

THE SPECIES *CAREX RANDALPINA* B. WALLN.
AND ASSOCIATION *FILIPENDULO*
ULMARIAE-CARICETUM RANDALPINAE ASS.
NOV. HOC LOCO IN CROATIA

ZVJEZDANA STANČIĆ

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In this paper, the species *Carex randalpina* is confirmed for the flora of Croatia. It was found in 2006, 2007 and 2008, in northwest Croatia, at four localities in the Krapina river valley (Bedekovčina, Kupljenovo, Luka, Pojatno – Novi Dvori). The species grows in dense stands which are, in this paper, described as the association *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco. The association belongs to marshland vegetation of the class *Phragmito-Magnocaricetea*. It develops in shallow depressions of the terrain, in moist habitats. The association is recorded in this paper for the first time in Croatia.

Key words: *Carex randalpina*, marshland vegetation, *Magnocaricion elatae*, *Phragmito-Magnocaricetea*, Croatia.

Stančić, Z.: Vrsta *Carex randalpina* B. Walln. i asocijacija *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco u Hrvatskoj. *Nat. Croat.*, Vol. 18, No. 2., 353–366, 2009, Zagreb.

U ovome radu potvrđena je dosad dvojbena nazočnost vrste *Carex randalpina* u Hrvatskoj. Vrsta je pronađena 2006., 2007. i 2008. godine, u sjeverozapadnoj Hrvatskoj, na četiri lokaliteta u dolini rijeke Krapine (Bedekovčina, Kupljenovo, Luka, Pojatno – Novi Dvori). Vrsta raste u gustim sastojinama koje su u ovome radu opisane kao asocijacija *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco. Asocijacija pripada močvarnoj vegetaciji razreda *Phragmito-Magnocaricetea*. Razvija se u plitkim udubljenjima terena, na vlažnim staništima. Asocijacija je u ovome radu po prvi puta zabilježena za Hrvatsku.

Ključne riječi: *Carex randalpina*, močvarna vegetacija, *Magnocaricion elatae*, *Phragmito-Magnocaricetea*, Hrvatska.

INTRODUCTION

Carex randalpina B. Walln. was originally found by Alfred Neumann in 1959, but he did not publish the finding, although there are detailed descriptions of the species in his unpublished manuscripts (WALLNÖFER, 1992, 1993). In the scientific literature, the species was mentioned for the first time by SEIBERT (1962) in Germany, but under the provisional name *C. oenensis*. Long after that, WALLNÖFER (1993) validly described the species. It obtained the name »*randalpina*« pursuant to its preponderant distribution in the lowlands around the Alpine region (WALLNÖFER, 1993).

So far, the distribution of *Carex randalpina* is known from the following countries: Austria (WALLNÖFER, 1993, 1994), Germany (SEIBERT, 1962; WALLNÖFER, 1993, 1994), Italy (PROSSER, 1998; COSTALONGA, 2006), Slovenia (WALLNÖFER, 1993, 1994; MARTINČIČ, 2007), and a questionable record in Switzerland (WALLNÖFER, 1994, 2006). Concerning the presence of the species in the Croatian flora, WALLNÖFER (1994, 2006) in a review of specimens of the *Carex* genus from the collections of the Department of Botany of the Faculty of Science in Zagreb (ZA, ZAHO), found one incomplete specimen collected by Ljudevit Rossi from the locality of Švarča in the Mrežnica river valley around Karlovac and designated it *Carex randalpina* or *C. xoenensis*.

Carex randalpina B. Walln. is closely related to *C. acuta* L., and between these two species there is the hybrid *C. xoenensis* A. Neumann ex B. Walln. (WALLNÖFER, 1992). The hybrid *C. xoenensis* has been recorded in Austria (WALLNÖFER, 1993, 1994), Germany (WALLNÖFER, 1993), Slovenia (WALLNÖFER, 1994) and Italy (PROSSER, 1998). The species *C. randalpina* also hybridises with the species *C. elata* All., the resultant hybrid being described under the name *C. xoberrodensis* B. Walln. (WALLNÖFER, 1993), and only known from Austria (WALLNÖFER, 1993).

The species *Carex randalpina* grows mostly as a dominant plant in dense stands in the composition of marshland vegetation, which have not so far been validly described in terms of phytosociological nomenclature (WEBER *et al.*, 2000). Such stands are known from Slovenia (MARTINČIČ, 2007). However, stands dominated by *Carex randalpina* and/or *C. xoenensis* are also known from Germany (SEIBERT, 1962; PHILIPPI, 1974; POTT, 1995; RENNWALD, 2000) and Austria (BALÁTOVÁ-TULÁČKOVÁ *et al.*, 1993). Authors in older publications did not distinguish between these two related taxa. In the paper by SEIBERT (1962), the species *Carex randalpina* (and/or *C. xoenensis*) was also mentioned with low cover values in the species composition of lowland forests (*Alnetum incanae* Aich. et Siegr. 1930 *loniceretosum* and *typicum*), shrubs (*Ligustro-Prunetum* Tx. 1952), marshland vegetation (*Phalaridetum arundinaceae* Libb. 1931, *Glycerietum maximae* Hueck 1931, *Sparganio-Glycerion* Br.-Bl. et Siss. 1942, *Caricetum inflato-vesicariae* W. Koch 1926, *Caricetum elatae* W. Koch 1926), and in other moist habitats (*Senecion fluviatilis* Tx. (1947) 1950). MARTINČIČ (2007) has noted the species *Carex randalpina* in the composition of lowland *Alnus glutinosa* (L.) P. Gaertn. forests.

As habitats of *Carex randalpina*, WALLNÖFER (1992, 1993) notes: mainly wet places without stagnant water, very seldom in the water; in full light or in only slightly shady places; on friable soil rich in nutrients; usually along streams, in lowland forests and their fringes, in roadside ditches and similar places.

In this paper, the species *Carex randalpina* is confirmed for the flora of Croatia and the new association *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco is described and also recorded for the first time in Croatia.

STUDY AREA

The new localities of the species *Carex randalpina* and the association *Filipendulo ulmariae-Caricetum randalpinae* are located in northwest Croatia (Fig. 1). The relief of the area investigated is characterized by valleys with the Krapina river and streams at altitudes of between 130 and 200 m a.s.l., hilly landscapes of between 200 and 400 m a.s.l., and mountains no higher than 1060 m a.s.l.

Climatically, the annual average temperature is about 10°C (CRKVENČIĆ *et al.*, 1974). Annual precipitation ranges between 900 and 1100 mm. It is present during the whole year, with two maxima: in early spring, and in late autumn.

With a more precise distinction of climatic and ecological conditions, the primary forest vegetation of northwest Croatia can be divided into several basic belts (HORVAT *et al.*, 1974): in the wet valleys there are forests of *Quercus robur* L. and *Fraxinus angustifolia* Vahl; in the hills, out of reach of the floodwater, forests of *Quercus petraea* Liebl. and *Carpinus betulus* L.; at higher altitudes, forests of *Fagus sylvatica* L.; and on the mountaintops, mixed *Fagus sylvatica* and *Abies alba* Mill. forests.

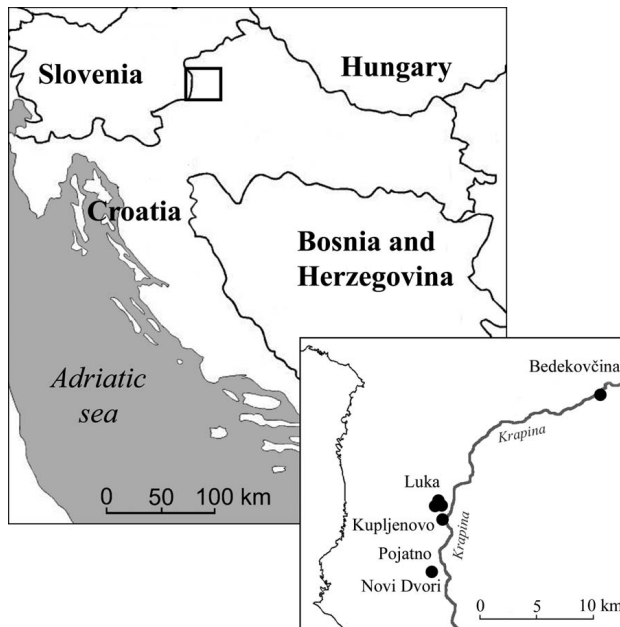


Fig. 1. Distribution map of *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco in Croatia.

METHODS

Field research was carried out during 2006, 2007 and 2008. The phytosociological investigations i.e. creation of relevés, were done according to the Zürich-Montpellier methodology (HORVAT, 1949; BRAUN-BLANQUET, 1964). The species composition of the *Filipendulo ulmariae-Caricetum randalpinae* from Croatia is shown in the analytical table (Tab. 1), in which species are sorted into groups according to their phytosociological affinity. The list of relevé localities is presented in the Appendix. A comparison of relevés from Croatia, Slovenia and Germany is shown in the synoptic table (Tab. 2).

In the data set researched, threatened plant taxa (NIKOLIĆ & TOPIĆ, 2005) were marked, as well as neophytes (OBERDORFER, 2001) (Tab. 1).

The International Code of Phytosociological Nomenclature (WEBER *et al.*, 2000) was used for the description of the new association's name.

The phytosociological affiliation of the community to higher syntaxonomic categories was accepted in accordance with PHILIPPI (1974).

The nomenclature of vascular plant species follows Flora Europaea (TUTIN *et al.*, 1964–1980, 1993), and the nomenclature of mosses follows FRAHM & FREY (1992).

RESULTS AND DISCUSSION

In this paper, the species *Carex randalpina* is confirmed for the flora of Croatia. It has been found in the Krapina river valley, in northwest Croatia (Fig. 1, Appendix), at the following localities: Bedekovčina, Kupljenovo, Luka, and between Pojatno and Novi Dvori.

The new association is described in this paper and assigned within marshland vegetation, in accordance with PHILIPPI (1974), to the following syntaxa:

Class *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941

Order *Phragmitetalia* W. Koch 1926

Alliance *Magnocaricion elatae* W. Koch 1926

**Association *Filipendulo ulmariae-Caricetum randalpinae* Stančić
ass. nov. hoc loco**

**Typus: relevé No. 1 in Tab. 1 in this paper
[Holotypus hoc loco]**

The same or related association was primarily recorded by SEIBERT (1962) under the provisional name *Caricetum oenensis*. However, the name of the community has not been validly published, since the name-giving taxon *Carex oenensis* was not validated earlier or at the time of the association's description (WEBER *et al.*, 2000: 747, 748). Later, WALLNÖFER (1992) validated the species *Carex oenensis*, and consequently BALÁTOVÁ-TULÁČKOVÁ *et al.* (1993: 102–103) published the association's name – *Caricetum oenensis* Seibert ex Balátová-Tuláčková *et al.* 1993. However, one year later, it was established that the name-giving taxon, i.e. nomenclatural type, described as *Carex oenensis* (WALLNÖFER, 1992), referred to a hybrid, and it was renamed *C. ×oenensis*, while the related parent species was described as a new taxon, *Carex randalpina*

Tab. 1. Analytical table of the association *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco in Croatia. Key to abbreviations: VU – vulnerable species, N – neophyte.

	Holotypus						
	Holotype						
Relevé number	1	2	3	4	5	6	7
Cover value (%)	90	100	100	90	100	100	100
Relevé area (m ²)	16	9	16	16	10	16	15
Relevé shape	4×4	3×3	4×4	4×4	5×2	4×4	3×5
Altitude (m a.s.l.)	134	135	135	134	149	134	131
Depth of water (cm)	0	0	0	0	0	0	0–5
a – abandoned, b – burned	a	a	a	a	a	b	b
Number of species	5	5	5	6	15	12	18
<i>Filipendulo ulmariae</i> – <i>Caricetum randalpinae</i>							
<i>Carex randalpina</i>	5	5	5	5	5	5	5
<i>Phragmito-Magnocaricetea</i>							
<i>Carex vesicaria</i> (VU)	.	.	.	.	.	+	+
<i>Carex riparia</i> (VU)	.	.	.	.	1	.	.
<i>Iris pseudacorus</i>	.	.	.	.	.	.	+
<i>Lycopus europaeus</i>	.	.	.	.	.	.	+
<i>Scutellaria galericulata</i>	.	.	.	.	.	.	+
Companions							
<i>Calystegia sepium</i>	+	2	+	+	1	+	1
<i>Filipendula ulmaria</i>	+	.	+	1	.	1	1
<i>Carex hirta</i>	.	.	.	.	+	+	+
<i>Lathyrus pratensis</i>	.	.	+	.	+	+	.
<i>Rubus caesius</i>	+	+	.	.	1	.	.
<i>Angelica sylvestris</i>	.	.	.	.	1	.	+
<i>Cirsium arvense</i>	.	.	.	+	+	.	.
<i>Lythrum salicaria</i>	.	.	.	.	.	+	+
<i>Solidago gigantea</i> (N)	.	1	.	.	.	.	+
<i>Symphytum officinale</i>	.	.	.	.	.	+	+
<i>Fritillaria meleagris</i> (VU)	+	.	.	.	.	.	.
<i>Echinocystis lobata</i> (N)	.	+	.	.	.	.	.
<i>Potentilla reptans</i>	.	.	+	.	.	.	.
<i>Colchicum autumnale</i>	.	.	.	+	.	.	.
<i>Thalictrum flavum</i>	.	.	.	+	.	.	.
<i>Bromus</i> sp.	.	.	.	.	+	.	.
<i>Galium aparine</i>	.	.	.	.	+	.	.
<i>Lysimachia nummularia</i>	.	.	.	.	+	.	.
<i>Myosotis scorpioides</i> agg.	.	.	.	.	+	.	.
<i>Poa trivialis</i>	.	.	.	.	+	.	.
<i>Urtica dioica</i>	.	.	.	.	1	.	.
<i>Valerianella</i> sp.	.	.	.	.	+	.	.
<i>Aegopodium podagraria</i>	.	.	.	.	.	+	.
<i>Equisetum arvense</i>	.	.	.	.	.	+	.

Tab. 1. continued

Relevé number	1	2	3	4	5	6	7
<i>Fragaria vesca</i>	+	.
<i>Selinum carvifolia</i>	+	.
<i>Carex brizoides</i>	+
<i>Carex panicea</i> (VU)	+
<i>Lysimachia vulgaris</i>	+
<i>Ophioglossum vulgatum</i>	+
<i>Silene flos-cuculi</i>	+
<i>Valeriana dioica</i>	+

(WALLNÖFER, 1993). Furthermore, in the Isar river valley north of Munich in Germany, where SEIBERT (1962) for the first time provisionally described the association *Caricetum oenensis*, in accordance with WALLNÖFER (1993, 1994) there were recorded both taxa *Carex randalpina* and *C. xoenensis*. At the present state of knowledge, it is not possible to establish to which taxon belongs the *Carex* species recorded in the original phytosociological table published by SEIBERT (1962). In order to avoid further ambiguities, on one hand due to invalid publication of the association's name, and on the other hand due to lack of data on which of the two related *Carex* species in the association described by SEIBERT (1962) the exemplars belong to, here is described the new association.



Fig. 2. Association *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco in habitat in Luka on 13/05/2006 (relevé 6).

The association *Filipendulo ulmariae-Caricetum randalpinae* is, in this paper, recorded for the first time in Croatia (cf. STANČIĆ, 2007), and represented by seven relevés (Tab. 1, Appendix). On the basis of species composition, relevés from Slovenia (MARTINČIĆ, 2007) also belong to the newly described association. The name of the association is constructed of two epithets, *Carex randalpina* and *Filipendula ulmaria* (L.) Maxim. *Carex randalpina* is character, dominant, the most frequent species and important for the association's recognition, while *Filipendula ulmaria* is one of the most frequent species (Tab. 1).

In the species composition of the association (Tab. 1) *Carex randalpina* is represented in all relevés and with high cover values. The character species of the class *Phragmito-Magnocaricetea* are found in a small number of relevés and with small cover values. Among the companions represented with the highest frequency are: *Calystegia sepium* (L.) R. Br. and *Filipendula ulmaria*, followed by *Carex hirta* L., *Lathyrus pratensis* L. and *Rubus caesius* L. In general, a poor floristic composition is characteristic of the community. In the seven relevés, 38 taxa in total were recorded, and the average number of species per relevé is 9.4. Stands not subject to any influences (Tab. 1) are usually poor in species. On the contrary, in stands affected by burning, the number of species per relevé is relatively high (Tab. 1) and amounts to 12 or 18 plant taxa (Tab. 1, relevés 6 and 7).

Physiognomically, this is dense vegetation with a height of about 1 m and more (Fig. 2). Cover values range between 90 and 100% (Tab. 1). The species *Carex randalpina*, as compared to all other big sedges in Croatia, is relatively identifiable by its light green, shining leaves, up to 18 mm wide (Fig. 3); large spikelets, which are



Fig. 3. Lower parts of stems of *Carex randalpina* B. Walln.



Fig. 4. Specimens of *Carex randalpina* B. Walln. in inflorescens.

pendulous because of their size (Fig. 4); and by the underground rhizomes, in the fresh state up to 7 mm across (Fig. 5); and roots from 1 to 4 mm thick (Fig. 5). Nevertheless, during any determination it has to be borne in mind that there are also hybrids (*C. xoenensis*, *C. xoberrodensis*), although they have not as yet been established for the Croatian flora.

In the comparison of the species composition of the association *Filipendulo ulmariae-Caricetum randalpinae* from Croatia and Slovenia (MARTINČIĆ, 2007), and *Carex randalpina* / *C. xoenensis* community (in the original, *Caricetum oenensis*) from Germany (SEIBERT, 1962) (Tab. 2), a great similarity is revealed. The synoptic table is compiled from 25 relevés and 84 plant taxa. In all three countries, in the floristic composition, besides *Carex randalpina*, the most frequent species are: *Filipendula ulmaria*, *Symphytum officinale* L., *Calystegia sepium* and *Lythrum salicaria* L. In Germany, *Carex acutiformis* Ehrh. and *Phalaris arundinacea* L. are recorded with high frequencies. However, due to the small number of recorded relevés, the association *Filipendulo ulmariae-Caricetum randalpinae* could be considered still insufficiently investigated.

Stands of *Filipendulo ulmariae-Caricetum randalpinae* in Croatia develop in shallow microdepressions of the terrain in moist habitats, which are rarely exposed to floodwater, even during heavy precipitation. Such stands are located within the meadow complexes in the Krapina river valley. Most of the surfaces investigated were not subjected to any anthropogenic influence, whereas two stands were exposed to occa-



Fig. 5. Roots and rhizomes of *Carex randalpina* B. Walln.

sional burning during the winter and early spring (Tab. 1). Burning off has a beneficial influence on the community in terms of enriching the species diversity, and the ash provides nutrients. *Carex randalpina* is a clonal plant, because of which it has features of a successful competitor and dominant plant species (SVENSSON *et al.*, 2005).

It is a well known fact that marshland vegetation belongs to the most endangered habitats in Croatia (MARTINIĆ, 2000), and in Europe as a whole (ANONYMOUS, 1992). Therefore, the association *Filipendulo ulmariae-Caricetum randalpinae* is also interesting from the nature-conservation aspect. On one hand, there is a small number of known localities, and associated stands mostly occupy small areas. On the other hand, in the floristic composition (Tab. 1) four vulnerable species from the list of the Red Book of Vascular Flora of Croatia (NIKOLIĆ & TOPIĆ, 2005) were found: *Carex panicea* L., *C. riparia* Curtis, *C. vesicaria* L. and *Fritillaria meleagris* L. There are also two neophytes: *Solidago gigantea* Aiton and *Echinocystis lobata* (Michx.) Torr. & A. Gray. Both neophytes are also recorded in other types of marshland vegetation (STANČIĆ, 2007), with the provision that *Solidago gigantea* belongs among the most common neophytes in communities of *Phragmito-Magnocaricetea* in Croatia. However, the spreading of neophytes is not so harmful to marshland communities that are already well developed (REJMÁNEK *et al.*, 2005), unless there should be any removal of surface vegetation cover, which is particularly prevalent when the water-courses are engineered.

Tab. 2. Synoptic table of the association *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco from Croatia and Slovenia (MARTINČIĆ, 2007), and *Carex randalpina* / *C. xoenensis* community (in original, *Caricetum oenensis*) from Germany (SEIBERT, 1962): a) in categories, b) in absolute frequency values.

Country Source	Croatia		Slovenia		Germany		Taxa freq.
	STANČIĆ current paper		MARTINČIĆ 2007		SEIBERT 1962		
Number of relevés	7		5		13		
Number of species	38		17		58		
	a	b	a	b	a	b	
<i>Carex randalpina</i> (et <i>C. xoenensis</i>)	V	7	V	5	V	13	25
<i>Filipendula ulmaria</i>	IV	5	II	2	II	4	11
<i>Symphytum officinale</i>	II	2			IV	9	11
<i>Calystegia sepium</i>	V	7			II	3	10
<i>Carex acutiformis</i>					IV	10	10
<i>Lythrum salicaria</i>	II	2	I	1	III	6	9
<i>Cirsium arvense</i>	II	2			II	5	7
<i>Equisetum arvense</i>	I	1	II	2	II	4	7
<i>Galium mollugo</i> agg.			II	2	II	5	7
<i>Lysimachia vulgaris</i>	I	1	II	2	II	4	7
<i>Phalaris arundinacea</i>					III	7	7
<i>Phragmites australis</i>			I	1	III	6	7
<i>Rubus caesius</i>	III	3			II	4	7
<i>Urtica dioica</i>	I	1			II	5	6
<i>Carex hirta</i>	III	3	I	1	I	1	5
<i>Eupatorium cannabinum</i>			II	2	II	3	5
<i>Galium aparine</i>	I	1			II	4	5
<i>Scutellaria galericulata</i>	I	1			II	4	5
<i>Iris pseudacorus</i>	I	1			II	3	4
<i>Myosotis scorpioides</i> agg.	I	1			II	3	4
<i>Scrophularia umbrosa</i>			II	2	I	2	4
<i>Solanum dulcamara</i>					II	4	4
<i>Alnus incana</i>					II	3	3
<i>Brachythecium salebrosum</i>					II	3	3
<i>Impatiens noli-tangere</i>					II	3	3
<i>Lathyrus pratensis</i>	III	3					3
<i>Stachys palustris</i>					II	3	3
<i>Vicia cracca</i> agg.					II	3	3
<i>Angelica sylvestris</i>	II	2					2
<i>Carex acuta</i>			II	2			2
<i>Carex elata</i>					I	2	2
<i>Carex vesicaria</i>	II	2					2
<i>Colchicum autumnale</i>	I	1	I	1			2

Tab. 2. continued

Country	Croatia		Slovenia		Germany		
	a	b	a	b	a	b	
<i>Eurhynchium swartzii</i>					I	2	2
<i>Fraxinus excelsior</i>					I	2	2
<i>Galium palustre</i> s. l.					I	2	2
<i>Humulus lupulus</i>					I	2	2
<i>Lysimachia nummularia</i>	I	1			I	1	2
<i>Mentha longifolia</i>					I	2	2
<i>Mentha pulegium</i>			II	2			2
<i>Poa trivialis</i>	I	1			I	1	2
<i>Potentilla reptans</i>	I	1			I	1	2
<i>Salix purpurea</i>					I	2	2
<i>Scrophularia nodosa</i>					I	2	2
<i>Solidago gigantea</i>	II	2					2
<i>Typha latifolia</i>					I	2	2
<i>Valeriana officinalis</i> s. l.					I	2	2

Species in only one relevé

Croatia: *Aegopodium podagraria*, *Bromus* sp., *Carex brizoides*, *C. panicea*, *C. riparia*, *Echinocystis lobata*, *Fragaria vesca*, *Fritillaria meleagris*, *Lycopus europaeus*, *Ophioglossum vulgatum*, *Selinum carvifolia*, *Silene flos-cuculi*, *Thalictrum flavum*, *Valeriana dioica*, *Valerianella* sp.

Slovenia: *Alnus glutinosa*, *Equisetum palustre*, *Euonymus europaea*, *Galium uliginosum*.

Germany: *Ajuga reptans*, *Allium carinatum*, *Calamagrostis epigejos*, *Cirsium oleraceum*, *Deschampsia cespitosa*, *Elymus repens*, *Epilobium hirsutum*, *Fissidens taxifolius*, *Glyceria maxima*, *Hypericum tetrapterum*, *Mentha aquatica*, *Pimpinella major*, *Poa angustifolia*, *P. palustris*, *Rubus idaeus*, *Salix* sp., *Senecio erucifolius*, *Sparganium erectum*.

For the preservation of *Carex randalpina* and *Filipendulo ulmariae*-*Caricetum randalpinae* in the study area, it is necessary to maintain the moisture in the habitat and carry out occasional controlled burning. Loss of existing habitats through the process of their becoming overgrown with shrub and woody species, or through various anthropogenic activities, is a potential threat worth considering.

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REFERENCES

- ANONYMOUS, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. The Council of the European Communities.
- BALÁTOVÁ-TULÁČKOVÁ, E., L. MUCINA, T. ELLMAUER & S. WALLNÖFER, 1993: *Caricetum oenensis* Seibert ex Bal.-Tul. et al. hoc loco. In: GRABHERR, G. & L. MUCINA (eds.): Die Pflanzengesellschaften Österreichs. Teil II. Natürliche waldfreie Vegetation. Gustav Fischer Verlag, Jena–Stuttgart–New York, p. 102–103.
- BRAUN-BLANQUET, J., 1964: Pflanzensoziologie. 3th ed. Springer Verlag, Wien–New York.
- COSTALONGA, S., 2006: Notula alla checklist della flora vascolare italiana. 1198. *Carex randalpina* Walln. (*Cyperaceae*). Informatore Botanico Italiano. Boll. Soc. Bot. Ital. **38**, 193.
- CRKVENČIĆ, I., M. FRIGANOVIĆ, R. PAVIĆ, V. ROGIĆ & M. SIĆ, 1974: Geografija SR Hrvatske II, Središnja Hrvatska. Školska knjiga, Zagreb.
- FRAHM, J.-P. & W. FREY, 1992: Moosflora. 3th ed. Verlag Eugen Ulmer, Stuttgart.
- HORVAT, I., 1949: Nauka o biljnim zajednicama. Nakladni zavod Hrvatske, Zagreb.
- HORVAT, I., V. GLAVAC & H. ELLENBERG, 1974: Vegetation Südosteuropas. Geobotanica Selecta Bd. IV. Gustav Fischer Verlag, Stuttgart.
- MARTINČIĆ, A., 2007: Notulae ad floram Sloveniae. 80. *Carex randalpina* B. Walln. Hladnikia **20**, 28–31.
- MARTINIĆ, I. (ed.), 2000: An Overview of the State of Biological and Landscape Diversity of Croatia with the Protection Strategy and Action Plans. Ministry of Environmental Protection and Physical Planning, Zagreb.
- NIKOLIĆ, T. & J. TOPIĆ (eds.), 2005: Crvena knjiga vaskularne flore Republike Hrvatske. Kategorije EX, RE, CR, EN i VU. Ministarstvo kulture, Državni zavod za zaštitu prirode, Zagreb.
- OBERDORFER, E., 2001: Pflanzensoziologische Exkursionsflora für Deutschland und angrenzende Gebiete. 8th ed. Verlag Eugen Ulmer, Stuttgart.
- PHILIPPI, G., 1974: 7. Ass.: *Caricetum oenensis* Seibert 1962. In: OBERDORFER, E. (ed.), Süddeutsche Pflanzengesellschaften. Teil I. Fels- und Mauergesellschaften, alpine Fluren, Wasser-, Verlandungs- und Moorgesellschaften. 4th ed. Gustav Fischer Verlag, Jena–Stuttgart–Lübeck–Ulm, p. 148.
- POTT, R., 1995: Die Pflanzengesellschaften Deutschlands. 2nd ed. UTB Ulmer, Stuttgart, p. 216–217.
- PROSSER, F., 1998: *Carex randalpina* B. Wallnöfer (*Cyperaceae*) nell'Italia Nord-Orientale. Webbia **53**, 31–43.
- REJMÁNEK, M., D. M. RICHARDSON & P. PYŠEK, 2005: Plant invasions and invasibility of plant communities, In: VAN DER MAAREL, E. (ed.), Vegetation ecology. Blackwell Publishing, Malden, Oxford & Carlton, p. 332–355.
- RENNWALD, E. (ed.), 2000: Rote Liste der Pflanzengesellschaften Deutschlands mit Anmerkungen zur Gefährdung. Schr.-R. f. Vegetationskunde **35**, 393–592.
- SEIBERT, P., 1962: Die Auenvegetation an der Isar nördlich von München und ihre Beeinflussung durch den Menschen. Landschaftspf. u. Vegetationskd. **3**, 1–123.
- STANČIĆ, Z., 2007: Marshland vegetation of the class *Phragmito-Magnocaricetea* in Croatia. Biologia, Bratislava **62** (3), 297–314.
- SVENSSON, B. M., H. RYDIN & B. Å. CARLSSON, 2005: Clonal plants in the community. In: VAN DER MAAREL, E. (ed.), Vegetation ecology. Blackwell Publishing, Malden, Oxford & Carlton, p. 129–146.
- TUTIN, T. G., N. A. BURGESS, A. O. CHATER, J. R. EDMONDSON, V. H. HEYWOOD, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), 1993: Flora Europaea 1. 2nd ed. Cambridge University Press, Cambridge.

- TUTIN, T. G., V. H. HEYWOOD, N. A. BURGESS, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), 1964–1980: Flora Europaea 1–5, Cambridge University Press, Cambridge.
- WALLNÖFER, B., 1992: Beitrag zur Kenntnis von *Carex oenensis* A. Neumann ex B. Wallnöfer. Linzer Biol. Beitr. **24** (2), 829–849.
- WALLNÖFER, B., 1993: Die Entdeckungsgeschichte von *C. randalpina* B. Wallnöfer spec. nov. (= "*C. oenensis*") und deren Hybriden. Linzer Biol. Beitr. **25** (2), 709–744.
- WALLNÖFER, B., 1994: Über neue Vorkommen von *C. randalpina* B. Wallnöfer in Slowenien und in der Schweiz. Linzer Biol. Beitr. **26** (2), 855–860.
- WALLNÖFER, B., 2006: Die Verteilung der Stomata auf den Laubblättern als wichtiges diagnostisches Merkmal zur Unterscheidung der Arten und Hybriden in der *Carex acuta*- und *C. rostrata*-Verwandtschaft (*Cyperaceae*). *Neilreichia* **4**, 195–208.
- WEBER, H. E., J. MORAVEC & J.-P. THEURILLAT, 2000: International Code of Phytosociological Nomenclature. 3rd ed. *J. Veg. Sci.* **11**, 739–768

Appendix

List of relevé localities, Gauß-Krüger coordinates, and dates of sampling.

Relevé 1: Luka, 5563564, 5089488, 13/05/2006; **relevé 2:** Kupljenovo, 5563981, 5088247, 28/05/2006; **relevé 3:** Luka, 5563670, 5089760, 26/05/2007; **relevé 4:** Luka, 5563560, 5089491, 06/05/2006; **relevé 5:** Bedekovčina, 5577885, 5099230, 11/05/2008; **relevé 6:** Luka, 5563464, 5089523, 13/05/2006; **relevé 7:** Pojatno – Novi Dvori, 5563062, 5083624, 13/05/2006.

S A Ž E T A K

Vrsta *Carex randalpina* B. Walln. i asocijacija *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco u Hrvatskoj

Z. Stančić

Ovim radom potvrđena je dvojbena nazočnost vrste *Carex randalpina* u Hrvatskoj. Naime, WALLNÖFER (1994) je, prilikom revizije roda *Carex* iz herbarske zbirke Ljudevita Rossi-ja (ZA), označio jedan nepotpuni primjerak iz okolice Karlovca kao *Carex randalpina* ili *C. ×oenensis*. Tijekom istraživanja močvarne vegetacije 2006., 2007. i 2008. godine, u dolini rijeke Krapine, na području sjeverozapadne Hrvatske, pronađena je vrsta *Carex randalpina*. Vrsta raste u gustim bujnim sastojinama, koje su u ovom radu opisane kao asocijacija *Filipendulo ulmariae-Caricetum randalpinae* ass. nov. hoc loco. To je nova močvarna zajednica za Hrvatsku. Karakterizira je dominantna vrsta, *Carex randalpina*, i mali broj vrsta u flornom sastavu. Zajednica pripada svezi *Magnocaricion elatae*, redu *Phragmitetalia* i razredu *Phragmito-Magnocaricetea*. Razvija se na vlažnim staništima u plitkim udubinama terena. Tijekom hladnijeg dijela godine na nekim površinama opaženo je spaljivanje suhih nadzemnih ostataka biljaka. Spaljivanje povoljno djeluje na razvitak vegetacije jer potiče bujan rast i razvoj većeg broja vrsta u flornom sastavu, te sprečava zaraštavanje

staništa drvenastim vrstama. Budući da su zasad vrsta i pripadajuća zajednica pronađene na malom broju lokaliteta i na užem geografskom području mogu se smatrati ugroženima.

Prilikom prvog navođenja asocijacije *Caricetum oenensis* u dolini rijeke Isar sjeverno od Münchena u Njemačkoj (SEIBERT, 1962), vrsta *Carex randalpina* nije bila validno opisana, pa je naziv vrste (*Carex oenensis*) i pripadajuće asocijacije bio samo provizoran. Kasnije je WALLNÖFER (1992) opisao vrstu, a ubrzo nakon toga su BALÁTOVÁ-TULÁČKOVÁ *et al.* (1993) opisali zajednicu *Caricetum oenensis* Seibert ex Balátová-Tuláčková *et al.* 1993. Međutim, prilikom opisa vrste (WALLNÖFER, 1992) došlo je do pogreške tako što je za nomenklaturni tip vrste *Carex oenensis* uzet hibrid. Pogreška je ispravljena preimenovanjem navedenog hibrida u *C. ×oenensis* (WALLNÖFER, 1993), dok je srodna roditeljska vrsta opisana kao *Carex randalpina* (WALLNÖFER, 1993). Nadalje, u dolini rijeke Isar gdje je SEIBERT (1962) pronašao spomenutu zajednicu, WALLNÖFER (1993, 1994) je utvrdio postojanje obje svojte, i *Carex randalpina* i *C. ×oenensis*. Budući da se na osnovi dostupnih podataka ne može utvrditi kojoj su svojti pripadali primjerci u snimkama objavljenim u radu SEIBERT-a (1962), a kako bi se izbjegle daljnje zabune oko imena zajednice, u ovome je radu opisana nova asocijacija.