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Carex juniperorum (Cyperaceae), a New Species from Northeastern North America, with a Key to Carex sect. Phyllostachys

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Abstract. Carex juniperorum, a distinctive new species of sect. Phyllostachys, is described. Carex juniperorum occurs in shallow, calcareous soil in open red-cedar woodland and associated glades in Ontario, Ohio, and Kentucky. Section Phyllostachys is lectotypified and a key is provided for the six known species. Carex juniperorum is most closely related to C. jamesii and C. willdenowii but differs from both of these species by its shorter culms 2–6.5 cm tall, shorter perigynium beaks 1.4–2.1 mm long, and pistillate scales lacking hyaline margins.

Mackenzie (1935) noted that Carex L. sect. Phyllostachys (J. Carey) L. H. Bailey (as sect. "Phyllostachyeae") consists of "four species of dry woodlands, exclusively confined to North America, north of Mexico" and commented further that it is "a very strongly marked group." Mackenzie's comments hold true except that five species are now known; the four Mackenzie treated, C. willdenowii Willd., C. jamesii Schwein., C. backii Boott, and C. saximontana Mack., as well as C. latebracteata Waterfall (1954).

The section is certainly "strongly marked." Striking diagnostic features such as the foliaceous pistillate scales and the few-flowered, solitary, androgynous spikes on basal peduncles which are strongly dilated at the apex (Crins 1990) impart a unique appearance to the group. The section is not obviously closely related to any other group of Carex and is apparently cohesive and natural. In a phylogenetic analysis, Crins (1990) showed that the section could be divided into two groups of species: one, consisting of C. backii, C. saximontana, and C. latebracteata characterized by wide leaves, few staminate flowers, wide pistillate scales, and thick, clavate stigmas, the other, consisting of C. jamesii and C. willdenowii characterized by narrow leaves, numerous staminate flowers, narrow pistillate scales, and thin, flexuous stigmas.

While studying the composition of the vegetation of red-cedar (Juniperus virginiana L.) woodlands surrounding alvar openings on the Napanee limestone plain of southeastern Ontario, several specimens of a cespitose sedge clearly belonging in Carex sect. Phyllostachys were found. These plants, however, differed from the other species of the section present in Ontario (C. backii, C. jamesii, and C. willdenowii), and also could not be placed with any other known species of this section. The affinity of these distinctive plants was clearly with the group of species including C. jamesii and C. willdenowii, as defined by Crins (1990). Similarly distinct plants were also found in Ohio by A. W. Cusick. Here we present the results of a morphological and distributional study of these distinctive plants resulting in the description of a new species.

Materials and Methods

More accurate information on the habitat and range was needed since the Napanee limestone plain of eastern Ontario is not a region known for endemics. Following the discovery of the Ontario population and an indication that similar plants occur in Ohio, we checked comparable habitats (edges of natural openings where
the soil was a shallow clay over limestone rock) in both areas and in the region between these two occurrences, and to the north. In addition, many herbaria were searched, including BKL, CAN, DAO, GH, HAM, MICH, MO, MU, NY, NYS, TRT, TRTE, UBC, US, and VDB. A key to the species of the sect. Phyllostachys and a distribution map of the new taxon were prepared based on examination of these herbarium materials and specimens collected in Kentucky, Ohio, and Ontario.

RESULTS AND DISCUSSION

The original site in Ontario discovered in 1989 (the type locality) contained over 1000 plants. Additional stations were discovered 0.2 km N of the type locality, where 15 plants occurred, and 2 km W, where ca. 600 plants occurred. Four stations were discovered in southern Ohio and five were discovered in northern Kentucky. At all of the Ohio and Kentucky stations, the plant was abundant with populations of at least several hundred individuals. Extensive searching in western New York on the limestones near Watertown and in the Niagara Frontier region did not reveal the plant, nor was it found in limestone areas of northern Ohio, southwestern and south-central Ontario, and southern Michigan.

Despite the fact that only two relatively small regions of occurrence were discovered, they were sufficiently far apart to encompass a broad area. With the exception of the plants from Kentucky and Ohio averaging slightly larger than those from Ontario, there was remarkable morphological uniformity among the stations.

The fact that the plant was not found in field reconnaissance over a large geographical area, nor in herbarium material examined, suggests that it is a highly localized species, and probably quite rare. We have not found material of the new taxon filed with the species it most closely resembles such as various species in sect. Acrocystis Dumort., nor other species in sect. Phyllostachys including C. backii, C. jamesii, and C. wildenowii. We have not seen any collections made prior to 1986.

Although additional material of the new taxon could not be found among the herbarium material examined, the field reconnaissance did produce thousands of plants from widely separated localities. The uniformity of the plants and their distinctive features clearly justified recognition of the new species proposed below. The following key summarizes distinctions among the species in the section and is the first key to the entire section since Mackenzie (1935).

KEY AND TAXONOMIC TREATMENT


1. Widest leaves 6–15 mm wide, very glaucous .............................................. C. latebracteata

1. Widest leaves 2–5.5 mm wide, ± green.

2. Lowest pistillate scales 2.4–4.5 mm wide, much wider than perigynia, appressed against and essentially concealing them; stigmas straight or convolute, essentially smooth (papillae minute); stamine flowers 2–4 per spike.

3. Perigynia 3.8–4.7 mm long; beaks 0.5–1 mm long; anthers 0.9–1.2 mm long .............................................. C. saximontana

3. Perigynia 4.5–6.2 mm long; beaks 1.5–2.5 mm long; anthers 1.2–1.8 mm long .............................................. C. backii

2. Lowest pistillate scales 1.2–2.5 (3) mm wide, not more than 1.5 times as wide as perigynia, spreading and not concealing them; stigmas flexuous, conspicuously papillate; stamine flowers 5–25 per spike.

4. At least the uppermost pistillate scales with broad, hyaline margins; tallest culms (6) 8–30 (40) cm; perigynium beaks (1.5) 2–5.5 mm long.

5. Perigynia (3) 4–9 per spike; achenes 1.5–2 times as long as wide; staminate scales obtuse to acute .............................................. C. wildenoswii

5. Perigynia 2–3 (4) per spike; achenes 1–1.5 times as long as wide; staminate scales ± truncate .............................................. C. jamesii

4. All pistillate scales lacking hyaline margins; tallest culms 2–6.5 (8.5) cm; perigynium beaks (1.2) 1.4–2.1 mm long .............................................. C. juniperorum

Carex juniperorum Catling, Reznicek, and Crins, sp. nov. (Fig. 1).—Type: Canada, Ontario, Hastings Co., Tyendina Twp, S side of Hwy. 401, E of Wyman Rd., 7 km NE of Shannonville, 9 June 1991, Catling 9100 (holotype: DAO; isotypes: B, BM, BUF, CM, F, GENT, GH, K, KE, KNK, KY, MICH, MO, MSC, NY, NYS, OS, P, QK, TRT, TRTE, US, VSC).
Planta valde cespitoseae, culmi 2–6.5 (8.5) cm alta; vaginae basales rubiginosae, glabrae. Folia 4–8; laminae 5–28 cm longae, 2–4 (5) mm latae; vaginae 2–3.5 cm longae, glabrae, zonis interi-ribus vaginarum hyalinis vel rubiginosimacularis. Inflorescentia ex 1–4 pedunculis basiliibus spicis androgynis solitariis folii absconditis constructa. Squamae pistillatae (7) 11–29 (38) mm longae, 1.2–2.5 (3) mm latae; squamae stami-natae 0.1–0.5 mm longae, 0.8–1.2 mm latae. Perigynia 3.8–5.1 mm longa, 1.5–2 mm lata, sub-teretia, viridia interdum rubiginosimaculara, glabra, in rostrum contracta; rostra (1.2) 1.4–2.1 mm longa, 0.6–1 mm lata, serralata. Achenium 1.9–2.5 mm longum, 1.5–2 mm latum. Stigmata 3. Antherae 3, 1–1.5 mm longae.

Plants densely cespitose, with rhizomes up to 3 mm long between adjacent shoots; roots brown, the younger with a sparse to moderate covering of hairs 0.16–0.48 mm long; culms 2–6.5 (8.5) cm high, with 2–3 (4) glabrous reddish-brown bladeless basal sheaths. Leaves 4–8; blades 5–28 cm long, 2–4 (5) mm wide, plicate to flat, leathery, glabrous, green, margins antrorsely serrulate distally; leaf sheaths 2.3–3.5 cm long, tightly enveloping culm, glabrous, lower reddish-brown on back, upper reddish-brown basally to brown, green, or whitish; inner band hylane, varying in color with the back but also sometimes red-dotted near slightly concave, flat, or slightly convex, thickened apex; ligules of lower leaves truncate or even concave or emarginate, those of inner leaves triangular and up to 3 mm long. Vegetative shoots 8–30 cm tall; pseudoculms 1.5–6.5 cm high and 1–2.5 mm wide, with 2–4 dark reddish-brown bladeless basal sheaths; leaves 5–8; blades up to 40 cm long, 0.9–3 mm wide, otherwise similar to those of fertile culms. Inflorescence of 1–4 erect basal peduncles of varying lengths, each with a solitari androgynous spike, arising centrally from a pseudoculm of the previous year and ± hidden among the leaves; peduncles 1.2–6.5 (8.5) cm long, filiform near base, 0.9–1.9 mm wide in expanded distal portion, triquetrous, smooth except for antrorsely serrulate, winged angles. Spikes 5–13 mm long, with (2) 1–3 pistillate flowers and (5) 7–15 (21) staminate flowers. Lower pistillate scales (7) 11–29 (38) mm long, 1.2–2.5 (3) mm wide, spreading and not concealing perigynia, leaf-like, long-acute, serralate-margined, green, 6–8-veined, leathery; upper much reduced. Stamine scales 0.1–0.5 mm long, 0.8–1.2 mm wide, encircling rachis and connate basally, truncate to obtuse, sometimes mucronate, whitened on erose-ciliate apex, brown or reddish-brown with a green center below, essentially nerveless. Perigynia 3.8–5.1 mm long, 1.5–2 mm wide, ascending, nearly terete in cross-section and tightly investing achene, green, becoming whitish-green in fleshy basal portion, sometimes red-flecked, glabrous, sessile, 2-veined, contracted abruptly into beak; beak ± flattened, (1.2) 1.4–2.1 mm long, 0.6–1 mm wide near base and gradually tapering to apex, serralate-edged, reddish-brown below pale whitish-brown bidentate or flat tip. Achene 1.9–2.5 mm long, 1.5–2 mm wide, terete, dark brown at maturity with a prominent, enlarged, pale brown stipitate base ca. 0.3–0.5 mm long. Styles thickened at base, articulated in a depression on top of achene; stigmas 3, elongate and prominently papillose. Anthers 3, 1–1.5 mm long.

The specific epithet “juniperorum,” (“of the junipers”) is given in recognition of this species’ close association with Juniperus virginiana.

Distribution (Fig. 2). Eastern Ontario and southern Ohio and adjacent Kentucky, on clayey soils derived from crumbling limestone bedrock in open woodlands with J. virginiana and Quercus spp. surrounding natural glade, alvar, or prairie openings.

Phenology. Flowering and fruiting in April and May in the southern portion of the range, fruiting extending to June in the northern stations.

Additional specimens examined. CANADA. Ontario: Hastings Co., Tyendinaga Twp., Salmon River Alvar, 7 km NE of Shannonville, 26 June 1989, Catling & Catling s.n. (MICH), 14 June 1990, Catling 8205 (DAO, UBC, herbarium W. J. Crins), N of quarry, W of Salmon River, 5.5 km NE of Shannonville, 11 June 1991, Catling 9102 (DAO, MICH, TRTE), S of Hwy. 401, E of Wyman Rd., ca. 7 km E of Shannonville, 9 June 1991, Catling 9101 (DAO).

Fig. 2. Distribution of Carex juniperorum.


Comments. Carex juniperorum is typically abundant in its habitats and is one of the major dominants of the ground layer. An associated dominant at all sites was Danthonia spicata (L.) P. Beauv. At the type locality and nearby Ontario stations, the herb layer was additionally dominated by Aster cordifolius L., C. siccata Dewey, C. pensylvanica Lam., C. umbellata Wild., Comandra ey, C. spithamea, (L.) Nutt., Fragaria virginiana Mill. var. virginiana, Hieracium piloselloides Vill. and Poa compressa L. Among the other species present were several with rather restricted distributions in eastern Ontario, including Calystegia spithamea (L.) Pursh ssp. spithamea, Carex backii, C. richardsonii R. Br., Geum triflorum Pursh, Hedysotis longifolia (Gaertn.) Hook., Monarda fistulosa L., Oenothera perennis L., and Potentilla canadensis L. At the Ontario sites, Juniperus communis L., Rhamnus cathartica L. and Rhus aromatica Aiton were frequent shrubs. The pH of the soil ranged from 7.0 to 7.8, and the soil was almost completely covered by the moss Thuidium abietinum (Hedw.) Bruch, Schimp. & Gümbel. with some Brachythecium sp.

Locally, in the Ohio and Kentucky sites, Schizachyrium scoparium (Michx.) Nees, Carex meadii Dewey, Hypoxis hirsuta (L.) Coville, Liatris spp., Silphium terebinthinaceum Jacq., and Sisyrinchium albidum Raf. were frequent associates. Soils were calcareous, with pH 6.8 and 6.7 and Ca++ concentrations 2080 and 1720 ppm respectively in two sites sampled (vouched by Reznicek 8742 and 8754, respectively). The habitat is moist in early spring and becomes quite dry in summer. As with the Ontario stations, there was a significant moss layer, including Thuidium abietinum, T. delicatulum (Hedw.) Mitt., T. recognitum (Hedw.) Lindb., Bryandersonia illecebra (Hedw.) H. Rob., Campyllum chrysophyllum (Brig.) Lange, and Fissidens cristatus Mitt. Recently, Boettcher and Kallisz (1991) have published a detailed soil and vegetation study of a characteristic habitat of Carex juniperorum in Ohio.

With its 4-9 perigynia per spike, coriaceous leaves, and truncate to rounded, often brownish, thickened, entire ligules, Carex juniperorum is similar to C. willdenowii. Carex jamesii has fewer perigynia per spike, softer leaves and the ligules are hyaline, rounded to nearly acute, and ciliate. On the other hand, the perigynium and stamineate scale morphology are similar to those of C. jamesii rather than those of C. willdenowii. The lack of a hyaline border to the pistillate scales of C. juniperorum is different from both C. jamesii and C. willdenowii, although similar to the scales of the C. backii group. The extremely short culms are unique, though approached in C. willdenowii var. megarrhyncha F. J. Herm. Consequently C. juniperorum is a very distinct taxon. However, it is easily overlooked because its fruit ripens very early and the culms are hidden at ground level well below the leaves, and sometimes within the moss mat.

The recent discovery of this distinctive new species in a supposedly botanically well-known area suggests that even the flora of northeastern North America is not as well-known as is commonly supposed. This species has now been collected from 12 sites. Fortunately, three of the Ohio sites, the Chaparral Prairie Preserve, Adams Lake State Park, and the Lynx Prairie Preserve (E. Lucy Braun Preserve), are protected natural areas, and thus the prospects for the continued survival of this species appear good.

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