

NEW DATA ON THE DISTRIBUTION OF *RANUNCULUS POLYPHYLLUS* WALDST. & KIT. EX WILLD. IN SERBIA

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Abstract - During our field studies of saline meadows, salt marshes and swampy flora carried out near the Bački Monoštor and Melenci villages (Vojvodina, Serbia) several specimens of the genus *Ranunculus* L. (Ranunculaceae) were found and identified as *Ranunculus polyphyllus* Waldst. & Kit. ex Willd. Apart from two records from the beginning of the last century, the appearance of this rare species has been uncertain in the flora of Serbia. We confirmed its presence at one known and two new localities in salt marsh and aquatic floating communities. Also, this is the first herbarium evidence of the presence of this species in Serbia.

Key words: *Ranunculus polyphyllus*, chorology, flora, Vojvodina, Serbia

INTRODUCTION

There are approximately 600 species of the genus *Ranunculus* L. distributed worldwide except in lowland tropics (Tamura, 1995; Whittemore, 1997). The distribution pattern shows high morphological diversity and frequent polyploidy (Hoffmann et al., 2010). According to Gajić et al. (1992) there are 51 species of *Ranunculus* in Serbia divided into two subgenera and ten sections. During our floristic studies of saline meadows, salt marshes and swamps carried out in Bačka and Banat (Vojvodina, Serbia) we found *Ranunculus polyphyllus* Waldst. & Kit. ex Willd. at three locations (Map 1). Although, there are some old literature records about its presence in Serbia (Prodán, 1914; 1915; Kovács, 1929; both authors subsequently cited by Budak, 1998), this species remains neglected in the "Flora of Serbia" (Gajić, 1970; Gajić et al., 1992). We observed it at one known and two new localities.

MATERIALS AND METHODS

Herbarium material is deposited in the Natural History Museum in Belgrade (BEO) (Holmgren et al. 1990; <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>) and the Institute for Nature Conservation of Vojvodina (HIPNS). The taxon description follows Tutin and Akeroyd (1993), Ovchinnikov (1937; 1970) and Waldstein and Kitaibel (1802) with some amendments based on individuals collected by the authors. Distribution of the taxon in Serbia is given on a map with 10 × 10 km² UTM grid system (Lampinen, 2001).

RESULTS AND DISCUSSION

Ranunculus polyphyllus Waldst. & Kit. ex Willd., *Sp. Pl.* 2(2): 1331 (1800); Waldst. et Kit. *Pl. rar. Hung. I*, 44-45, tab. 45 (1802).

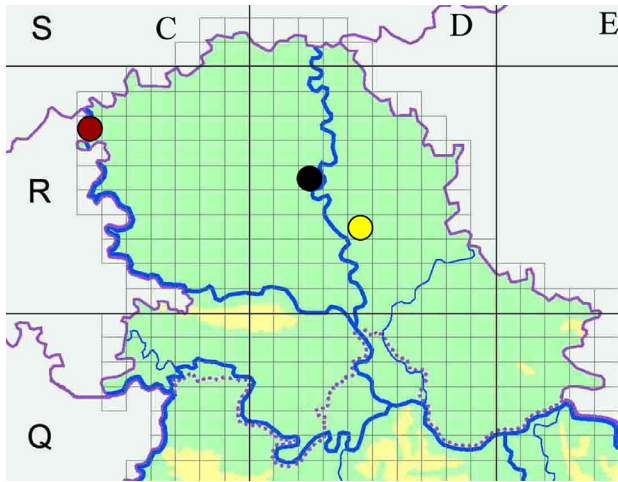


Fig. 1.-*Ranunculus polyphyllus* Waldst. & Kit. ex Willd.- specimens from Crna Bara pond (Bački Monoštor-Bezdan) (photo Timotić D.)

Morphology - Annual yellow green glabrous plant submerged in water, floating or ascending. Root fibrous. Aerial stems 10-15 cm high, ascending, stout, divaricately branched. Submerged stems up to 80 cm long. Leaves verticillate, opposite or alternate in the upper part of the stem (in literature rarely alternate), petiolate, basal approached. Submerged leaves numerous, densely whorled, reduced to filiform petioles 8-15 cm long. Floating leaves on long capillary peduncles, with lanceolate to oblong-elliptic lamina 4-23 mm long, entire or apically tridentate. Aerial leaves broadly elliptic oblong (in literature elliptic to narrowly oblong) entire to trilobate, uppermost narrowly elliptic (in literature linear), entire, almost sessile, alternate, with minute membranaceous stipules. Flowering pedicells terete, somewhat sulcate, straight, becoming elongate 9-40 mm long (in literature 5-12 cm) and arcuately curved during fructification. Flowers erect, yellow, 3-6 mm in diameter.

Perianth segments 5 (3). Sepals pale yellowish, ovate, obtuse, submembranous, up to 2 mm long. Petals yellow, glossy, slightly longer than sepals, with very short claw and small open nectarial pit. Stamina aggregate, filaments yellow, incurvate, anthers elliptic ovate (in literature ovate), golden. Achenes 1-1.4 mm long, aggregated in globose capitula, numerous, obovate, slightly laterally compressed, minutely papillose, narrowly winged, with very short beak. IV-V. Type: *in aquis Hungariae* (holo. B-Willd. 10543) (Davis et al., 1988).

General distribution - This is a Eurosiberian lowland species distributed in the Eurasian forest-steppe zone from northern Kazakhstan and the southern part of western Siberia to the Pannonian plain (Holub, 1999; Lufarov and Borodina-Grabovskaya, 2001). The record from the ecologically different and geographically isolated mountain site in eastern



Map. 1-Known distribution of *Ranunculus polyphyllus* Waldst. & Kit. ex Willd. in Serbia (Vojvodina).

Anatolia (Turkey) is likely to be doubtful (Sorger and Buchner, 1983). It was described from Hungary and recorded in Slovakia (Futák, 1982; Holub, 1999), Romania (Nyárády, 1953; Ciocărlan, 2009), Ukraine, Russia and Kazakhstan (Ovchinnikov 1937; 1970; Luferov and Borodina-Grabovskaya, 2001). Populations in Serbia are on the southwestern border of the species range. The closest populations are situated in southern Hungary (Szujkó-Lacza et al. 1993; J alas and Suominen, 1989).

Distribution in Serbia - the province of Vojvodina: Bačka, Bezdan, more or less on the edge of a salt marsh with *Carex riparia*, surrounded by *Ranunculus ophioglossifolius*, *R. lateriflorus*, 15 May, 1909. UTM 34T CR 37 (Prodán, 1914: 119-120); Bački Monoštor (Monostorszeg), swampy areas near a railroad station, between *Carex stricta* tussocks (*l. c.* 120; Prodán 1915: 221); Banat, Bečej [Óbesce], in backwaters of the Tisa river, surrounded by aquatic vegetation, but this is much rarer. "Dying out". UTM 34T DR 25 (Kovács, 1929: 80); Bački Monoštor-Bezdan, Special Nature Reserve "Gornje Podunavlje", Štrbac, forest section 11, subsection 3, Crna Bara pond, drying zone between ass. *Caricetum elatae* W. Koch 1926, *Caricetum ripariae* Knapp and Stoffers 1962 and adjacent semi-saline meadows, only terrestrial individuals, app. 45° 49' 03. 01" N, 018° 57' 41. 16" E, 88

m a. s. l. UTM 34T CR 37, leg. B. Panjković, R. Perić 13 May, 2008, BEO, HIPNS; Bezdan, Karapandža, channel Sirota, "Telefonska proseka" backwaters (B. Panjković June, 2006, *pers. comm.*); Banat, Elemir-Melenci, proposed protected area "Okanj bara", riparian zone of Žuglja bara pond (water depth: 20-40 cm), near ass. *Bolboschoenetum maritimi kontinentale* Soó (1927) 1957. UTM 34T DR 43, leg. B. Panjković 08-Apr-2008, BEO, HIPNS; (Fig. 1).

General data - rare in Bačka, on swampy areas and salt marshes near the Danube and Tisa rivers (Budak, 1998). According to Slavnić (1956), vegetation of the shallows beside water shores on mineral soils in Vojvodina is provisionally included in ass. *Ranunculetum aquatilis-polyphylli* Soó 1933, and fragmentary developed, without *R. polyphyllus* (however he made relevés in August when this species has already completed its life cycle). In addition, Prodán (1914) mentioned this species with *R. aquatilis* L. There is one sheet with two individuals of *R. polyphyllus* in the herbarium collection of G. Prodán in the Sombor City Museum, without any location data (Boža et al., 2007).

The reconfirmed and new records from the vicinity of the Bački Monoštor and Melenci villages have been reported as abstracts (Perić et al., 2009; Panjković et al., 2010).

Habitat - Aquatic to semiaquatic plant growing in shallow waters, drying lake and channel beds, on muddy places, salt marshes, saline and semi-saline swamps, ravines, and ponds. A population between Bački Monoštor and Bezdan was detected on a drying waterside of Crna Bara pond, in a zone between tussock sedge communities (ass. *Caricetum elatae* W. Koch 1926, *Caricetum ripariae* Knapp and Stoffers. 1962) and adjacent semi-saline meadows. The geological substrate is represented with upper Holocene sandy clay and very fine, coarse aleurite sand deposits on Pleistocene and Neogene deposits (Trifunović, 1986-1994). The pedological substrate is brownized chernozem with spots of solod and solonetzic soil (Nejgebauer et al., 1971). Together with *R. polyphyllus*, at this location are recorded:

Carex elata All., *Carex riparia* Curtis, *Draba muralis* L., *Lychnis flos-cuculi* L., *Mentha aquatica* L., *Moenchia mantica* (L.) Bartl., *Montia fontana* L. subsp. *chondrosperma* (Fenzl) Walters, *Oenanthe silaifolia* Bieb., *Ranunculus sceleratus* L., *Trifolium angulatum* Waldst. and Kit., *Ventenata dubia* (Leers) Cosson, and *Viola persicifolia* Schreber. This is quite an inconstant species, with pronounced population fluctuations, even in the same year. When G. Prodán returned in June 1910 to the location near Bezdán (where he had previously found *R. polyphyllus* (May 15, 1909)), in order to collect a few hundred specimens for I. Dörfler's "Herbarium normale", he discovered that *R. polyphyllus* had disappeared due to an overgrowth of grass, with only a few individuals in a nearby swamp (Prodán, 1914). Similarly, after recording this species in May 2008 near Crna Bara pond, we did not find it during our next visit (May 2011) because of the dry conditions and grass overgrowth. Specimens from the Žuglja bara pond between Elemir and Melenci have been found in shallow water close to ass. *Bolboschoenium maritimi* *Continentale* Soó (1927) 1957. The geological substrate in Žuglja bara comprises upper Holocene deposits (sand, clay and aleurite silt) as well as paludine and pontic pliocene lacustrine to fluvial-lacustrine deposits (Terzin et al., 1992). The pedological substrate is solonetz with solonchak (Nejgebauer et al., 1971). According to Soó (1966), this species is characteristic for the aquatic floating community *Batrachietum aquatilis-Ranunculetum polyphylli* Soó (1933) 1961 (ass. *Ranunculetum aquatilis-polyphylli* Soó 1933) as well as for saline vegetation communities from the alliance *Beckmannion erucaeformis* Soó 1933 (like ass. *Agrostio stoloniferae-Alopecuretum pratensis*. Soó 1933 corr. Borhidi 2003 and *Agrosti-Eleochari-Alopecuretum geniculati* (Magyar, 1928) Soó, 1939).

Taxonomic position - Mostly treated as a member of section *Xanthobatrachium* (Prantl) L. Benson (Ovchinnikov, 1937; Nyárády, 1953; Popov, 1957; Tutin et al., 1993; Tzvelev, 1994), *R. polyphyllus* has been recently included in the separate section *Polyphyllus* (Tzvelev) Lufarov-Grabovsk. (syn. sect. *Xanthobatrachium* subsect. *Polyphylli* Tzvel.),

together with the arcto-alpine circumpolar species *R. pygmaeus* Wahlenb. The main diagnostic characteristics of the section *Polyphyllus* are usually numerous whorled cauline leaves and the submerged leaves are often with elongated and filamentous peduncles. In addition, all members of section *Xanthobatrachium* (Prantl) L. Benson are perennial, while *R. polyphyllus* is annual (erroneously reported as perennial by some authors) (Lufarov and Borodina-Grabovskaya, 2001). This classification proposal is not supported by recent nrITS phylogeny data (Hörandl et al., 2005). According to this data, section *Xanthobatrachium* corresponds to the subclade IV of large core clades (comprising a total of 19 subclades) inside the genus *Ranunculus*, and it is closely related to a phylogenetically unresolved branch with polymorphic *R. sceleratus* (in the early stage of development *R. polyphyllus* can be confused with *R. sceleratus*). On the other hand, *R. pygmaeus*, as a second member of "section *Polyphyllus*" is located within subclade I comprising arctic and high alpine northern hemisphere species and corresponds to the section *Ranunculus* (*sensu* Tamura, 1995). In addition, *R. polyphyllus* was not included in the materials used in the study of Hörandl et al. (2005), so its phylogenetic and taxonomic position remains unresolved: however, it most likely would be within subclade IV corresponding to the section *Xanthobatrachium*.

Threatened status - As a member of the fragile communities of aquatic and semiaquatic temporary habitats (especially inland salt marshes) and because of its inconstant appearance, which is greatly influenced by the groundwater level fluctuations and changing weather conditions, information about the global distribution and population trends of *R. polyphyllus* are not known completely. However, the taxon is included in the European Red List of Vascular Plants (Bilz et al., 2011) and the IUCN Red List of Threatened Species under category DD (data deficient). The population trend is assessed on global level to be decreasing (Lansdown, 2011). In Slovakia it has the status of a critically endangered (CR) taxon (Feráková et al., 2001) and with the last record from 1964, it seems to have disappeared (P.

Eliáš, *pers. comm.*). In Hungary, it is evaluated as a near-threatened (NT) taxon (Király, 2007). Further investigations concerning population trends and distribution are needed to fulfill the IUCN Red List Categories and Criteria (2001) and to define the threatened status of *R. polyphyllus* in Serbia.

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