



Research Article

Notes on rare and newly found *Carex* taxa (Cyperaceae) in Croatia

Jacob Koopman¹, Helena Więclaw², Janez Mihael Kocjan³, Sandro Bogdanović^{4*}

¹ ul. Kochanowskiego 27, PL-73-200 Choszczno, Poland

² University of Szczecin, Institute of Marine and Environmental Sciences, Adama Mickiewicza 18, PL-70-383 Szczecin, Poland

³ Dolenja vas pri Polhovem Gradcu 70, SI-1355 Polhov Gradec, Slovenia

⁴ University of Zagreb, Faculty of Agriculture, Department of Agricultural Botany, Svetošimunska cesta 25, HR-10000 Zagreb, Croatia

Abstract – Although the flora of Croatia is rather well known, several new *Carex* species and hybrids were able to be added during a caricological visit to Croatia and after two more years of fieldwork (2023–2024). The total number of *Carex* species is now 91; besides, there are eleven *Carex* hybrids known. During our herbarium research and revision in several European herbaria, and recent fieldwork, five new *Carex* taxa for Croatia were found: *C. distachya* subsp. *phyllostachioidea*, *C. depressa* subsp. *transsilvanica*, *C. nigra* subsp. *juncea*, *C. pairae*, and *C. secalina*, while *C. aterrima* subsp. *aterrima* was overlooked on the previous Croatian national list. In addition, eleven hybrids were found that were new for Croatia: *C. × alberti*, *C. × alsatica*, *C. × auronensis*, *C. × leutzii*, *C. × oberrodensis*, *C. × oenensis*, *C. × prolixa*, *C. × pseudoaxillaris*, *C. × subviridula*, *C. × villacensis*, and *C. × xanthocarpa*. Moreover, several rare *Carex* species were confirmed at known locations and new localities were detected for multiple species. The following species were involved: *C. atrata*, *C. buekii*, *C. capillaris*, *C. cespitosa*, *C. fritschii*, *C. illegitima*, *C. lasiocarpa*, *C. pulicaris*, *C. punctata*, *C. randalpina*, *C. rupestris*, and *C. vulpinoidea*. *Carex limosa* has to be considered as extinct from Croatia. Search for the species *C. arenaria*, *C. diandra*, *C. frigida*, *C. melanostachya*, *C. pauciflora*, *C. stenophylla*, and *C. supina*, has revealed only very old herbarium specimens, but there has been no recent confirmation in the field. For *C. dioica* there was no material available, nor could it be confirmed in the field. Two hybrid names, *C. × rossiana* and *C. × villacensis*, are lectotypified here.

Keywords: Balkan Peninsula, biodiversity, herbarium revision, hybrids, lectotypification

Introduction

The flora of Croatia has been studied relatively well and a lot of information can be found in the national Flora Croatica Database – FCD (Nikolić et al. 2014, Nikolić 2019, 2020a, b, c, 2024). To date, 87 species of the genus *Carex* L. (Cyperaceae) have been recorded in Croatia, with some subspecies and varieties, and two hybrids in literature (Koopman 2022). Several of these 87 *Carex* species in Croatia have been found for the first time in recent years: *C. buekii* Wimm. by Alegro and Marković (1999), *C. pulicaris* L. by Topić and Ilijanić (2001), *C. randalpina* B.Walln. by Stančić (2009), *C. punctata* Gaudin by Koopman and Topić (2011), *C. phyllostachys* C.A.Mey. by Terlević et al. (2021), and *C. vulpinoidea* Michx. by Király et al. (2021). We have

been able to add in total 17 new *Carex* taxa, including eleven hybrids, to the flora of Croatia. Special attention has been paid to very rare ones.

Carex arenaria L., *C. frigida* All., *C. limosa* L., *C. melanostachya* M.Bieb. ex Willd., *C. pauciflora* Lightf., and *C. stenophylla* Wahlenb. are dubious in Croatia according to FCD (Nikolić 2024). According to the Red Book of Vascular Flora of Croatia (Nikolić and Topić 2005) and Topić and Stančić (2006), 16 species are threatened, of which *C. bohémica* Schreb. and *C. pulicaris* L. are critically endangered (CR); *C. davalliana* Sm., *C. divisa* Huds., *C. echinata* Murray, *C. extensa* Gooden., *C. flava* L., *C. hostiana* DC., *C. lepidocarpa* Tausch, *C. nigra* (L.) Reichard, and *C. oederi* Retz. are endangered (EN), while *C. panicea* L., *C. riparia* Curtis, *C. rostrata* Stokes, and *C. vesicaria* L. are vulnerable (VU).

* Corresponding author e-mail: sbogdanovic@agr.hr

The aim of this article is to present an update of the knowledge about the genus *Carex* in Croatia, based on field investigations and herbarium revisions in 2023 and 2024.

Material and methods

Fieldwork was carried out from May to October 2023 and during the vegetation season of 2024 (in total 54 fieldwork days), mainly in the continental lowlands of Croatia, the Mediterranean part of Croatia, as well as in the mountain area of Gorski Kotar, Mt Velebit and Mt Dinara.

Moreover, herbarium material from B, BP, CNHM, HHMR, SZUB, ZA, ZAGR, and ZAHO as well as from the virtual herbaria P, W, and WU, has been consulted and revised. Abbreviations of herbaria follow the Index Herbariorum (Thiers 2024). In total more than 3000 herbarium sheets were consulted and revised. Recently collected specimens have been deposited at ZAGR (University of Zagreb, Croatia), SZUB (University of Szczecin, Poland), and in Jac. Koopman's private herbarium (Choszczno in Poland). A complete set of herbarium specimens of new *Carex* taxa will be made accessible in ZAGR virtual herbarium according to Bogdanović et al. (2016).

The nomenclature of carices follows Koopman (2022). For nomenclatural issues the latest ICN was followed (Turland et al. 2025, Turland 2019). The Appendix presents a list of all currently known *Carex* taxa in Croatia, including hybrids.

Results

Currently there are 91 species of *Carex* known from Croatia, the occurrence of 75 of which (82%) was confirmed with certainty during our fieldwork and study of herbarium material in several herbaria. In total, five taxa new for Croatia were found: *C. distachya* Desf. subsp. *phyllostachioidea* (Ö.Nilsson) Jac.Koopman, Więclaw, Bogdanović & T.Denchev, *C. depressa* Link subsp. *transsilvanica* (Schur) K.Richt., *C. nigra* (L.) Reichard subsp. *juncea* (Fr.) Soó, *C. pairae* F.W.Schultz, and *C. secalina* Willd. ex Wahlenb. One taxon, *C. aterrima* Hoppe subsp. *aterrima*, was overlooked on the previous Croatian national list of the vascular flora and is now added. Moreover, eleven new *Carex* hybrids for Croatia were detected during our herbarium research and fieldwork (see Appendix). Below there is a discussion of the rare and new *Carex* taxa found during our fieldwork and research on herbarium material, alphabetically arranged. At present, the genus *Carex* in Croatia comprises 91 species, 26 subspecies and eleven varieties, as well as eleven hybrids with certainty.

Discussion

Carex aterrima Hoppe subsp. *aterrima*

The occurrence of *Carex aterrima* in the national Flora Croatica Database was omitted and overlooked in the recent

past, although it had been mentioned in older literature (Horvat 1931:194, Degen 1936: 584, Horvat 1952: 208) from two valleys on Mt Velebit. However, this taxon has been found during our study in the herbaria of BP, ZA and ZAHO. Subsequently we carefully checked for its occurrence in potential habitats on Mt Velebit, and were able to confirm its existence at three sites (Fig. 1A).

Specimens examined: Sjeverni Velebit: Gromovača; u dolini južno Jerkovića dolca, 23 Jul 1929, I. Horvat s.n. (ZA 78121); Flora Croatica: Sjev. Velebit, Kukovi, 23 Jul 1926 (sub. *Carex atrata*), I. Horvat s.n. (ZAHO); Comit. Lika Krbava. Velebit: in dolinis ad cacumen alpis Kozjak prope pagum Stirovaca, alt circ. 1550 m, 21 Sep 1908, J. B. Kümmerle 684 (BP); North Velebit, Nature Park Velebit, Mt Kozjak, in sinkhole, ca. 1550 m, 44°44'2.8" N, 15°1'42.3" E, 23 Jul 2024, S. Bogdanović s.n. (ZAGR); National Park North Velebit, in sinkhole between Gromovača and Rossijeva koliba, ca. 1550 m, 6 Sep 2024, S. Bogdanović & I. Ljubičić s.n. (ZAGR); National Park North Velebit, in sinkhole east of Rossijeva koliba, ca. 1570 m, 44°45'55.4" N 14°59'25.0" E, 6 Sep 2024, S. Bogdanović & I. Ljubičić s.n. (ZAGR).

Carex atrata L. subsp. *atrata*

In the Croatian flora, this rare taxon is known from a few alpine localities in Gorski Kotar and the mountains of Velebit and Plješivica (Horvat 1930, 1952, 1952–1953, Modrić Surina and Surina 2010). It occurs in the vegetation of snow-beds and in dolines (sinkholes). During our field survey, we could confirm its presence on Mt Risnjak and Mt Snježnik in Gorski Kotar, and on Zavižan on Mt Velebit (Fig. 1B).

Specimens examined: Velebit. Zavižan, Jul 1974, I. Trinajstić s.n. (CNHM); Lička Plješivica: Žestikovac, ca 1500 m, 17 Jul 1925, I. Horvat s.n. (ZA 20322); Sjeverni Velebit, Zavižan, u Modrić dolcu, u klekovini krivulja, 27 Jul 2023, S. Bogdanović s.n. (ZAGR); NP Risnjak, okolica Platka, Medlužine, u ponikvi u šumi, 8 Jul 2023, S. Bogdanović & S. Čato s.n. (ZAGR); NP Risnjak, Snježnik-Guslica, rudine, 9 Jul 2023, S. Bogdanović & S. Čato s.n. (ZAGR); Gorski Kotar, ponikva Škurina, 10 Jul 2023, S. Bogdanović & S. Čato s.n. (ZAGR).

Carex buekii Wimm.

The occurrence of this species in Croatia was first confirmed in April 1997 by Alegro and Marković (1999), who found the species in Gornje Prilišće and Vukova Gorica along the River Kupa in the WNW of Croatia, bordering Slovenia (see also Koopman et al. 2018). We could find this species further to the south on two sites, near Plaški and Dretulja (Karlovac County), and further to the west, near Belo (Primorje-Gorski Kotar County), also close to the River Kupa (Fig. 1C). During the revision of herbarium material in ZAGR one specimen was found from Vukovar in eastern Croatia, and in CNHM one specimen from Lika.

Specimens examined: Karlovac County, near Plaški, 45°5'28.0" N, 15°22'8.5" E, 375 m, wet meadow, *Magnocaricion*,

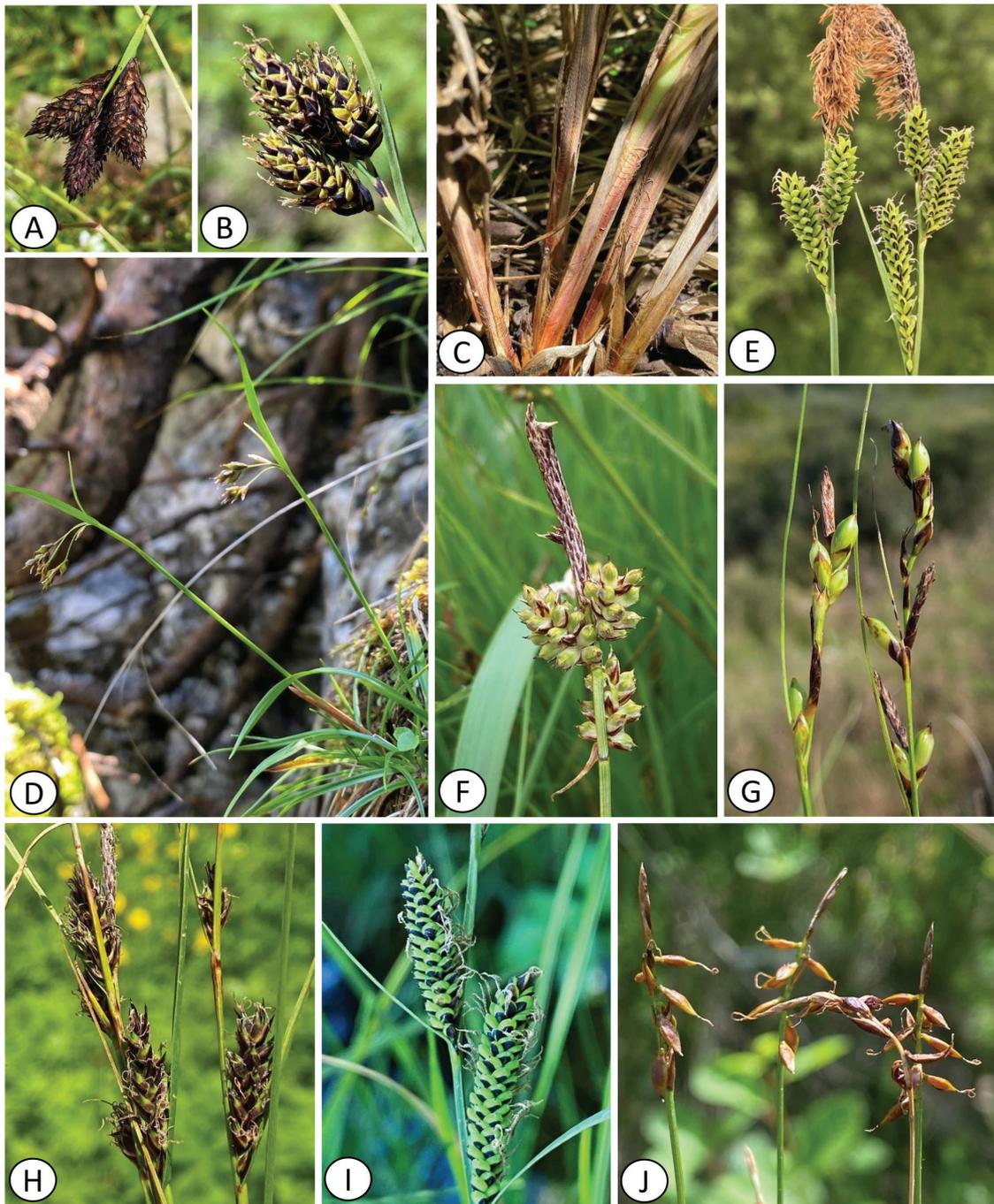


Fig. 1. Photos of some rare and newly found *Carex* taxa from Croatia discussed in this article. A – *C. aterrima*, B – *C. atrata*, C – *C. buekii*, D – *C. capillaris*, E – *C. cespitosa*, F – *C. fritschii*, G – *C. illegitima*, H – *C. lasiocarpa*, I – *C. nigra* subsp. *junceae*, J – *C. pulicaris* (photo: S. Bogdanović).

20 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, ZAGR); Primorje-Gorski Kotar County, 170 m E of village Belo, 45°28'30.4" N, 14°53'49.4" E, 228 m, wet meadow, 23 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, ZAGR); near Plaški, close to spring of Dretulja stream, 45°4'40.5" N 15°20'49.5" E, 21 Jun 2023, S. Bogdanović s.n. (ZAGR); Vukovar County, Vukovar, lokalitet Lijeva bara, vlažna livada na nagibu uz baru, 45°20'12" N, 19°0'36" E, 30 Mar 2020 (sub. *Carex elata*), V. Mudri & I. Vitasović Kosić s.n. (ZAGR 61036); N Croatia, Varaždinske Toplice, east of

cemetery, wet meadow, 30 Jun 2023, S. Bogdanović s.n. (ZAGR); Značajni krajobraz, Barećeve špilje, u jarku, 44°59'35.70" N, 15°43'36.40" E, 11 May 2021, S. Buzjak s.n. (CNHM).

Carex capillaris L. subsp. *capillaris*

In the Croatian Red Book of the Vascular Flora, *Carex capillaris* is listed as “data deficient” (Nikolić and Topić 2005). It is known from a few sites in Gorski Kotar, Vela Kapela, Klek, Lička Plješivica, and Sjeverni Velebit (Horvat 1930, 1952, Modrić Surina and Surina 2010). It is a rare

species growing within the alpine belt in the vegetation of snow-beds and in valleys (sinkholes), among rocky crevices in wetlands. During our fieldwork, we confirmed it in Gorski Kotar and on Sjeverni Velebit (Fig. 1D).

Specimens examined: Sjeverni Velebit, Zavižan, u Modrić dolcu, u klekovini krivulja, 27 Jul 2023, S. Bogdanović s.n. (ZAGR); Gorski Kotar, ponikva Škurina, 10 Jul 2023, S. Bogdanović & S. Čato s.n. (ZAGR); Gorski Kotar, Veliko Snježno, 10 Jul 2023, S. Bogdanović & S. Čato s.n. (ZAGR); Velika Kapela, Biješe Stijene, na vrhu, na kamenitim blokovima, eksp. N, 25 Jun 1932, I. Horvat s.n. (ZAHO); Velebit, Mali Rajinac, supra Krasno, 1699 m, 26 Jul 1907, Lj. Rossi 17.549 (ZA 15308).

***Carex cespitosa* L.**

This species was found for the first time in Croatia on Drežničko polje by J. Topić in 2009 (Nikolić 2024). Afterwards it was only mentioned for the same locality and for Rijeka but it was not confirmed by Jiménez-Mejías et al. (2014). During our survey, it was confirmed in Drežničko polje where it grows in karstic wetland (Fig. 1E).

Specimen examined: Lika, Drežničko polje, 45°9'27.7" N, 15°5'56.1" E, 21 May 2023, S. Bogdanović s.n. (ZA, ZAGR).

***Carex distachya* Desf. subsp. *phyllostachioidea* (Ö.Nilsson) Jac.Koopman, Więclaw, Bogdanović & T.Denchev**

Carex distachya was split up into two varieties by Nilsson (1985), *C. distachya* var. *distachya* and *C. distachya* var. *phyllostachioidea* Ö.Nilsson, the latter only known from Asian West Türkiye and the East Aegean Islands. Koopman et al. (2025) show that this taxon has a wider occurrence in Southeast-Europe, and they raised it to subspecies level. Recent herbarium revision of *C. distachya* material has revealed the existence of this subspecies from Mt Biokovo in Croatia. From the typical subspecies it differs in having wider leaves (0.9–2.5 mm), utricles with 2 distinct veins and with a somewhat scabrid beak (see Koopman et al. 2025). This taxon occurs (at least) in Türkiye, Greece, Bulgaria, Montenegro, and Croatia. In Croatia, the westernmost part of its distribution range is involved.

Specimen examined: Kotišina, 31 May 1993, Lj. Regula-Bevilacqua s.n. (ZA 51309). [New for Croatia].

***Carex depressa* Link subsp. *transsilvanica* (Schur) K. Richt.**

Examination of the herbarium collection in BP revealed the existence of one herbarium sheet collected by L. Rossi from Mt Velebit, named as *Carex* × *rossiana* Degen [*C. caryophyllea* var. *trachyantha* (Dorner ex Heuff.) Nyman × *C. halleriana* Asso]. According to the protologue given by Degen (1936: 585), this hybrid is known only from the type locality in Živi Bunari on Mt Velebit. Recently it could be found neither in any other herbaria examined nor in the field. However, the herbarium specimen in BP corresponds

without any doubt to Degen's prologue. Therefore, we select here as a lectotype for the name *C. × rossiana* the following specimen:

Lectotype (designated here): Croatia litoralis ad Živi Bunari pone pagum Stinica, 26 Apr 1913, Lj. Rossi s.n. (BP 243009!).

Carex caryophyllea var. *trachyantha* is a synonym of *C. depressa* subsp. *transsilvanica* (Koopman 2022). After careful examination of the type specimen of *C. × rossiana*, we noticed that the utricles were full and well developed, the shape and indumentum of utricles and female glumes belong to *C. depressa* subsp. *transsilvanica*, and therefore this hybrid name, *C. × rossiana*, has to be considered only a synonym and not a hybrid of that taxon. [New for Croatia].

***Carex fritschii* Waisb.**

This species grows on sandy and gravelly soils in central European oak forests of Austria, Switzerland, France, Germany, Czech Republic, Italy, Slovenia, Croatia, and Hungary (Rotreklová et. al. 2011, Koopman 2022). In Croatia, *C. fritschii* is very rare and according to the FCD only two localities are known so far (Nikolić 2024). Both localities are in the Lika region: Plaško polje and National Park Plitvička jezera, which could not be confirmed by our research. However, we found two new sites, one in Bruvno in Lika and a second one in Klana in Gorski Kotar (Fig. 1F). On the latter site *C. fritschii* grows together with *C. pilulifera* L. and forms here the hybrid *C. × villacensis* Kük. [*C. fritschii* × *C. pilulifera*], which is a new taxon for the Croatian flora. Determination of this hybrid is in accordance with Kükenthal (1909) and Řepka (1992). The specimens of *C. fritschii* coming from Trstenik in Gorski Kotar and deposited in NHMR herbarium, have to be attributed, after revision, to *C. × villacensis* rather than to *C. fritschii*.

Specimens examined: Gorski Kotar, NE of Klana, Ovcije, edge of wet grassland, 45°28'15.42" N, 14°24'10.26" E, 1 Jun 2024, S. Bogdanović s.n. (NHMR, ZAGR); Lika, Bruvno-Mazin, grassland along the road, 44°25'21.9" N, 15°55'12.8" E, 19 Jun 2024, S. Bogdanović & M. Temunović s.n. (ZAGR).

***Carex illegitima* Ces.**

The occurrence of this rare Mediterranean species in Croatia was firstly known from the island of Hvar where it was mentioned under the name *Carex pharensis* Visiani (1852: 346). According to the FCD, *C. illegitima* occurs in Croatia only on some central Adriatic islands (Brač, Šolta, Hvar, Vis, Biševo, Svetac, Korčula) and on Pelješac peninsula. This species was confirmed on the islands of Biševo and Vis. On Vis it was found at two locations, namely NW of Komiža on the west coast of the island and near Milna in the SE (Fig. 1G).

Specimens examined: Dalmatia, Island of Vis, NW of Komiža, near Sv. Blaž, 43°3'13.9" N, 16°4'47.7" E, 287 m, along the road, macchia with *Pinus halepensis* and *Erica*

multiflora, 17 May 2023, S. Bogdanović, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, SZUB, ZAGR); Island of Vis, Milna-Stončica, 43°3'48.8" N, 16°14'30.1" E, 25 m, macchia along path to the sea, 17 May 2023, S. Bogdanović, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman); Dalmacija, otok Vis, Oključina, u šumi hrasta crnike, uz put, 27 Aug 2005, S. Bogdanović s.n. (ZAGR 43821); Dalmatia, Island Biševo, Potok, in *Pinus halepensis* forest, 15 m above the sea, 27 Aug 2000, S. Bogdanović s.n. (ZAGR 79753); o. Vis, Vis-Hum, 3 May 1964, I. Trinajstić 6346 (CNHM); Kroatien, Dalmatien, Insel Korčula, Kuppe (mit Sender) oberhalb der Ortschaft Korčula, NE-Seite, 65 m, 42°57'31" N, 17°07'57" E, alt. 65 m, 8 Jun 2004, Karl s.n. (W 0284489).

Carex lasiocarpa Ehrh. var. *lasiocarpa*

In older literature, this taxon was recorded from continental lowland areas in Croatia: Mali Bukovec in Podravina, Selnica in Prekmurje, Imbrovec and Đelekovec in Slavonia, Sisak, Topolovac, Mužilovčica, and in Lonjsko polje in Posavina (Schlosser and Vukotinović 1869). At none of these localities the species could be confirmed during our investigation. These days there are only three localities in Croatia at which *C. lasiocarpa* is known and forms the well-developed community of *Caricetum lasiocarpae* Koch 1926 within bog vegetation (Šegulja 2005, Alegro and Šegota 2008, Topić and Vukelić 2009, Anonymous 2022). We were able to confirm *C. lasiocarpa* at all three known localities (Velebit, National Park Plitvička jezera and Blatuša) (Fig. 1H).

Specimens examined: Srednji Velebit, Sunderac, vlažni travnjak uz potok (nekadašnji cret), 25 Jul 2019, S. Buzjak s.n. (CNHM); Flora Croatica, In fossis et aquis stagnantibus, s.d., J.C. Schlosser s.n. (ZA 20935); Lika, Nacionalni Park Plitvička jezera, Ljeskovačke bare, 44°50'58.88" N, 15°36'1.92" E, 5 Jun 2024, S. Bogdanović & M. Temunović s.n. (ZAGR); Sjeverni Velebit, Sunderac, na cretu, 44°37'52.04" N, 15°6'41.91" E, 6 Jun 2024, S. Bogdanović & M. Temunović s.n. (ZAGR); Kordun, Blatuša, cret Đon močvar, 45°19'3.94" N, 15°54'27.79" E, 4 Jun 2024, S. Bogdanović & S. Čato s.n. (ZAGR).

Carex limosa L.

There are only two known localities of *Carex limosa* in Croatia. One is cited by Schlosser and Vukotinović (1869) in "Flora Croatica", the second is known from a single herbarium specimen in ZA herbarium that was collected from Pleternica in Slavonia by Antun B. Pavić, probably from the early 19th century. Localities of *C. limosa* have been controversial since the early 20th century, when even Horvat (1939) was dubious about its existence in Croatia. We have examined all reported old localities cited by Schlosser and Vukotinović (1869: 1187): Široko Brezje near Križevci, Sv. Leonard and Noršić Selo near Samobor, and Pleternica in Slavonia. Even after occurrences of more than 150 years at those localities *C. limosa* could not be confirmed and there were no new findings either. Such acidophilous peat bogs

(*Rhynchosporion albae* Koch 1926) in which *C. limosa* usually grows do not exist anymore in Croatia or are very impoverished. Peculiarly, according to Topić (1995: 164) *C. limosa* was found within grassland vegetation in Bačinska jezera in the Neretva River Delta, but this is evidently an erroneous identification because the species that are given in the list belong to impoverished vegetation of *Isoeto-Nanojuncetea* Br.-Bl. et Tx. in Br.-Bl. et al. 1952. Analysing the extinction of fen and bog plants and their habitats in Croatia, Topić and Stančić (2006) concluded that *C. limosa* has vanished from Croatia. Therefore, we can assume that *C. limosa* is extinct in Croatia. As a boreal relict species, it is very rare in the Balkan flora; in the neighbouring countries Slovenia (Kocjan 2012, Kocjan et al. 2026), Bosnia and Herzegovina (Milanović 2017), and Serbia (Stevanović et al. 1999, Niketić and Tomović 2018) it occurs sporadically. *Carex limosa* is also extinct from the Hungarian flora (Király 2007, Bartha et al. 2015).

Specimen examined: Pleternica, s.d., A. Pavich s.n. (ZA 11547).

Carex melanostachya M.Bieb. ex Willd.

This species is extremely rare in Croatia with a few known localities cited in the FCD (Nikolić 2024). One herbarium specimen was collected by Lj. Vukotinović in 1877 in Fužine (Gorski Kotar), two localities were known from Požega valley in Slavonia (Tomašević 1998) and Petrijevcu in Baranja (photographs by J. Topić from 2011 incorporated in FCD), and more recently it has been found in Molve in Podravina on the border with Hungary (Csiky and Purger 2008). Another old record close to the Croatian border is from Bosanski Brod in Posavina (Kummer and Sendtner 1849) which is cited by Stupar et al. (2021) for the territory of Bosnia and Herzegovina. Milanović (2014) could not confirm the occurrence of *C. melanostachya* at the locality in Bosanski Brod recently. Despite an intensive search, at none of the Croatian localities *C. melanostachya* could be confirmed by us and therefore this species has to be considered at least as doubtful or possibly even extinct in Croatia.

Specimen examined: In sylvis umbrosis non rara, s.d., J.K. Schlosser s.n. (ZA 20942).

Carex nigra (L.) Reichard subsp. *juncea* (Fr.) Soó

The *Carex nigra* complex has five subspecies of which two (*C. nigra* subsp. *nigra* and *C. nigra* subsp. *juncea*) occur in Croatia. The latter taxon was found near the village of Sunger in Gorski Kotar and represents a new taxon for Croatia (Fig. 1I). In the FCD, *C. nigra* subsp. *juncea* is listed as a synonym of *C. nigra* subsp. *nigra*, but according to Koopman (2022) and POWO (2024) these are two accepted subspecies. *Carex nigra* subsp. *juncea* differs from the typical subspecies in having the following characters: it grows caespitose (vs. rhizomatous), and it has typically shiny, light brown lowest leaf sheaths (vs. dark brown, non-shiny lowest leaf sheaths).

Specimens examined: Gorski Kotar, Sunger, on wet forest edge with *Populus alba* and *Betula pendula*, 1 Jun 2024, 45°19'28.82" N, 14°48'33.66" E, S. Bogdanović s.n. (ZAGR); Lika, Ličko Lešće, cret uz hotel Gacka, 44°48'46.96" N, 15°19'9.4" E, 17 Jun 2023, S. Bogdanović s.n. (ZAGR); Ličko Lešće, uz hotel Gacka, cret, 44°48'47" N, 15°19'10" E, 17 May 2019, S. Buzjak s.n. (CNMH). [New for Croatia].

Carex pairae F.W.Schultz

In older Croatian literature, this species was known and cited under the name *Carex contigua* Hoppe subsp. *pairae* (F.W.Schultz) Degen, only known from a few sites on Mt Velebit (Degen 1936: 581). However, it was not on the national list in the FCD. *Carex pairae* belongs to *Carex* sect. *Phaestoglochin* Dumort., and it has to be considered a species distinct from *C. muricata*, having small (3.25–4.0 × 1.75–2.25 mm), spreading, oval to ovate utricles and obovate, acuminate, light brown female glumes (Molina et al. 2008a). *Carex pairae* is a more or less thermophilous species, usually found at lower altitudes, with a wide distribution, more frequent in southern Europe (Molina et al. 2008a).

Specimens examined: Velebit. In Carpinis fagetorum prope Alan, alt. c. 1200 m, 20 Jul 1908, A. Degen s.n. (BP); Süd Istrien, Pola, s.d., s.coll. (BP).

Carex pulicaris L.

This species was mentioned for the first time for Croatia by Topić and Ilijanić (2001), who thought to have it found on Trstenik Moor (Gorski Kotar) in the NW of Croatia. According to Wallnöfer (2008) this concerns a misidentification of *C. davalliana* Sm. However, *C. pulicaris* has been found afterwards, at another location in Croatia (pers.

comm. J. Topić, Zagreb). We found this species near Plaški near Dretulja spring (Karlovac County), in a mire, where it had been found before (Koopman and Topić 2011) (Fig. 1J).

Specimens examined: Karlovac County, surroundings of Plaški, 45°4'31.8" N, 15°20'48.4" E, 386 m, mire, 20 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman); Karlovac County, Plaški, near Dretulja spring, 45°4'26.74" N, 15°21'6.73" E, 21 Jun 2023, S. Bogdanović s.n. (ZAGR).

Carex punctata Gaudin var. *punctata*

This taxon was found for the first time in Croatia by J. Topić, at three locations in the north of the country during 2004–2009, near the villages of Pisarovinska Bregana, Plaški, and in the Risnjak National Park (Koopman and Topić 2011). Afterwards, Glasnović et al. (2015) found this species near Pižinovac in the Neretva River Delta. We can add two new sites, one near Belo, along the River Kupa in Gorski Kotar, bordering Slovenia and a second one in Kordun, near the village Bojanjci (Fig. 2A). Recently, this species has also been discovered in the flora of Bosnia and Herzegovina by Milanović et al. (2019).

Specimens examined: Gorski Kotar, 170 m E of Belo, N side of road, 45°28'30.1" N, 14°53'49.3" E, 228 m, wet meadow, 23 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, SZUB); Pisarovina, Pisarovinska Bregana, vlažna livada, 25 May 2004, M. Vrbeč s.n. (CNHM); NP Risnjak, Bela Vodica - Španov Laz, cret, 45°24'55.68" N, 14°41'7.82" E, 16 Jul 2020, S. Buzjak & Z. Sedlar s.n. (CNHM); NP Risnjak, Leska, cret, 45°25'9.87" N, 14°40'35.27" E, 9 Jul 2020, S. Buzjak s.n. (CNHM); Gorski Kotar, Belo, wet meadow along the road, 45°28'28.4" N

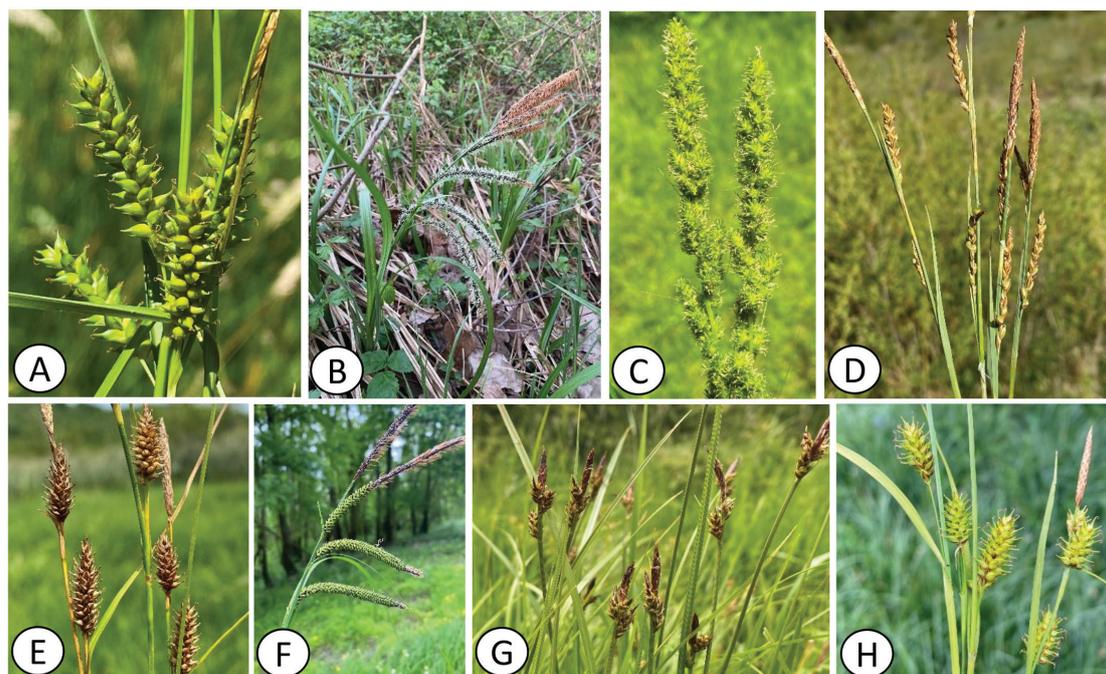


Fig. 2. Photos of some rare and newly found *Carex* taxa from Croatia discussed in this article. A – *C. punctata*, B – *C. randalpina*, C – *C. vulpinoidea*, D – *C. x alberti*, E – *C. x leutzii*, F – *C. x oenensis*, G – *C. x villacensis*, H – *C. x xanthocarpa* (photo: S. Bogdanović).

14°53'55.7" E, 30 May 2024, *S. Bogdanović s.n.* (ZAGR); Kordun, village Bojanjci near peat bog Đon močvar, along the forest path, 45°18'59.1" N, 15°54'16.73" E, 4 Jun 2024, *S. Bogdanović & S. Čato s.n.* (ZAGR).

Carex randalpina B. Walln.

Stančić (2009) mentioned this species for the first time for Croatia. It was found in 2006 in NW Croatia, near Zagreb, in the River Krapina valley, at four sites, near Bedekovčina, Kupljenovo, Luka, and Pojatno – Novi Dvori. We found this species near Jezerane in Lika, possibly the most southern site in Croatia, and also near Kosovići, which is just north of the Luka site by Stančić (2009), near Jurkovo Selo in Žumberak, west of Zagreb, and in Draganići (Fig. 2B).

Specimens examined: Karlovac County, Jezerane, 45°3'43.7" N, 15°10'44.3" E, 453 m, wet meadow with *Viola elatior*, 20 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman); Zagreb County, Zaprešić, 45°57'2.4" N, 15°44'49.4" E, 166 m, wet meadow along road in village, roadside mown, 21 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (SZUB); Zagreb County, Zaprešić, 45°57'0.1" N, 15°47'9.8" E, 154 m, 21 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (SZUB); Petrovina, stream Stupanj, 45°41'9.5" N, 15°33'49.1" E, 200 m, *Caricetum randalpiniae* at open place in *Alnetum* forest, 23 May 2023, *S. Bogdanović, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman, SZUB); Zagreb County, Jurkovo Selo, 45°42'24.1" N, 15°28'6.4" E, 200 m, meadow along stream, *S. Bogdanović, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (SZUB); Žumberak, Potok-Potok, vlažna livada, 300 m.n.v., 15 May 2003, *M. Vrbek & S. Buzjak s.n.* (CNHM); Karlovac County, Draganići gas station, Ribnjaci Draganići, along the channel, 45°33'30.6" N, 15°36'35.1" E, 7 Apr 2024, *S. Bogdanović & S. Čato s.n.* (ZAGR); Žumberak, Bukovac Svetojanski, wet meadow along stream Žumberačka reka, 45°42'17.48" N, 15°35'10.79" E, 9 May 2024, *S. Bogdanović & I. Ljubičić s.n.* (ZAGR); Karlovac County, Draganići gas station, Ribnjaci Draganići, along the channel, 45°33'30.6" N, 15°36'35.1" E, 12 May 2024, *S. Bogdanović & S. Čato s.n.* (ZAGR).

Carex rupestris All. subsp. *rupestris*

This is one of the rarest *Carex* taxa in Croatia. It is known from a single locality within the Bijele i Samarske stijene Strict Reserve on Vela Kapela. It was recorded by Horvat (1952) and for a long period it could not be confirmed. Recently we have confirmed its occurrence on the summit plateau of Bijele stijene on Vela Kapela. This species is also very rare in the rest of the Dinaric Mountains on the western Balkan Peninsula, where it is known only from Mt Notranjski Snežnik in Slovenia (Wraber 1966), from Mt Kamešnica in Bosnia and Herzegovina, and from Mt Durmitor in Montenegro (Horvat 1952).

Specimen examined: Vela Kapela, Bijele i Samarske stijene, plateau on the summit of Bijele stijene, 45°13'9.39" N, 14°58'32.89" E, 13 Oct 2023, *S. Bogdanović & M. Temunović s.n.* (ZAGR).

Carex secalina Willd. ex Wahlenb. var. *secalina*

During herbarium revision of *Carex hordeistichos* Vill. in ZA we found one herbarium sheet with *C. secalina*, a new species for Croatia. In historical literature of the Croatian flora, *C. secalina* was cited as a synonym of *C. hordeistichos* and several continental localities were cited, among them Toplike, today known as Varaždinske Toplice (Schlosser and Vukotinović 1869: 1195). We were not able to confirm the occurrence of *C. secalina* on the cited localities, probably because of extensive usage and changes of agricultural land in the continental part of Croatia. Therefore, this species is presumably extinct in Croatia, while the current occurrence of *C. hordeistichos* in Croatia is at least doubtful.

Specimen examined: In arenosis humidis Toplike et alibi, s.d., *J. C. Schlosser s.n.* (ZA 24921). [New for Croatia].

Carex vulpinoidea Michx.

This is an introduced species, native to N America, and known from just one site in Croatia, east of the village of Belo, close to the River Kupa in Gorski Kotar (Király et al. 2021), where it was confirmed during our fieldwork (Fig. 2C). Three clumps of this species were found. It was also mentioned by Király et al. (2021) west of Belo, but there we could not find any specimen.

Specimen examined: Gorski Kotar, just E of Belo, N side of road, 45°28'26.4" N, 14°53'55" E, 230 m, roadside, 23 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman); Gorski Kotar, Belo, along the road, 45°28'26.1" N 14°53'54.7" E, 30 May 2024, *S. Bogdanović s.n.* (ZAGR).

New *Carex* hybrids for Croatia

During herbarium research and fieldwork, we found eleven *Carex* hybrids new for Croatia. The distribution in Europe given for each hybrid below is according to Koopman (2022), and Croatia can thus be added at each hybrid. In the cited References more information about these hybrids is given.

Carex × *alberti* H.Lév. [*C. flacca* × *C. panicea*] (Fig. 2D)

Distribution: Europe: Czech Republic, France, Germany, Italy, Netherlands, Poland, Slovakia, Switzerland, Ukraine.

Reference: Koopman et al. (2022).

Specimen examined: Velebit, Baške Oštarije, on Ljubica bog, 44°31'40.4" N 15°11'12.1" E, 10 May 2024, *S. Bogdanović & S. Čato s.n.* (ZAGR).

Carex × *alsatica* Zahn [*C. demissa* × *C. flava*]

Distribution: Europe: Belgium, Czech Republic, Finland, France, Germany, Italy, Latvia, Netherlands, Norway, Poland, Slovakia, Spain, Sweden, Switzerland, United Kingdom.

References: Jermy et al. (2007), Więclaw (2014), Więclaw and Wilhelm (2014), Koopman et al. (2022).

Specimens examined: Gorski Kotar, just E of Belo, N side of road, 228 m, wet meadow, 45°28'30.1" N, 14°53'49.3" E, 23 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman, SZUB); In pratis humidis vallis Dobra ad Jalsa pone Karlovac, 26 May 1888, *Lj. Rossi 5650* (ZA 7269); In pratis humidis ad Borl pone Karlovac, 9 Jun 1887, *Lj. Rossi 5652* (ZA 7270).

***Carex × auronensis* L.C.Lamb. [*C. acuta* × *C. acutiformis*]**

Distribution: Europe: Belarus, Czech Republic, France, Germany, Italy, Latvia, Lithuania, Sweden, United Kingdom.

This hybrid grows often together with both parental species.

Reference: Koopman et al. (2022).

Specimen examined: Primorje-Gorski Kotar County, after Crni Lug, wet meadow, 691 m, 45°24'40.9" N, 14°41'38.5" E, 24 May 2023, *J.M. Kocjan, A. Jakob, H. Więclaw & Jac. Koopman s.n.* (Herb. Jac. Koopman, ZAGR).

***Carex × leutzii* Kneuck. [*C. hostiana* × *C. lepidocarpa*] (Fig. 2E)**

Distribution: Europe: Belarus, Belgium, Czech Republic, Estonia, Finland, Germany, Italy, Latvia, Lithuania, Norway, Poland, Slovakia, Slovenia, Sweden, Switzerland, United Kingdom.

References: Jermy et al. (2007), Więclaw and Koopman (2013), Więclaw (2014).

Specimens examined: Lika, near Plaški, 45°4'31.8" N, 15°20'48.4" E, 386 m, mire, 20 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman, SZUB); Flora croatica, In pratis humidis hic inde, *J.C. Schlosser s.n.* (ZA 7267); Karlovac County, Plaški, near Dretulja spring, 45°4'31.8" N, 15°20'48.4" E, 21 Jun 2023, *S. Bogdanović s.n.* (ZAGR).

***Carex × oberrodensis* B.Walln. [*C. elata* × *C. randalpina*]**

Distribution: Europe: Austria, Italy.

This hybrid was only mentioned, but not found, during investigation of *C. randalpina* communities in the River Krapina valley by Stančić (2009). However, we could confirm its current occurrence in Croatia from one site.

Reference: Wallnöfer (1993).

Specimen examined: Karlovac County, Draganići gas station, Ribnjaci Draganići, along the channel, 45°33'30.6" N, 15°36'35.1" E, 7 Apr 2024, *S. Bogdanović & S. Čato s.n.* (ZAGR).

***Carex × oenensis* A.Neumann ex B.Walln. [*C. acuta* × *C. randalpina*] (Fig. 2F)**

Distribution: Europe: Austria, Germany, Italy, Slovenia.

Reference: Wallnöfer (1993).

Specimens examined: Nature Park Lonjsko polje, N of Mužilovčica, wet meadow along the forest edge, 45°25'47.6" N, 16°41'31.4" E, 23 Apr 2024, *S. Bogdanović & M. Temunović s.n.* (ZAGR); Žumberak, Bukovac Svetojanski, wet meadow along stream Žumberačka reka, 45°42'17.48" N, 15°35'10.79" E, 9 May 2024, *S. Bogdanović & I. Ljubičić s.n.* (ZAGR).

***Carex × prolixa* Fr. [*C. acuta* × *C. elata*]**

Distribution: widespread in Europe: Austria, Belarus, Belgium, Bosnia and Herzegovina, Czech Republic, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Montenegro, Netherlands, Poland, Russia, Slovakia, Slovenia, Sweden, United Kingdom.

References: Jermy et al. (2007), Koopman et al. (2022).

Specimen examined: Lika, Ličko Lešće, near Hotel Gacka, margin of bog, 44°48'47.5" N, 15°19'07.4" E, 17 Jun 2023, *S. Bogdanović s.n.* (ZAGR).

***Carex × pseudoaxillaris* K. Richt. [*C. otrubae* × *C. remota*]**

Distribution: Europe: Austria, Belgium, France, Germany, Italy, Ireland, Netherlands, Poland, Romania, Slovakia, United Kingdom.

Carex × pseudoaxillaris was found in Croatia only at one site, in two clumps, together with its parental species.

References: Jermy et al. (2007), Koopman et al. (2023).

Specimen examined: Posavina, Turopoljski Lug, *Quercus robur* wood, broadleaved forest border, in ditch along road, 45°38'12.2" N, 16°12'29.3" E, 125 m, 21 May 2023, *H. Więclaw, J.M. Kocjan & Jac. Koopman s.n.* (Herb. Jac. Koopman, ZAGR).

***Carex × subviridula* Fernald [*C. flava* × *C. oederi*]**

Distribution: widespread in Europe: Austria, Belarus, Belgium, Bulgaria, Estonia, Finland, France, Germany, Latvia, Lithuania, Norway, Poland, Romania, Russia, Sweden, Switzerland.

This hybrid grows often together with both parental species.

References: Więclaw (2014), Więclaw and Wilhelm (2014).

Specimen examined: Flora Croatica: Lika, Gospić, Divoselo, 16 Jun 1961, *I. Horvat s.n.* (ZAHO).

***Carex × villacensis* Kük. [*C. fritschii* × *C. pilulifera*]**

Distribution: Europe: Austria, Czech Republic.

This is a very rare hybrid in the European flora, known so far only from Austria and the Czech Republic. This taxon has been found for the first time in Croatia in Gorski Kotar (Fig. 2G). *Carex × villacensis* was described by Kükenthal (1929: 35) from Villach, a town in Carinthia in S Austria. After herbarium research on the type material, deposited in several herbaria (B, BP, BR, P, MW, NY, and WU), we noticed that the name *C. × villacensis* had not been

typified yet. Therefore, we designate here a lectotype from B herbarium that is in accordance with the description provided in the protologue by Kükenthal (1929):

Lectotype (designated here): AUSTRIA. Villach, in praesilvae prope Lind, 9 Jun 1928, G. Kükenthal s.n. (B!).

References: Kükenthal (1929), Řepka (1992).

Specimens examined: Liburnijski krš, Gorski Kotar, Trstenik, ombrotrofni cret u sukcesiji, 11 Jul 2007, 45°29'22.7" N, 14°27'19.4" E, B. Berković & Ž. Modrić s.n. (NHMR 521); Liburnijski krš, Gorski Kotar, Trstenik, travnjak, 25 Jun 2007, 45°29'29.6" N, 14°27'14.8" E, Ž. Modrić s.n. (NHMR 518); Liburnijski krš, Gorski Kotar, Trstenik, ombrotrofni cret u sukcesiji, 11 Jul 2007, 45°29'21.1" N, 14°27'18.9" E, B. Berković & Ž. Modrić s.n. (NHMR 515); Gorski Kotar, NE of Klana, Ovčije, edge of wet grassland, 45°28'15.42" N, 14°24'10.26" E, 1 Jun 2024, S. Bogdanović s.n. (NHMR, ZAGR); Gorski Kotar, NE of Klana, Gumance, grassland, 45°30'23.58" N, 14°25'33.1" E, 1 Jun 2024, S. Bogdanović s.n. (ZAGR).

Carex × *xanthocarpa* Degl. [*C. flava* × *C. hostiana*] (Fig. 2H)

Distribution: widespread in Europe: Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, United Kingdom.

References: Jermy et al. (2007), Więclaw and Koopman (2013), Więclaw (2014), Koopman et al. (2022).

Specimens examined: Lika-Senj County, NW of Korenica, 44°46'33.3" N, 15°40'54.5" E, 685 m, mire, 19 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, SZUB); Karlovac County, Jezero, SE of Plaški, 45°5'47.5" N, 15°21'15.6" E, 380 m, wet meadow with *Scilla litardierei*, 20 May 2023, H. Więclaw, J.M. Kocjan & Jac. Koopman s.n. (Herb. Jac. Koopman, SZUB); Karlovac County, Plaški, near Dretulja spring, 45°4'42.4" N 15°20'42.6" E, 21 Jun 2023, S. Bogdanović s.n. (ZAGR).

Conclusions

Currently the genus *Carex* in the Croatian flora comprises 91 species with certainty, including 26 subspecies and eleven varieties, as well as eleven hybrids. Of these 91 species 75 were confirmed by our research, as well as all the eleven hybrids. Three species are represented by two subspecies: *Carex distachya* (*C. distachya* subsp. *distachya* and *C. distachya* subsp. *phyllostachioidea*), *Carex flacca* (*C. flacca* subsp. *flacca* and *C. flacca* subsp. *erythrostachys*), and *C. nigra* (*C. nigra* subsp. *nigra* and *C. nigra* subsp. *juncea*). All the other lower taxa concern the nominotypical ones. In total, six new *Carex* taxa for Croatia were found during our research: *C. aterrima* subsp. *aterrima*, *C. distachya* subsp. *phyllostachioidea*, *C. depressa* subsp. *transsilvanica*, *C. nigra* subsp. *juncea*, *C. pairae*, and *C. secalina*, as well as eleven new *Carex* hybrids.

Only some very old herbarium specimens of the following seven species, *C. arenaria*, *C. diandra*, *C. frigida*, *C. melanostachya*, *C. pauciflora*, *C. stenophylla*, and *C. supina*, have been found; in the case of *C. frigida* there is only one old herbarium sheet, without any precise location and year of collection. It was not possible recently to confirm in the field the occurrence of these seven species in Croatia. In herbaria there was no *C. dioica* material. We therefore believe that the eight species listed above should be considered dubious for the current flora of Croatia. Their status, historical and chorological notes in Croatia will be published in a separate article. Although older herbarium specimens of *C. bohémica* were found in ZA herbarium, the species was recorded recently in the eastern part of Croatia by Topić (1989), Csiky and Purger (2008), and Rožac et al. (2018). The situation regarding *C. disticha* is very similar, with, only one old herbarium specimen being found, confirmed recently for the Island of Krk by Starmühler (2004, 2006) and by Rotensteiner (2024). *Carex limosa* seems to be extinct in Croatia, as the only available collection dates back to the 19th century. Finally, *C. egorovae* Molina Gonz., Acedo & Llamas from the *C. divulsa* aggregate, is mentioned from the National Park Paklenica on Mt Velebit in Croatia (WU 0044091!) by Molina et al. (2008b). All our newly collected material from the National Park Paklenica and Mt Velebit clearly belongs to *C. leersii*. All revised herbarium material in B, BP, CNHM, ZA, ZAGR and ZAHO belongs without any doubt to *C. leersii*, too. Further attention has to be paid to *C. egorovae* during future fieldwork.

Koopman (2022) mentioned two *Carex* hybrids for Croatia, *C. × rossiana*, erroneously as *C. caryophyllea* × *C. halleriana*, and *C. halleriana* × *C. michelii*. The former turned out to be *C. depressa* subsp. *transsilvanica*, see above, while the latter was actually found just on the other side of the border in Romania. Therefore, counted in the current *Carex* flora of Croatia are the eleven hybrids discussed above.

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Appendix: The genus *Carex* in Croatia

List of all currently known *Carex* taxa in Croatia, including hybrids. Taxa in bold were confirmed during fieldwork research (May–October 2023, April–August 2024). Underlined taxa were only confirmed through herbarium research. H NEW – taxa found in herbarium research in 2023–2024; F NEW – taxa found during fieldwork research (May–October 2023, April–August 2024); D? – doubtful taxa, as herbarium material is missing and the taxon could not be found during our fieldwork; D! – doubtful taxa, as no location is given in the herbarium collection(s); not found during our fieldwork either; † – extinct from the flora.

1. *C. acuta*
2. *C. acutiformis*
3. *C. alba*
4. *C. appropinquata*
5. *C. arenaria*
6. *C. aterrima*
6.1. *C. aterrima* subsp. *aterrima*, F NEW
7. *C. atrata*
7.1. *C. atrata* subsp. *atrata*
8. *C. bohemica*
9. *C. brachystachys*
10. *C. brizoides*
11. *C. buekii*
12. *C. canescens*
12.1. *C. canescens* subsp. *canescens*
13. *C. capillaris*
13.1. *C. capillaris* subsp. *capillaris*
14. *C. caryophyllea*
14.1. *C. caryophyllea* var. *caryophyllea*
15. *C. cespitosa*
15.1. *C. cespitosa* var. *cespitosa*
16. *C. davalliana*
17. *C. demissa*
17.1. *C. demissa* subsp. *demissa*
18. *C. depauperata*
19. *C. depressa*
19.1. *C. depressa* subsp. *transsilvanica*, H NEW
20. *C. diandra*
21. *C. digitata*
22. *C. dioica*, D?
23. *C. distachya*
23.1. *C. distachya* subsp. *distachya*
23.2. *C. distachya* subsp. *phyllostachioidea*, H NEW
24. *C. distans*
24.1. *C. distans* subsp. *distans*,
25. *C. disticha*
26. *C. divisa*
27. *C. divulsa*
28. *C. echinata*
28.1. *C. echinata* subsp. *echinata*
29. *C. egorovae*
30. *C. elata*
30.1. *C. elata* subsp. *elata*
31. *C. elongata*
32. *C. ericetorum*
33. *C. extensa*
34. *C. ferruginea*
35. *C. firma*
36. *C. flacca*
36.1. *C. flacca* subsp. *flacca*
36.2. *C. flacca* subsp. *erythrostachys*
37. *C. flava*
38. *C. frigida*, D!?
39. *C. fritschii*
40. *C. halleriana*
41. *C. hirta*
42. *C. hordeistichos*
43. *C. hostiana*
44. *C. humilis*
44.1. *C. humilis* var. *humilis*
45. *C. illegitima*
46. *C. kitaibeliana*
46.1. *C. kitaibeliana* var. *kitaibeliana*
47. *C. lasiocarpa*
47.1. *C. lasiocarpa* var. *lasiocarpa*
48. *C. leersii*
49. *C. lepidocarpa*
49.1. *C. lepidocarpa* subsp. *lepidocarpa*
50. *C. leporina*
51. *C. limosa*, †

52. *C. liparocarpos*
52.1. *C. liparocarpos* subsp. *liparocarpos*
53. *C. melanostachya*, D!?
54. *C. michelii*
55. *C. montana*
56. *C. mucronata*
57. *C. muricata*
57.1. *C. muricata* subsp. *muricata*
58. *C. nigra*
58.1. *C. nigra* subsp. *juncea*, F NEW
58.2. *C. nigra* subsp. *nigra*
59. *C. oederi*
59.1. *C. oederi* var. *oederi*
60. *C. ornithopoda*
60.1. *C. ornithopoda* subsp. *ornithopoda*
61. *C. otrubae*
62. *C. pairae*, H NEW
63. *C. pallescens*
64. *C. panicea*
65. *C. paniculata*
65.1. *C. paniculata* subsp. *paniculata*
66. *C. pauciflora*
67. *C. pendula*
68. *C. phyllostachys*
69. *C. pilosa*
70. *C. pilulifera*
70.1. *C. pilulifera* subsp. *pilulifera*
71. *C. praecox*
72. *C. pseudocyperus*
72.1. *C. pseudocyperus* var. *pseudocyperus*
73. *C. pulicaris*
74. *C. punctata*
74.1. *C. punctata* var. *punctata*
75. *C. randalpina*
76. *C. remota*
76.1. *C. remota* subsp. *remota*
77. *C. riparia*
78. *C. rostrata*
78.1. *C. rostrata* var. *rostrata*
79. *C. rupestris*
79.1. *C. rupestris* subsp. *rupestris*
80. *C. secalina*
80.1. *C. secalina* var. *secalina*, H NEW
81. *C. sempervirens*
82. *C. spicata*
82.1. *C. spicata* subsp. *spicata*
83. *C. stenophylla*
83.1. *C. stenophylla* subsp. *stenophylla*
84. *C. strigosa*
85. *C. supina*
85.1. *C. supina* var. *supina*
86. *C. sylvatica*
86.1. *C. sylvatica* subsp. *sylvatica*
87. *C. tomentosa*
88. *C. umbrosa*
88.1. *C. umbrosa* subsp. *umbrosa*
89. *C. vesicaria*
90. *C. vulpina*
91. *C. vulpinoidea*, [Introduced]
92. *C. × alberti* [*C. flacca* × *C. panicea*], F NEW
93. *C. × alsatica* [*C. demissa* × *C. flava*], F NEW
94. *C. × auronensis* [*C. acuta* × *C. acutiformis*], F NEW
95. *C. × leutzii* [*C. hostiana* × *C. lepidocarpa*], F NEW
96. *C. × oberrodensis* [*C. elata* × *C. randalpina*], F NEW
97. *C. × oenensis* [*C. acuta* × *C. randalpina*], F NEW
98. *C. × proluxa* [*C. acuta* × *C. elata*], F NEW
99. *C. × pseudoaxillaris* [*C. otrubae* × *C. remota*], F NEW
100. *C. × subviridula* [*C. flava* × *C. oederi*], H NEW
101. *C. × villacensis* [*C. fritschii* × *C. pilulifera*], F NEW
102. *C. × xanthocarpa* [*C. flava* × *C. hostiana*], F NEW