



## *Hierochloë repens* (Host) Simonk. (Gramineae) in Serbia

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**ABSTRACT:** During a field study of steppic flora and vegetation conducted on the [Veliki] Rimski Šanac in the vicinity of Gospodinci and on the Deliblato Sands (Serbia: Vojvodina Province), we found *Hierochloë repens*, a Eurasian species from the family Gramineae that is autochthonous on the Pannonian Plain as well and was for a long time neglected in the flora of Serbia. After examination of herbarium specimens from Serbia belonging to the *H. odorata* complex, we conclude that the only member of the complex present in Serbia is *H. repens*, which was formerly misinterpreted as *H. odorata* s.str.

**KEYWORDS:** flora, chorology, Serbia

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### INTRODUCTION

The genus *Hierochloë* R. Br. comprises  $\pm$  36 species mainly confined to the temperate and boreal regions of the Northern Hemisphere (COPE 1982) with two representatives recorded in Serbia treated as *H. australis* (Schrader) Roemer & Schultes and *H. odorata* (L.) Wahlenb. (SIGUNOV & GAJIĆ 1986). However, some unconfirmed, not always precise data unsupported by herbarium evidence suggest that a third species, viz., *H. repens* (Host) Simonk., is also present in Serbia (GOMBOCZ 1945; WALLNÖFFER 2007). This species was originally described (HOST 1805) on the basis of specimens collected from historical areas of Hungary which are now partly situated within the borders of Serbia. But after its initial recognition as an independent species, *H. repens* was not widely accepted and subsequently became neglected in favour of *H. odorata* (or was considered merely as its synonym). During the last decades, *H. repens* has been accepted as a properly separated species within the *H. odorata* complex, which raised questions concerning its identity and distribution in some countries (WEIMARCK 1971, 1980; WALLNÖFFER 2007) and in some cases (Hungary, Romania) resulted in the final deletion of *H. odorata* s. str. from national

flora lists in favour of *H. repens* (PENKSZA *et al.* 1999; PENKSZA & RUPRECHT 2002).

In the course of floristic and phytosociological investigations of loess steppic habitats developed on remnants of the earth embankment defensive system belonging to the former Roman fortification line ("*Limes Sarmatiae*"), which are today known as the [Veliki] Rimski Šanac (DIMITRIJEVIĆ 1975), as well as on the Deliblato Sands, we found a considerable number of individuals of *H. repens*. As was done by investigators in Hungary and Romania, we decided to check the status of *H. odorata* in Serbia.

### MATERIALS AND METHODS

Herbarium material was deposited in the Institute of Botany and Botanical Garden Jevremovac in Belgrade (BEOU) (THIERS 2016) and the Institute for Nature Conservation of Vojvodina province in Novi Sad (PZZP). Additional specimens were checked in the Herbarium of the Hungarian Natural History Museum in Budapest (BP) (THIERS 2016). The taxon description follows WEIMARCK (1980), HOST (1805), CLAYTON *et al.* (2006 onwards) and WALLNÖFFER (2007) with some additional comments based on specimens collected by the authors.

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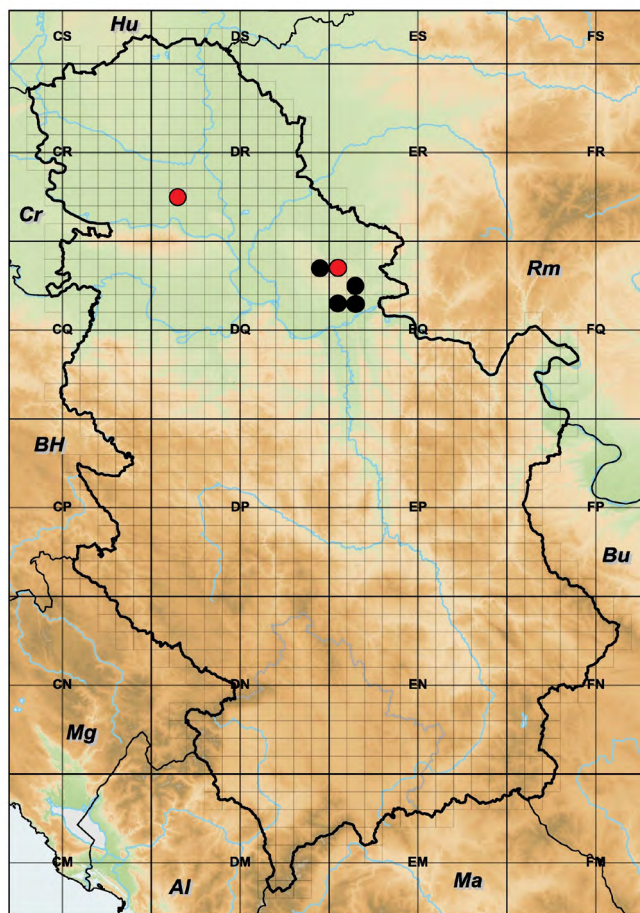
Distribution data in Serbia are mapped on a 10 × 10 km MGRS grid system (LAMPINEN 2001).

## RESULTS AND DISCUSSION

*Hierochloë repens* (Host) Simonkai, *Enum. Fl. Transs.* 560 (1886).

**Syn.** *Holcus repens* Host, *Icon. Descr. Gram. Austriac.* 3: 3, Tab. 3 (1805) [basion.]; *Hierochloë odorata* subsp. *pannonica* Chrtek & V. Jirásek, *Preslia* 36: 247 (1964); *Hierochloë stepporum* P. A. Smirn., *Byull. Moskovsk. Obsch. Isp. Prir., Otd. Biol., n. s.* 63(5): 81 (1958); *Hierochloë odorata* auct. serb., non (L.) Wahlenb. sensu Sigunov & Gajić in Sarić, *Fl. Serb.* 10: 244 (1986).

**Description.** Perennial rhizomatous erect plant (30)45-70(90) cm tall. *Rhizomes* elongated, flexuous, subterete to obtusely ribbed, covered with brownish scales and short capillate roots. *Stems* glabrous, sulcate, in basal part covered with numerous brownish-greyish [and ± fibrous] sheets. *Leaves* plane, (5)7-9(11) mm wide, pruinose, subcanaliculate, minutely scabrid along partly narrowly convoluted margins and on abaxial side of lamina apex [also on adaxial nervature of lamina and occasionally on abaxial side around ligule]. *Ligule* membranous, obtuse, irregularly denticulate or lacerate, 2-3.5[4] mm long. *Inflorescence* a ovoid panicle, (5)6.5-10(14) cm long [and about 3 cm wide] comprising (80)120-160(300) ± densely clustered spikelets. *Rhachis* glabrous, subterete, in upper part compressed, with 11-12 nodes. *Panicle branches* ± contracted before and after anthesis. *Spikelets* solitary, pedicellate, ovate, laterally compressed, 3.4-4.4[4.5] mm long, comprising 2 basal (lateral) male and 1 terminal hermaphrodite floret. *Pedicells* puberulous [in our specimens glabrous], below the spikelet slightly thickened with sparse hairs 0.1-0.3 mm long. *Glumes* subequal, ovate, keeled, membranous, shiny, reaching apex of florets. Lower glume 3.4-4.2 mm long, 1-veined with acute apex. Upper glume 3.4-4.7 mm long, 3-veined with acute or slightly bifid apex. *Lemma* of male florets ovate, keeled, greenish-brown, shiny, cartilaginous, 3.3-3.8 mm long, obscurely 5-veined, awned, densely ciliate on margins [cilia about 0.5 mm long], dorsally minutely scabrid and sparsely ciliate, especially near acute, mucronate or bifid apex. *Awn* straight, subapical or almost terminal, (0.1)0.2-0.5(0.8) mm long. *Lemma* of hermaphrodite florets ovate, not keeled, hard and shiny, obscurely 5-veined, 2.5-3.5 mm long, with convolute margins enclosing most of palea and ± appressed scabrid-ciliate around acute apex. *Palea* of male florets elliptic-ovate, membranous, not keeled, [about 3.5 mm long], 2-veined, minutely scabrid-ciliate along veins and around slightly bifid apex. *Palea* of hermaphrodite florets ovate, membranous, not keeled, 1-veined, minutely scabrid-ciliate along vein ending in



**Figure 1.** Known distribution of *Hierochloë repens* (Host) Simonk. in Serbia (Vojvodina) - black circles: previous literature and herbarium records; red circles: new records.

acute or emarginate apex. *Stamens* 3 in male and 2 in hermaphrodite floret. *Anthers* 1.6-2.7 mm long. *Ovarium* glabrous, fusiform. *Rhachilla* disarticulating below each fertile floret. *Grain* oblong, with adherent pericarp.  $2n = 28, 28+2B$ . *Flowering time*: IV-V. *Seed dispersal*: endozoochoria (Soó 1970). *Lectotypus*: WU, W-Host 1885-0002386, designed by G. WEIMARCK (1971: 154).

**General distribution.** This species has Pontic-Pannonian-Central Asian distribution, occurring from East-Central and Southeastern Europe across Eastern Europe (northwards to c. 56° N) to the northern Caucasus, southwestern Siberia and the Altai mountains. It was originally described from central Hungary, as well as from the present transboundary area between Hungary and Serbia [*In Pannonia in arenosis cultis & incultis Comitatus Pesthiensis, Bacsensis, Cumaniae*], and has been recorded in Austria, the Czech Republic, Slovakia, Hungary, Serbia, Romania, Bulgaria, Ukraine, Poland (adventive), Belarus, Russia (central, southern and eastern parts of European Russia, the northern Caucasus, southwestern Siberia) and Kazakhstan (WEIMARCK 1971, 1980; GĘSIŃSKI 2003; WALLNÖFFER

2007; GEŠIŃSKI & RATYŃSKA 2011; ASSYOV & PETROVA 2012; CLAYTON *et al.* 2014). The distribution is still somewhat unclear because of confusion with *H. odorata*, which seems to have a more northern distribution, occurring instead in central and northern parts of Europe, as was indicated by WEIMARCK (1980).

**Distribution in Serbia. Bačka: Gospođinci:** [Veliki Rimski Šanac [MGRS 34T DR12], N 45° 29' 09.42", E 020° 18' 10.68", 71 m (Panjković, B., Stojšić, V. 02-Apr.-2014, PZZP; Stojšić, V., Perić, R., Panjković, B. 09-May-2014, BEOU; PZZP).

**Banat: Deliblato Sands:** Velika čoka [MGRS 34T EQ08], ≈N 44° 59' 05.66", E 021° 04' 05.04", 173 m (Perić, R., Rilak, S. 21-Apr.-2016, PZZP); Devojački bunar [MGRS 34T EQ98], along roads, in glades [subn. *Hierochloë odorata* (L.) Whlbg.] (Panjković, V. 04-Sep-1975, BUNS; OBRADOVIĆ & PANJKOVIĆ 1980: 328); Grebenac [MGRS 34T EQ17] (Wierzb. [Wierzbicki, P. P.] [sine datum], no. 645863, BP); on sandy fields near Grebenac ["Gerbenaiz", "Grebenaacz", "Grebenačz", subn. *Holcus repens* Host, *Hierochloë orientalis* Fries & Heuff. and *Hierochloa orientalis*[s] Fries et Heuffel] (Heuffel, L.<sup>1</sup>, May-1823, no. 645862, BP; Heuffel [J.] 1835, no. 228364, BP; Wierzbicki [P. P., commemoravit L. Haynald] 1839, no. 645868, BP; Heuffel [J.], [s. d.], no. 645867, BP); Deliblato [MGRS 34T EQ06] ([sine nomine] 26/28-May-1951, BEOU); Dubovac [MGRS 34T EQ16], still sandy soil outside Dubovac ["Dubovácz", subn. *Holcus repens*] (Kitaibel, P. 19-Jun-1800, GOMBOCZ 1945: 526) (Fig. 1).

**Imprecise data: northern Serbia** (WEIMARCK 1971; 1980 ap. WALLNÖFFER 2007: 255); **Banat:** ["Banatus", subn. *Holcus repens* Host] (Rochel [A.] [s.d.], no. 228363, BP; ROCHEL 1828: 28); ["legio Teutonico-banatica", i.e., southern and southeastern parts of the present day Serbian Banat between Perlez, Uzdin, Vršac, Bela Crkva and the Danube River, corresponding to the German and Serbian regiments of the former Banatian Military Frontier in the Habsburg Monarchy, subn. *Holcus repens* Host and *Hierochloa orientalis* Fries et Heuff.], on sandy fields (Heuffel [J.] [s.d.], no. 645866, BP; HEUFFEL 1858a: 224; 1858b: 188).

**Srem?** ["Syrmia", "Syrmien", subn. *Hierochloa borealis*] (Rochel, A. [s.d.] "in Syrmia this is most harmful of grasses among crops", [s.d.], W; ROCHEL 1838: 21; WALLNÖFFER 2007: 255), on fields [subn. *Holcus odoratus*] (Kitaibel, P. [s.d.], fascicle xxxix/263, no. 6919, [labelled by S. Jávorka as *Hierochloë odorata* (L.) Wahlbg.], BP; JÁVORKA 1925: 67).

**Possible data: Bačka:** Zmajevno-Noví Sad [subn. *Hierochloë repens*] (Kitaibel, P., 02-Jun-1800, STURC 1989: 324, selected from GOMBOCZ 1945). Originally, Kitaibel in his diary (GOMBOCZ 1945: 501) wrote that between Zmajevno and Novi Sad he collected *Holcus*

*odoratus* (which is a basionym of *Hierochloë odorata* (L.) Wahlenb.). His quite detailed account as to the exact collection locality ("among the second and third inn ["Wirtshaus"] between Zmajevno ["Ókér"] and Novi Sad ["Neusatz"]) can be relatively easily traced on the First Military Survey map of this area (1782-1785, Sect. XVI: 39; XVII, no. 39-40), displaying all three inns ["wh.,"] along the Zmajevno-Noví Sad road, where the collection locality can be positioned close to the Mali Rimski Šanac ["Kleine Römer Schanze"] (DR02). This is about 15 km away from the locality where we collected *H. repens*.

Nicolaus Host's description of *H. repens* was based on specimens collected a few times by Waldstein and Kitaibel during their collecting trip across Bačka and Banat in the present day Hungary and Serbia. Although Kitaibel in his diary initially labeled his specimens partly as *Holcus odoratus* L. and partly as *Holcus repens* (as *nomen nudum*), all revised historical herbarium specimens from various collections (BEOU, BP, BUNS) representing members of the *Hierochloë odorata* complex originating from Serbia, as well as our own field investigations in Serbia, unequivocally indicate only *H. repens*. Also, previously published data indicating the presence of *H. odorata* in Serbia but unsupported by herbarium evidence (cf. SCHLOSER & VUKOTINOVIĆ 1869: 1215; ZORKÓCZY 1896: 110; GOMBOCZ 1945: 498-499, 513; OBRADOVIĆ 1966: 170; JOVANOVIĆ *et al.* 1983: 377; OBRADOVIĆ & BOŽA 1985: 67; 1986: 129; SIGUNOV & GAJIĆ 1986: 244) possibly refer to *H. repens* (Fig. 2).

**Habitat.** Xeromesophilic meadows or shrubby areas, steppe slopes, fallows, vineyards, on light sandy or loamy soils (WEIMARCK 1980; PENKSZA & RUPRECHT 2002; GEŠIŃSKI 2007). Specimens from Serbia are found on habitat types very similar to those in Hungary and Romania (PENKSZA & RUPRECHT 2002). The habitat near Gospođinci is a degraded loess steppic meadow belonging to the alliance *Festucion rupicolae* Soó. The geological substrate is represented by Pleistocene deposits of fluvial sand, aleuritic sands and clays (MALEŠEVIĆ 1982). The pedological substrate is chernozem (NEJGEBAUER *et al.* 1971). The following accompanying vascular plant taxa were recorded: *Achillea millefolium* L., *Astragalus cicer* L., *Centaurea* sp. (*C. scabiosa* agg.), *Convolvulus arvensis* L., *Coryza canadensis* (L.) Cronquist, *Dactylis glomerata* L., *Eryngium campestre* L., *Euphorbia cyparissias* L., *Euphorbia nicaeensis* All. subsp. *glareosa* (Pallas ex M. Bieb.) A. R. Sm., *Galium verum* L. subsp. *verum*, *Lathyrus tuberosus* L., *Muscari comosum* (L.) Mill., *Ononis* sp., *Phragmites australis* (Cav.) Trin. ex Steud., *Poa pratensis* L., *Rorippa austriaca* (Crantz) Besser, *Rubus caesius* L., *Salvia nemorosa* L., *Silene latifolia* Poir. subsp. *alba* (Mill.) Greuter & Burdet, *Teucrium chamaedrys* L. and *Thalictrum minus* L. The habitat on the Deliblato Sands is a semi-open forest-steppe meadow corresponding to the plant community *Prunetum tenellae* Soó 1947 developed on Quaternary aeolian sand as the geological

1 "L" meaning "Lugosiensis" or citizen of former Lugos, now Lugoj in Romania, where Johann Heuffel spent most of his life.





**Figure 2.** Upper left and right: individuals of *Hierochloë repens* (Host) Simonk. from Gospodinci; bottom left and right: old specimens of *Hierochloë repens* (Host) Simonk. from the Deliblato Sands (BEOU).

substrate (RAKIĆ 1980) and brown steppic soil on sand as the pedological substrate (NEJGEBAUER *et al.* 1971). Accompanying species were: *Adonis vernalis* L., *Arabidopsis thaliana* (L.) Heynh., *Asparagus officinalis* L., *Carex praecox* Schreb., *Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter & Burdet, *Crataegus monogyna* Jacq., *Dactylis glomerata* L., *Festuca rupicola* Heuff., *Galium aparine* L., *G. glaucum* L., *Geranium sanguineum* L., *Lamium purpureum* L., *Paeonia tenuifolia* L., *Prunus tenella* Batsch, *Sedum telephium* L. subsp. *maximum* (L.) Krock., *Silene latifolia* Poir. subsp. *alba* (Mill.) Greuter & Burdet, *Teucrium chamaedrys* L., *Thlaspi perfoliatum* L. and *Vicia* sp.

All examined herbarium specimens of the genus *Hierochloë* collected in Serbia over the course of nearly 200 years and housed in the BEOU, BEO, BUNS and BP collections indicate that two species are present in Serbia, viz., *Hierochloë repens* (Host) Simonkai and *H. australis* (Schrader) Roemer & Schultes. The first species is typical of dry, steppic habitats developed on sand in Bačka and Banat. In view of its habitat preferences in neighbouring countries and its known records in parts of western and northern Bulgaria (ASSYOV & PETROVA 2012), the presence of *H. repens* could be expected in lowland to montane steppic habitats in eastern Serbia too. On the other hand, *H. odorata* (L.) Wahlenb. is not confirmed for Serbia, a fact compatible with observations published by WEIMARCK (1980) according to which this species has a more northern, boreal distribution, occurring instead in more humid habitats in central and northern parts of Europe.

### Key for identification of species of the genus *Hierochloë* present in Serbia<sup>2</sup> and related species

**1a.** Awn of lemma of male floret distally attached, 1-3(-4) mm long, caespitose plant without creeping rhizomes. Mostly in open mountain woods, e.g., on Mts. Kopaonik and Goč.

#### *H. australis* (Schrader) Roemer & Schultes

**1b.** Awn of lemma of male floret, if present, subapical or apical, up to 1 mm long. Plant with creeping rhizomes. **2**

**2a.** Base of stems enclosed by numerous, persistent, greyish, withering leaf-sheaths. Leaves (5)7-9(11) mm wide, pruinose. Panicle ovoid (5)6.5-10(14) cm long, composed of (80)120-160(300) usually densely clustered spikelets. Pedicels below the spikelets with hairs 0.1-0.3 mm long. Vigorous plant with thick rhizomes. Dry, steppic grasslands. Bačka and Banat.

#### *H. repens* (Host) Simonkai

**2b.** Base of stem without conspicuous numerous greyish leaf-sheaths. Leaves (2.2)3-6(8) mm wide, vividly green.

Panicle pyramidal and somewhat smaller, (2.5)3.5-9(12.5) cm long, composed of (8)25-60(100) spikelets loosely arranged in small groups. Pedicels with hairs up to 0.1 mm long immediately below the spikelets. A comparatively slimmer plant. Wet meadows, fens, riversides, lake-shores. Not confirmed in Serbia.

#### *H. odorata* (L.) Wahlenb.

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<sup>2</sup> Based on the studies of WEIMARCK (1980) and WALLNÖFFER (2007), as well as on our own observations and examination of specimens from the following herbarium collections: BEO, BEOU, BP and BUNS.

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## Botanica SERBICA



## REZIME

## *Hierochloë repens* (Host) Simonk. (Gramineae) u Srbiji

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Prilikom terenskih istraživanja stepske flore i vegetacije na [Velikom] Rimskom šancu u okolini Gospodinaca i na Deliblatskoj peščari (Srbija: Vojvodina) pronašli smo *Hierochloë repens*, evroazijsku vrstu iz familije trava, koja je autohtona i u Panonskoj niziji, ali je dugo vremena bila zanemarena u flori Srbije. Nakon pregleda herbarijumskih primeraka *H. odorata* kompleksa iz Srbije zaključili smo da je u Srbiji prisutna samo vrsta *H. repens* koja je donedavno pogrešno tretirana kao *H. odorata* s.str.

**KLJUČNE REČI:** flora, horologija, Srbija

