

***Buglossoides rochelii* (Boraginaceae) – a supplement to the flora of the Pannonian Plain**

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***Buglossoides rochelii* (Boraginaceae) – kiegészítés az Alföld flórájához**

Összefoglalás – A nagyobb magyarországi és szerbiai herbáriumok *Buglossoides* anyagának kritikai felülvizsgálata eredményeképp úgy tűnik, hogy a *Buglossoides rochelii* (Friv.) Stoyanov, Mátis & Sennikov (≡ *Lithospermum rochelii* Friv.) areája a Pannonicum alföldi tájaira is kiterjed. Mind a keleti elterjedési területén, mind a Pannonicumban főként pszammofita (homoki) faj. Dolgozatunkban közöljük a magyarországi és szerbiai történeti előfordulásait, és közlünk néhány megfigyelést a szerbiai állományokról és élőhelyeik jelenlegi állapotáról.

Kulcsszavak: elterjedés, Magyarország, Szerbia, új adatok

Summary – Previously unknown occurrences of *Buglossoides rochelii* (Friv.) Stoyanov, Mátis & Sennikov (≡ *Lithospermum rochelii* Friv.) have been identified in the Pannonian Plain, based on field investigations and a critical revision of the genus *Buglossoides* in the major herbarium collections of Hungary and Serbia. In both its eastern range and the Pannonian Basin, the species predominantly occurs as a psammophyte. This paper summarizes its historical distribution in Hungary and Serbia, and provides new data on the current status of its habitats and populations in Serbia.

Key words: distribution, Hungary, new records, Serbia

Introduction

Following a broad molecular sampling, the genus *Buglossoides* Moench has been redefined to include only the annual species of *Buglossoides* (CECCHI *et al.* 2014), which were previously classified under *Buglossoides* sect. *Buglossoides* (JOHNSTON 1954).

A recent study inferred that *Lithospermum rochelii* Friv. is the earliest, but previously overlooked, name for a taxon considered as *Buglossoides glandulosa* (Velen.) R.Fern. in the Balkans and as *Buglossoides czernjajevii* (Klokov & Des.-Shost.) Czerep. in the floras of Moldova, Ukraine, and Russia. Therefore, *L. rochelii* was reinstated, and a new combination, *Buglossoides rochelii* (Friv.) Stoyanov, Mátis & Sennikov, was proposed (STOYANOV *et al.* 2023). Currently, according to the new circumscription of the tribe *Lithospermeae* Dumort. and the latest



taxonomic and nomenclatural revisions, *Buglossoides* s. str. includes five species (POWO 2025). Recently, an additional species described from Central Asia, *Buglossoides asiatica* Ovchinnikova, was added to the genus (OVCHINNIKOVA 2025).

The key diagnostic characters of *B. rochelii* are its light green leaf indumentum, undulate semiamplexicaul leaves (most noticeable in larger individuals), dense and extremely glutinous hairs, and a bright yellow flower throat (Fig. e1). Due to the fading of the yellow throat and the partial reduction of the glands at the end of flowering, the species remained unrecognized in the flora of the Pannonian Plain and was erroneously identified as *B. arvensis* (L.) I.M. Johnst.

This article aims to clarify this taxonomic confusion, to formally report *B. rochelii* for the floras of Hungary and Serbia, and to provide data on its distribution and habitats.

Material and methods

This study is based on a literature review and a thorough examination of *Buglossoides* specimens housed in the herbaria BEO, BEOU, BP, BUNS, and PZZP (acronyms follow THIERS 2025). In addition to herbarium data, verified observations from the iNATURALIST COMMUNITY (2025) were also used. Herbarium surveys were conducted in autumn 2024 by the first author. Several specimens were found in the BP collection, for which field surveys were essential to confirm their identification. These field surveys were conducted in spring 2025.

Results and Discussion

Buglossoides rochelii is reported here for the first time in the floras of Hungary and Serbia, based on a targeted review of herbarium specimens of the genus *Buglossoides* in the major herbarium collections of both countries. The species has a limited distribution and is largely confined to sandy habitats of the Pannonian Plain.

Field investigations informed by herbarium data from the Deliblato Sands in Serbia were successful. Recent populations of *B. rochelii* were confirmed at two sites in this area: Mali Kravan and Spomenik.

In contrast, field surveys at sites in Hungary, selected based on highly glandular *Buglossoides* specimens examined during the herbarium review, did not confirm the presence of extant *B. rochelii* populations in April 2025 (N. Bauer, pers. comm.). At present, the only known occurrence of *B. rochelii* in Hungary is based on a few historical herbarium specimens collected from Bugac.

Taxonomic remarks

The main difficulty in identifying *B. rochelii* lies in the fact that, by the end of anthesis, the yellow spot in the flower throat – a key diagnostic character – fades or disappears entirely. As a result, the species is often misidentified as *B. arvensis*. Undulate, semiamplexicaul leaves are also a reliable diagnostic trait, but this feature is less conspicuous in smaller individuals. In the field, the most distinctive characteristic of *B. rochelii* is the abundance of viscid hairs, which often cause soil particles or sand grains to adhere to the leaves and stems (Fig. e2). In herbarium

specimens, key features include the light green leaf indumentum and undulate (or revolute) leaf margins. However, in the smallest specimens with entire leaves, the glandular hairs are the only well-preserved diagnostic character. These are lemon-yellow tinged (versus whitish and transparent in living plants) and are most clearly visible beneath the leaves. Glandular hairs, although occasionally present in *B. arvensis*, are quite sparse, subsessile, or borne on much shorter stalks than the hispid hairs, and crucially, they are not glutinous. *Buglossoides rochelii* is further distinguished by its grayish-brown, rugulose, furrowed, and finely granulose nutlets, whereas those of *B. arvensis* are dark brown and uniformly, distinctly tuberculate (Fig. e3).

Distribution and habitats

Buglossoides rochelii has a limited distribution in the Balkans but is relatively widespread in the Northern Black Sea region, as indicated by a recent synthesis of occurrence data for its conspecific taxa, *B. glandulosa* and *B. czernjajevii* (STOYANOV *et al.* 2023). Most recently, the species was confirmed for Turkey and newly reported for Turkmenistan (OVCHINNIKOVA 2025). In the present study, *B. rochelii* was also recorded from the Pannonian Plain, indicating a westward expansion of its known native range (Fig. 1). It is possible that earlier literature records referring to the occurrence of similar annual *Buglossoides* species in sandy habitats of Serbia (Deliblato Sands, Subotica Sands, and Danubian sands in the Iron Gates area) – which lack corresponding herbarium specimens – may in fact pertain to *B. rochelii*. According to CINCOVIĆ & KOJIĆ (1974), the genus *Buglossoides* in Serbia is represented by the following taxa: *B. arvensis* subsp. *arvensis* [*Lithospermum arvense* L.], *B. incrassata* subsp. *incrassata* [*Lithospermum arvense* var. *incrassatum* (Guss.) Cincović & Kojić], *B. incrassata* subsp. *splitgerberi* (Guss.) E.Zippel & Selvi [*Lithospermum arvense* var. *leithneri* Heldr. & Sart.], and *B. tenuiflora* (L.f.) I.M.Johnst. [*Lithospermum tenuiflorum* L.f.], all of which are primarily restricted to dry, often ruderal, open habitats. All known records of *B. rochelii* in Serbia indicate that its characteristic habitat is Pannonic inland dunes – a habitat type recognized as a conservation priority under both national and European legislation (ANONYMOUS 2010, EUROPEAN COMMISSION 2013). Phytogeographically, its known localities in Serbia fall within both the Pannonian and Danubian provinces of the Pannonian–Danubian subregion of the Pontic–South Siberian floristic region (STEVANOVIĆ *et al.* 1999). Phytocoenologically, it is associated with the alliances *Festucion vaginatae* Soó 1929 and *Bassio laniflorae–Bromion tectorum* (Soó 1957) Borhidi 1996 (BUTORAC & PANJKOVIĆ 2013). Its most recently discovered habitats in the Deliblato Sands can be characterized as steppic vegetation on sand, belonging to the association *Koelerio–Festucetum wagneri* Stjepanović–Veseličić 1953 (Mali Kravan locality), or as bare sand (Spomenik locality). At both sites, individuals of *B. rochelii* typically form more or less dense patches on weakly developed brown steppic soils (NEJGEBAUER *et al.* 1971), usually in areas disturbed by trampling of red deer. The plant communities in which *B. rochelii* occurs are dominated by *Koeleria macrantha* (Ledeb.) Schult. and *Festuca wagneri* (Degen, Thaisz & Flatt) Krajina (Mali Kravan locality). Associated species include: *Astragalus dasyanthus* Pall., *A. onobrychis* L., *Cerastium semidecandrum* L., *Chrysopogon gryllus* (L.) Trin., *Dianthus pontederiae* A.Kern., *Eryngium campestre* L., *Galium verum* L., *Gypsophila paniculata* L., *Potentilla cinerea* Chaix ex Vill., *Stachys recta* L., *Stipa borysthena* Klokov ex Prokudin, *Verbascum nigrum* L., and *Viola arvensis* Murray.

In Hungary, historical records of *B. rochelii* are available only from the Bugac Sands. A targeted search for the species at this site in spring 2025 was unsuccessful. Although populations

of *B. rochelii* can be locally abundant, they are often highly restricted in distribution, and locating suitable habitats may be a matter of chance. Bugac represents the northernmost known locality of the species within the Pannonian Plain and lies only about 50 km north of the confirmed sites in the Province of Vojvodina, Serbia. Further and more intensive surveys of sandy habitats in Hungary may yet confirm the presence of *B. rochelii* in the country.

List of the revised specimens and observations

The records listed below (excluding those found by the authors in 2025) have been misidentified as *Lithospermum* (*Buglossoides*) *arvense*. For historical records, approximate coordinates are given in square brackets at the end.

Serbia

- Banat: Deliblato Sands, Dolovo-Kravan, 4 April 1948, A. Sigunov, (BEO 17908) [44.93476°N, 20.97318°E]
- Banat: Deliblato Sands, Mali Kravan locality, 29 May 1955, A. Sigunov (BEO 086299)
- Banat: Deliblato Sands, Mala Tilva locality, 12 April 1972, A. Sigunov (BEO 083959) [44.96553°N, 21.01121°E]
- Banat: Deliblato Sands, Flamunda locality, 11 April 1973, A. Sigunov (BEO 083957) [44.93351°N, 21.07602°E]
- Banat: Deliblato Sands, vicinity of village Šumarak, 27 May 2010, M. Jovanović (BEO 54336) [44.80564°N, 21.19484°E]
- Northeast Serbia: Zatonje, Zatonje Sands, 11 April 2005, V. Stevanović, D. Lakušić, S. Vukojičić, G. Tomović (BEOU 19357) [44.79733°N, 21.37933°E]
- Bačka: Subotica Sands, Subotica-Čavolj, 7 April 1975, G. Czékus (BUNS) [46.15225°N, 19.65080°E]
- Banat: Deliblato Sands, 26 April 2001, P. Boža, J. Gabrić (BUNS)
- Bačka: Bački Vinogradi-Horgoš, Selevenjska šuma, 13 May 1980, B. Šajinović (PZZP) [46.14650°N, 19.88357°E]
- Bačka: Bački Vinogradi-Horgoš, Kilapoš, 24 April 1991, B. Butorac (PZZP) [46.14140°N, 19.91215°E]
- Bačka: Bački Vinogradi-Horgoš, Selevenjska šuma, 29 April 1991, B. Butorac (PZZP) [46.14650°N, 19.88357°E]
- Bačka: Subotica Sands, Hrastovača, Zečji Jaroš, 11 May 1993, B. Butorac (PZZP) [46.15682°N, 19.64904°E]
- Banat: Deliblato Sands, forest compartment No. 92, 10 May 1994, V. Stojšić (PZZP)
- Banat: Deliblato Sands, Volfove livade, Mala Pustara, 12 May 1994, V. Stojšić (PZZP) [44.92888°N, 21.12069°E]
- Banat: Deliblato Sands, 9 May 2006, V. Stojšić (PZZP)
- Bačka: Kanjiža vicinity, between Selevenjske pustare and Kapetanski rit, salinized depressions and steppic remnants on loess, spring 2007, K. Sabadoš (PZZP) [46.07333°N, 19.98706°E]
- Banat: Deliblato Sands, Mali Kravan, 44.943031°N, 21.009555°E, 13 May 2025, R. Perić (PZZP)

- Banat: Deliblato Sands, Spomenik, 44.918364°N, 21.130138°E, 14 May 2025, R. Perić (PZZP)
- Severno-Bački: Subotica, Palić, 46.15094°N, 19.73429°E, 2 May 2024, M. Vujić, <https://www.inaturalist.org/observations/223782258>

Hungary

- Kecskemét, in arenosis Bugaci Nagyerdő praedii Bugaci puszta, 29 April 1914, I. Szurák (BP 138990) [46.656380°N, 19.601528°E]
- Bugac: Kiskunság Nat. Park, in arenosis in Junip.-Pop., 23 March 1977, J. Szujkó-Lacza & G. Fekete (BP 496224) [46.656380°N, 19.601528°E]
- Bugac: Kiskunság Nat. Park, in silva ustulata & solo sabuloso, 11 April 1978, J. Szujkó-Lacza & G. Fekete (BP 493792, BP 495743, BP 495747) [46.656380°N, 19.601528°E]



Fig. 1 Occurrence data of *Buglossoides rochelii* (black solid triangles) in Serbia and Hungary
1. ábra A *Buglossoides rochelii* előfordulási adatai Szerbiában és Magyarországon

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Electronic appendix / Elektronikus melléklet



Fig. e1 Diagnostic characters of *Buglossoides rochelii*: **A** – bright yellow spot in flower throat, **B** – undulate leaves
(photographs by S. Stoyanov)

e1. ábra A *Buglossoides rochelii* bélyegei: **A** – élénksárga folt a virág torkában, **B** – hullámos levelek (S. Stoyanov felvételei)

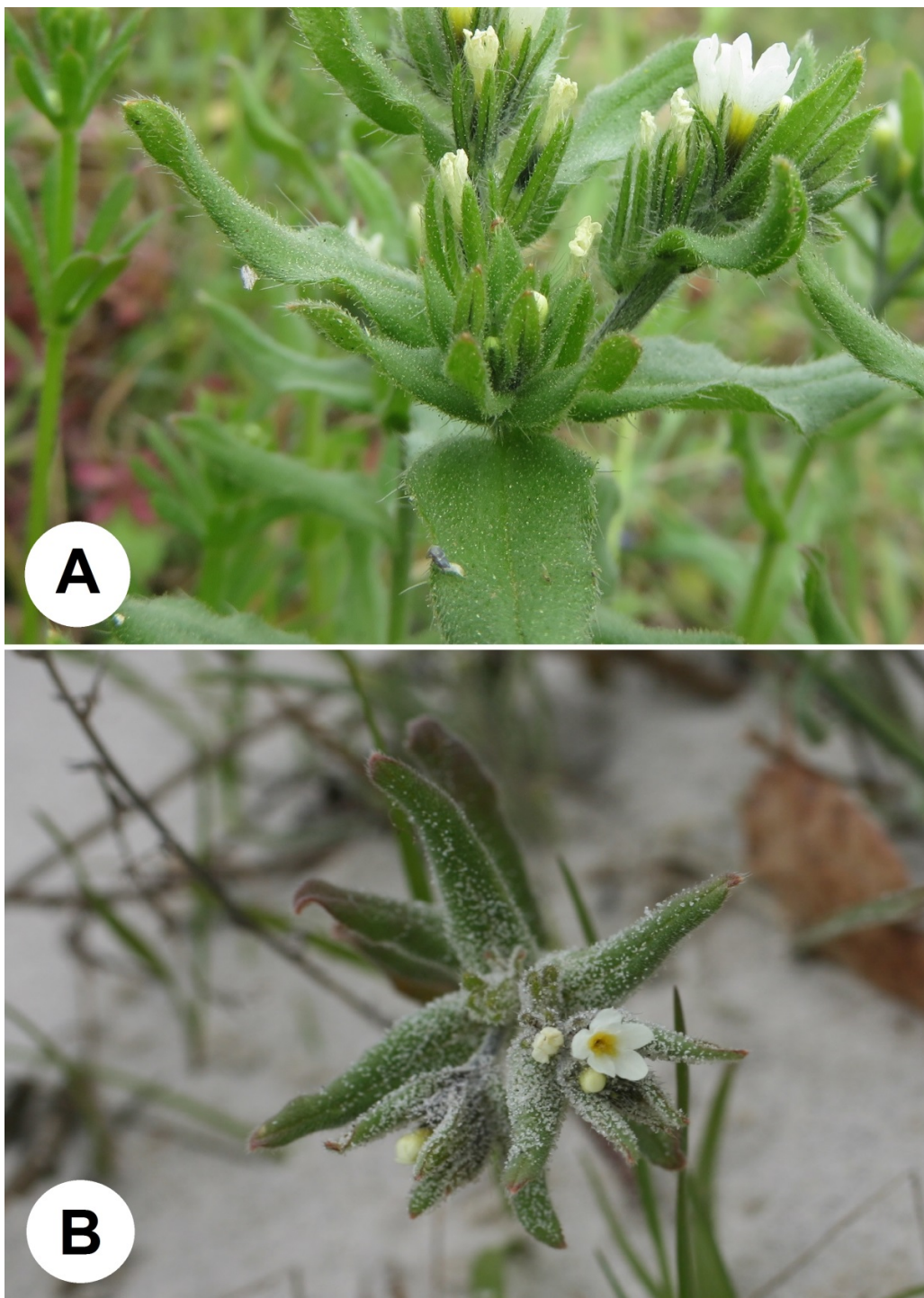


Fig. e2 *Buglossoides rochelii*: **A** – glandular-viscid indumentum, **B** – sand grains stuck to the leaves (photographs by S. Stoyanov)

e2. ábra *Buglossoides rochelii*: **A** – mirigyes-ragacsos szőrözöttség, **B** – a levelekhez tapadt homokszemcsék (S. Stoyanov felvételei)



Fig. e3 Nutlets of *Buglossoides rochelii* (photograph by R. Perić)
e3. ábra A *Buglossoides rochelii* termései (R. Perić felvétele)