteristic of the

most numerous type section *Cerastium* (*Orthodon* Sér.). Within the type section, all the annual species are traditionally classified in the separate subsection *Fugacia* (Fenzl) Hayek. According to Scheen *et al.* (2004) and Brysting *et al.* (2007) the distinction between annual and perennial species in section *Cerastium* is not supported. Some annuals such as *Cerastium brachypetalum* Pers. and *C. glomeratum* Thuill. are relatively old taxa, while some other annuals such as *C. semidecandrum* L., *C. pumilum* Curtis and *C. diffusum* Pers., together with short-leaved perennials *C. fontanum* group, belong to the same group which is younger than *C. brachypetalum* and *C. glomeratum* as well as the perennial *C. latifolium* L. group, but older than the other perennial species. The great similarity between the members of *C. pumilum* s.l. aggregate and *C. diffusum* is also confirmed.

All the annuals mentioned above, except *C. diffusum*, are also recorded in the Flora of Serbia as well as in Vojvodina (Gajić 1970). According to Niketić (2009), *C. glutinosum* Fr. would be the only one representative of the *C. pumilum* group in Serbian flora.

During our floristical investigations of saline meadows and salt marshes in the vicinity of Apatin (Vojvodina) in 2006, we found specimens of genus *Cerastium* with tetramerous flowers. The preliminary survey showed that collected specimens probably belong to *Cerastium subtetrandrum* (Lange) Murb. A field investigation in spring 2009 reconfirmed the presence of this questionable taxon in the observed area (Map. 1). A review of the literature data revealed that this taxon had not been yet recorded for the flora of Serbia.

MATERIAL AND METHODS

Herbarium material was checked in the Herbarium of the Institute of Botany and Botanical Garden, University of Belgrade (BEOU), Royal Botanic Garden Edinburgh (E) and Natural History Museum of Vienna (W). The collected material is deposited in the Natural History Museum in Belgrade (BEO), the Department of Biology and Ecology in Novi Sad (BUNS) (Holmgren *et al.* 1990; <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>), and the Institute for Nature Protection of Serbia (HIPNS). Taxon description is given according to Karlsson (2001), with some changes resulting from our field and herbarium observations. The estimation of threatened status of some of the listed species for the territory of Serbia is made according to criteria and categories of IUCN (2001).

RESULTS AND DISCUSSION

After inspection of herbarium collections (BEOU, E) we have definitely confirmed that a newly discovered population belongs to (Baltic Mouse-ear):

- Cerastium subtetrandrum* (Lange) Murb., Bot. Not. 1898: 259 (1898).
 ≡ *C. pumilum* f. *subtetrandrum* Lange, Haandb. Danske fl. ed. 4: 676 (1887) [basion.].
 ≡ *C. diffusum* subsp. *subtetrandrum* (Lange) P. D. Sell & Whitehead, Feddes Repert. 69: 23 (1964).
 = *C. glutinosum* var. *bracteatum* Westerl., Bot. Not. 1869: 145 (1869).

Voucher specimens: Serbia, Vojvodina: Bačka, Apatin, salt marshes. UTM 34T CR45. leg. R. Perić 03-May-2006, (sub *C. diffusum* subsp. *subtetrandrum*) 40755 BEO; BUNS; HIPNS; Apatin-Svilojevo, salt marshes next to Kurjačica wood, solonetz with solonchak spots in the loess. 45°39'41.01" N, 19°01'20.88" E. leg. R. Perić 19-Apr-2009, 40756 BEO, HIPNS (Fig. 1).

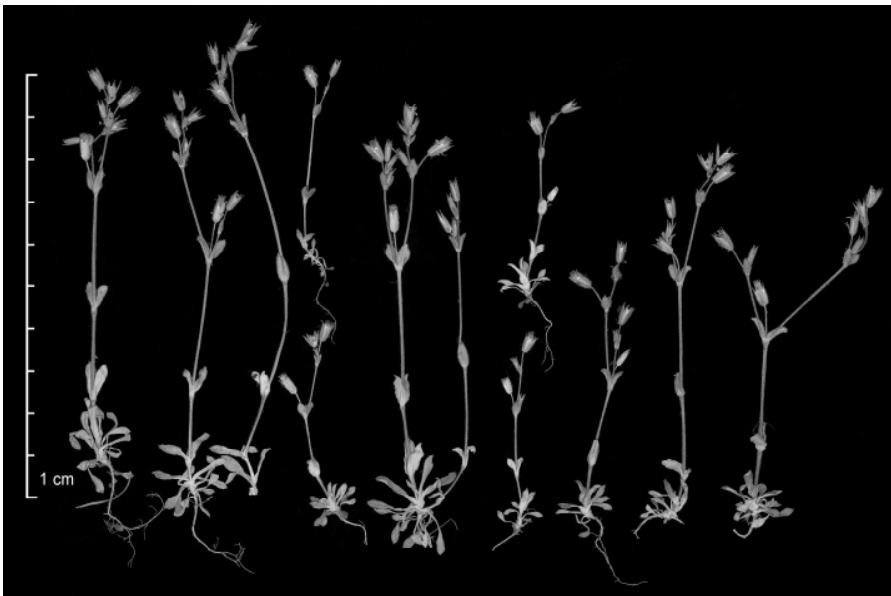
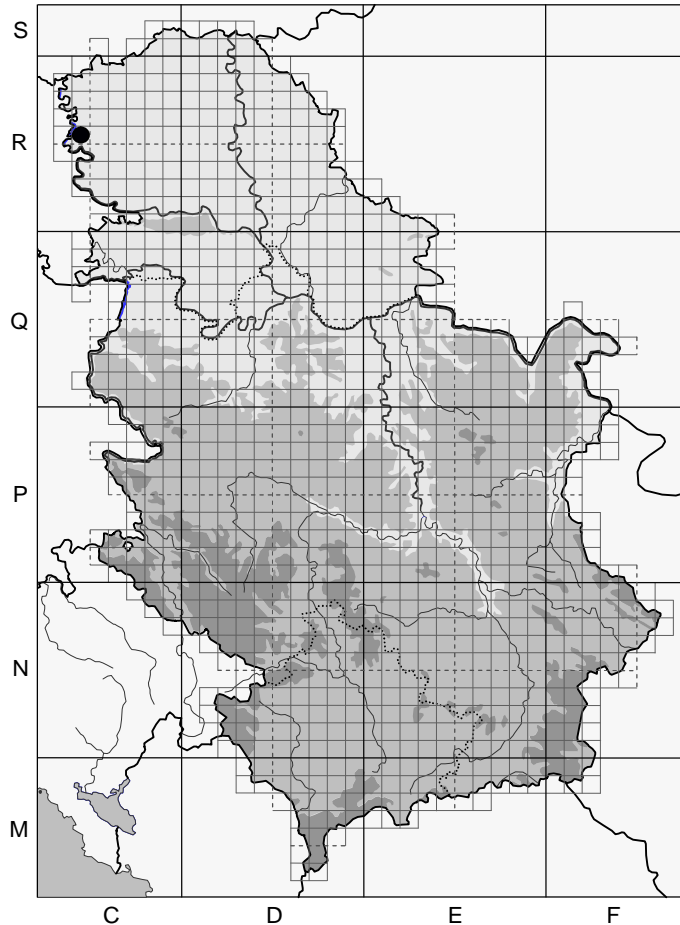


Fig. 1 - *Cerastium subtetrandrum* (Lange) Murb. –
 – voucher specimens 40756 BEO.

The first record had been reported earlier as a preliminary communication in a manuscript (Perić 2006) as well as in an abstract (Perić & Boža 2007) (sub *C. diffusum* subsp. *subtetrandrum*).

Description: Overwintering annual with a basal rosette; pale or yellowish green. *Stems* 1-3 [in literature 1-14(26)], 4-10 cm height [in literature 3-20(26) cm], ± erect. Below and in the middle shortly hirsute to hispid (up to 0.4 mm) and very sparse short glandular; the upper internodes with glandular (up to 0.3 mm) and usually also with very scattered hirsute hairs. *Basal leaves* oblanceolate-spathulate to obovate-spathulate, obtuse,



Map 1. - Known distribution of *Cerastium subtetrandrum* (Lange) Murb. in Serbia.

0.5-1 cm long, with petiole 0.25-0.5 cm long, only on the margin and near the margin shortly hirsute to hispid (up to 0.5 mm). Stem leaves obovate or elliptical, sometimes ovate, oblanceolate or lanceolate, acute to acuminate, 0.4-1.2 cm long and 0.2-0.6 cm wide, on both surfaces shortly hirsute to hispid (up to 0.6 mm). *Dichasial cyme* ± lax, comprising (15)30-50(60)% of the total stem height, with glandular (up to 0.2 mm) and usually also

with scattered hirsute hairs. *Bracts* herbaceous or rarely upper ones with very narrow scarious margin, usually dark reddish at apex, hirsute (up to 0.5 mm) to glabrous on the upper surface and margin (upper ones also glandulose), glandulose (especially upper ones) to glanduloso-hirsute on the lower surface and margin. Lower bracts elliptical to ovate, acute to apiculate, 0.3-0.5(0.8) cm long and 0.2-0.3(0.4) cm wide; shorter and narrower than the uppermost stem leaves. Upper bracts lanceolate to ovate, acute. *Pedicels* ± thick and straight, rarely reflexed during fructification, densely glandular and sparsely hirsute (up to 0.2 mm), lowermost equalling or up to three times as long as the calyx. *Sepals* 4(5), lanceolate, acute or sometimes subacute, (3)4-6 mm long, usually dark reddish below the apex, densely glandular (up to 0.4 mm) and hirsute (up to 0.5 mm) only at the apex (which is not overtopped by hairs) and at the base; with silver-gray scarious margin (0.2-0.5 mm wide). *Petals* 4(5), oblanceolate to narrowly obovate, shorter than sepals, 3-4 mm long, 1-2 mm wide, incised to 10-25(33)%, completely glabrous. *Stamens* 4-6(8); filaments thin, 1.5-2.5 mm long, glabrous, white; anthers capitate, 0.3-0.4 mm long, yellowish. *Styles* terete, 4(5), 0.6-1 mm long. *Capsule* scarious, cylindrical, straight or sometimes very slightly curved towards the apex, 5.5-8 mm long, 1.5-2.5 mm wide, apically contracted, 1-2 mm exceeding the calyx; teeth 8(10), ovate-lanceolate, obtuse, with involute margins, immature usually dark reddish at apex. *Seeds* reniform, triangular or deltoid, 0.5-0.75 mm, pale brown, with obtuse tubercles. $2n=72$ (Hagerup 1941). IV-V.

Distribution: The occurrence of the species is probably not completely known yet. It was described from Denmark, and also was recorded in S. Sweden (Karlsson 2001), N. Poland (Zajac 1974), S.E. Austria (Murbeck 1898, Franz *et al.* 1937, Lonsing 1969, Möschl 1973), Slovakia (Dostál 1950, 1989), and Hungary (Soó 1970, Rakonczay 1990, Szujkó-Lacza 1993, Tamás 2003). It is also recorded in the flora of Estonia (Skottsberg & Vestergren 1901) and Finland (Pettersson 1952), but without herbarium evidence (Kukk 1999, Karlsson 2001). It probably could be treated as a casual alien in these countries (Kurtto & Lahti 1987). According to Clapham *et al.* (1962) some earlier data for N. Scotland actually refer to *C. diffusum*. The distribution range of *C. subtetrandrum* belongs to Central European areal-type, as well as to the W. Panonian - W. Baltic (littoral) floristic element (Meusel *et al.* 1965). The newly discovered population of *C. subtetrandrum* in N. Serbia (Vojvodina) represents the southernmost point in the species range. The next populations are situated in S. Hungary.

Habitat: Semihalophytic and psammophytic plant of pioneer plant communities in open places. This plant was discovered on saline-alkaline pasture near forest edging, on moderately risen flattened solonetz polygons between saline microdepressions and their slopes. The pedological sub-

strate is represented with solonetz containing approximately 37, 5 % fine and coarse sand in A1 horizon, locally intermingled with patches of solonchak. The geological substrate is terrace, partially hydromorphic loess (Živković *et al.* 1972). Its habitat in Serbia is phytocoenologically characterised by two communities: woodland-steppe *Peucedano-Asteretum punctati* (Rapcs.) Soó and saline-alkaline pasture community *Artemisio-Festucetum pseudovinae* (Magyar) Soó. The following taxa in both communities are observed in two layers. Shrub layer: *Crataegus monogyna* Jacq., *Pyrus pyrastra* Burgsd., *Rosa canina* agg. Herb layer: *Achillea pannonica* Scheele, *Allium vineale* L., *Alopecurus pratensis* L., *Anthoxanthum odoratum* L., *Artemisia santonicum* L. subsp. *santonicum*, *Aster sedifolius* L. subsp. *canus* (Waldst. & Kit.) Merxm., *Bromus hordeaceus* L., *Carex praecox* Schreber, *C. stenophylla* Wahlenb., *Cerastium dubium* (Bast.) O. Schwartz, *C. glutinosum* Fr., *Cruciata pedemontana* (Bellardi) Ehrend., *Cynodon dactylon* (L.) Pers., *Elymus repens* (L.) Gould., *Erophila verna* (L.) Chevall., *Festuca pseudovina* Hackel ex Wiesb., *Galium verum* L., *Lepidium perfoliatum* L., *Moenchia mantica* (L.) Bartl., *Myosotis stricta* Link ex Roemer & Schultes, *Myosurus minimus* L., *Ornithogalum kochii* Parl., *Peucedanum officinale* L., *Plantago maritima* L., *P. tenuiflora* Waldst. & Kit., *Poa pratensis* L., *Potentilla argentea* L., *Puccinellia limosa* (Schur) Holmberg, *Ranunculus pedatus* Waldst. & Kit., *Sagina apetala* Ard., *Scilla autumnalis* L., *Scorzonera cana* (C. A. Meyer) O. Hoffm., *Spergularia rubra* J. & C. Presl., *Valerianella locusta* (L.) Laterrade, *Ventenata dubia* (Leers) Cosson in Durieu.

Outside Serbia, *C. subtetrandrum* grows in green dunes of the alliance *Sileno conicae-Cerastion semidecandri* Korneck, together with annual species: *Erodium lebelii* Jord., *Phleum arenarium* L., *Silene conica* L. etc. (Anonymous 1991). In Scandinavia, it is recorded in grazed seashore meadows, in patches of slightly moist, bare soils, rarely in driftwalls of algae or in ruderal habitats (Karlsson 2001). In Austria (Neusiedler saltmarshes) and Hungary it forms a community with *Puccinellia intermedia* (Schur) Holmb. and *Lepidium cartilagineum* (J. C. Mayer) Thell and prefers small sandy elevations behind a moody soil (Franz *et al.* 1937, Horváth *et al.* 1995). According to Soó (1970) it is recorded on moist, nutrient-rich solonchak soils. Furthermore, it lives on neutral to basic soils, extremely poor in mineral nitrogen (Horváth *et al.* 1995).

Taxonomic position: This taxon was first described as a form of *C. pumilum* Curtis, and soon was raised to a specific rank (Murbeck 1898). However, the description in Murbeck's paper was partly inappropriate and therefore led to later misinterpretations. But Murbeck properly concluded that the species belongs to the *C. pumilum* s.l. complex and that it is closely related to *C. glutinosum* Fr. ("*C. pallens*") and *C. pumilum* s.s. This

treatment is followed by Ascherson *et al.* (1923) and Karlsson (2001). Some others authors (Hegi 1912, Zajac 1974, Jalas & Suominen 1986) accepted a wide species concept and treated all derivate of *C. pumilum* s.l. as conspecific (ex. *C. subtetrandrum* as form of *C. pumilum*). In fact *C. subtetrandrum* and *C. pumilum* clearly differ in many characters, including some of those discarded by Zajac (1974) [fide Karlsson 2001]. Actually, *C. subtetrandrum* is probably closely related to *C. glutinosum*. The lack of clear ecological and chorological separation between these two taxa, as well as the partial sterility of their natural hybrids (Murbeck 1898), indicate a significant degree of their isolation. Differences between the two taxa are presented in the following key:

- Majority of flowers tetramerous, and with 8 capsule teeth. Inflorescence often comprising more than 40% of the total height. Bracts herbaceous or rarely upper ones with very narrow scarious margin. Calyx (3)4-6 mm long. Stamens 4-6(8). Pedicels straight during fructification
 *C. subtetrandrum*
- Tetramerous flowers very rare. Inflorescence comprising less than 40% of the total height. Bracts with scarious margin. Calyx 4-6(7) mm long. Stamens 5-8(10). Pedicels slightly bent during fructification
 *C. glutinosum*

In addition to the aforementioned classifications, Sell & Whitehead (1964a, 1964b, 1993) and Friedrich (1979) treated *C. subtetrandrum* as a subspecies of *C. diffusum* Pers. which inhabits coastal dunes and rocks of Atlantic Europe and possibly also the W. Mediterranean. However, *C. subtetrandrum* and *C. diffusum* are very clearly different in many characters. For example *C. diffusum* has dark green habitus, its lowermost flowers are usually below the middle or on the base of the shoot, its leaves are wider and obtuse, bracts are always hirsute on the upper surface, lowermost bracts are almost the same size as the uppermost stem leaves and capsule is not notably contracted at the apex.¹ According to Karlsson (2001) these taxa never come into contact in nature, and no intermediates are known. Therefore, *C. subtetrandrum* is best regarded as a separate species which belongs to the *C. pumilum* aggregate.

Population trends and threatened status: The taxon is not included either in the European (ECE 1991) or in the global IUCN Red List of Threatened Plants (Walter & Gillett 1998). Outside Serbia, in Slovakia it has the status of endangered (EN) taxon (Ferákova & Migra 1999), in

¹ However, according to Karlsson (2001) diagnostic features noticed in *Flora Europaea* (Sell & Whitehead 1964b, 1993) are not valid.

Sweden of vulnerable (VU) (Gärdenfors 2005), and in Hungary it is treated as a potentially threatened taxon (P) (Rakonczay 1990, Horváth *et al.* 1995).

Its population mosaically occupies a small area (ca. 500 m²) on the central and southeastern part of the grassland between Apatin and Svilojevo village. Over the last few years the main threat factors are the expansion of fishfarms, construction of field roads, ploughing, overpasturing, overgrazing and grassland burning. All these factors cause significant population size fluctuation and habitat fragmentation and destruction. Applying the IUCN (2001) Red List Categories and Criteria, the current threatened status of *C. subtetrandrum* in Serbia is estimated as Critically Endangered (CR B1a,b(iii);B2b(iii) / VU A1a;D2;E), bearing in mind only one single location, with a small area of occupancy, as well as an estimated continuing decline.

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**CERASTIUM SUBTETRANDRUM (CARYOPHYLLACEAE),
НОВА ВРСТА У ФЛОРИ СРБИЈЕ**

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Р Е З И М Е

Током флористичких истраживања заслањених ливада и слатина у широј околини Апатина (Војводина), у пролеће 2006. по први пут је уочено присуство популације ретке терофитске врсте *Cerastium subtetrandrum* (Lange) Murb. на територији Србије и балканских земаља. У оквиру таксономски сложеног комплекса *C. pumilum* Curtis, врста је морфолошки најсличнија *C. glutinosum* Fr., али се на основу присуства неких поузданих диференцијалних карактера може закључити да ове врсте нису конспецијске. Поменути карактери су код *C. subtetrandrum*: четворомерни цветови и чауре са осам зубаца, сразмерно велике цвасти, скоро увек зељасте брактеје, краће чашице и прашници, као и усправне цветне дршке током плодоношења. Још увек не постоји консензус у вези таксономског статуса *C. subtetrandrum* - дуго времена је био третиран као инфраспецијски таксон од *C. pumilum* или *C. diffusum* Pers., али се на основу новијих таксономских студија и кариолошких података, може прихватити став да је реч о засебној врсти, која се спорадично среће на песковитим и сланим местима у Прибалтичким земљама и Панонској низији. Новооткривена популација у Војводини констатована је на најјужнијем познатом локалитету

у оквиру ареала врсте. На том станишту је карактеристична за отворене степске и слатинске заједнице [*Peucedano-Asteretum punctati* (Raps.) Soó и *Artemisio-Festucetum pseudovinae* (Magyar) Soó] на слано-алкалним пашњацима близу обода шуме, на фрагментима солоњца између дна сланих микродепресија и њихових ивица. Због постојања само једне популације, која је ограничена на површину мању од 500 м², као и због растућег негативног тренда антропогене деградације станишта, процењено је да је, према IUCN критеријумима, врста крајње угрожена (CR) на територији Србије.