Notes on Carex (Cyperaceae) from China: three new species

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Abstract

Carex remotistachya, C. daxinensis and C. fangiana, three new species from China, are described and illustrated. Carex remotistachya resembles C. doniana (sect. Molliculae), differing by having spikes remote, staminate spikes with a 3–5 cm long peduncle at the base, leaves 3–6 mm wide, and stigmas shorter than perigynia. Carex daxinensis is similar to C. caudispicata (sect. Radicales), but differs in having perigynia ellipsoid-ovoid, 4–4.5 mm long, staminate parts of spikes shorter than pistillate ones, and leaves 2–3.5 mm wide. Carex fangiana is similar to C. nitidiutriculata (sect. Hymenochlaenae), differing by having leaves 6–9 mm wide, staminate spike solitary, and perigynia glabrous.

Key words: Carex daxinensis, C. fangiana, C. remotistachya, Cyperaceae, new species, taxonomy

Introduction

The genus Carex Linnaeus (1753: 972), a group of perennial grass-like plants, contains four subgenera: subg. Vigneastra (Tuckerman 1843: 10) Kükenthal (1899: 516), subg. Vignea (B. Beauvois in T. Lestiboudois 1819: 22) Petermann (1849: 602), subg. Psyllophora (Degland 1828: 285) Petermann (1849: 581) and subg. Carex (Waterway & Starr, 2007). Recent studies show these subgenera to be largely polyphyletic or paraphyletic, with the exception of subg. Vignea (Waterway & Starr, 2007). In China, the genus is represented by 527 species, of which 260 species are endemic (Dai et al., 2010). It is one of the largest genera of seed plants in China (Wu et al., 2011).

Our ongoing field collection and specimen examination in China have resulted in the discovery of fourteen new taxa of Carex (Jin 2009, Jin & Zheng 2008, 2010, Jin et al. 2003, 2004, 2005a, 2005b, 2011, 2012), as well as a few distribution provincial records (Zhao et al. 2011, 2012). In the present paper, we describe three new species from eastern and south-western China, and name them Carex remotistachya, C. daxinensis and C. fangiana. All three are narrow endemics, and may be appropriate for listing as threatened taxa, following IUCN guidelines.

Taxonomic treatment

Carex remotistachya Y. Y. Zhou & X. F. Jin, sp. nov. (Figure 1)

Species nova C. donianae Spreng. affinis est, a qua spikes inter se remotis, spikes staminatis pedunculos 3–5 cm longos gerentibus, foliis 3–6 mm latis, stigmatibus perigyniis brevioribus differt.

Type:—CHINA. Zhejiang Province: Pan’an County, Shanghu Township, Sanhuang, 120º36’18.75”E, 29 º07’17.09”N, along stream beside forests, elevation 450 m, 16 May 2012, X. F. Jin 2872 (holotype HTC!, isotype ZM!).

Perennial herbs. Rhizomes indurate, with slender stolons. Culms 40–60 cm tall, acutely trigonous, scabrous, with brownish bladeless sheaths at base (aphyllopodic). Leaves shorter than culms, or nearly equal in length; blades 3–6 mm wide, flat, scabrous on upper margins. Involucral bracts leaflike or shortly leaflike, lower ones longer than spikes, uppers nearly equaling spikes, not sheathed. Spikes 3 or 4, remote; terminal spike staminate, clavate, 3–4.5 cm long, ca. 3 mm wide, with a 3–5 cm long peduncle at base; lateral spikes pistillate, cylindrical, 2.5–5 cm long, 6–8 mm wide, densely flowered, the lowest long pedunculate, upper ones shorter. Staminate scales oblong-
oblanceolate, pale brown, 4–4.5 mm long, acute at apex, green 1-veined costa. Pistillate scales oblong-ovate, pale green or whitish green, 2–2.5 mm long, acuminate at apex, green 1-veined costa excrrent into a mucronate. Perigynia longer than pistillate scales, horizontally patent at maturity, ovoid, trigonous, slightly inflated, 3.5–4 mm long, yellowish green, glabrous, distinctly veined, base broadly cuneate, gradually contracted into a short beak at apex; orifice 2-lobed with short teeth. Achenes loosely enveloped, obovoid-ellipsoid, trigonous, castaneous, ca. 1.5 mm long, not stipitate at base; style not thickened at base; stigmas 3, slender, 1.5–2 mm long, persistent.

FIGURE 1. Carex remotistachya Y. Y. Zhou & X. F. Jin, sp. nov. (A) habit, lower part with rhizomes, roots and leaves; (B) inflorescence; (C) staminate scale; (D) pistillate scale; (E) perigynium; (F) achene (drawn by Xiao-Feng Jin from holotype in HTC).
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NOTES ON CAREX (CYPERACEAE) FROM CHINA

Distribution & Habitat:—Endemic to China. The species is known only from Shanghu Township, Pan’an County of central Zhejiang Province (Figure 2). It grows in moist places along streams at ca. 450 m elevation.

Phenology:—Flowers and fruits of Carex remotistachya were collected from mid-May to early June.

Etymology:—The specific epithet refers to the remote spikes, not aggregated at the top of culms.

Additional collections (paratypes):—CHINA. Zhejiang Province: Pan’an County, Shanghu Township, Sanhuang, 120º36’18.75’’E, 29 º07’17.09’’N, along stream, elevation 450 m, 2 June 2012, X. F. Jin 2880 (HTC!), 2881 (HTC!), 2882 (HTC!); the same locality, 17 May 2013, X. F. Jin & Y. Y. Zhou 3016 (HTC!, ZM!), 3017 (HTC!, ZM!).

Similar species:—Carex remotistachya belongs to C. sect. Molliculae Ohwi (1936: 450), characterized by having medium-sized perigynium beaks, rhizomes stoloniferous, spikes densely flowered and perigynia yellowish green or stramineous. It is morphologically similar to C. doniana Spreng. (1826: 825), but differs in having spikes remote, peduncles of staminate spikes 3–5 cm long, leaves 3–6 mm wide, persistent stigmas shorter than perigynia. In contrast, C. doniana has approximate spikes, peduncles of staminate spikes only 0.5–3 cm long, leaves 6–12 mm wide, persistent stigmas nearly equaling to perigynia.

Carex daxinensis Y. Y. Zhou & X. F. Jin, sp. nov. (Figure 3)

Species nova est proxima C. caudispicatae F. T. Wang & Tang ex P. C. Li, a qua perigyniis ellipsoideo-ovoidis, 4–4.5 mm longis, spicae partibus flororum staminatorum e ejus apice exertis, eis flororum pistillatorum brevioribus, foliis 2–3.5 mm latis recedit.

Type:—CHINA. Guangxi Zhuangzu Autonomous Region: Daxin County, Leiping Township, Mt. Xiaoxuan, 107º05’29.18’’E, 22 º38’39.65’’N, in thickets, elevation 220 m, 19 May 2013, X. F. Jin & Y. Y. Zhou 3026 (holotype, HTC!, isotype, ZM!).

Perennial herbs. Rhizomes short, indurate. Culms loosely caespitose, (3-)10–50 cm tall, trigonous, 0.5–1 mm thick, smooth. Leaves longer to slightly shorter than culms; blades 2–3.5 mm wide, flat, stiff, with dark brown sheaths at base. Involutcal bracts linear, nearly equaling or slightly shorter than inflorescence, sheathless. Spikes 1–3,
androgynous, cylindrical, 1–2 cm long, 3–4 mm wide, densely flowered, staminate parts shorter than pistillate ones; lateral spikes exserted from middle part of culms, with erect short peduncles. Staminate scales ovate, ca. 2 mm long, acute at apex, subleathery, green 1-veined. Pistillate scales ovate, ca. 3 mm long, acute at apex, subleathery, membranous at margins, pale green laterally, green 1-veined costa. Perigynia longer than pistillate scales, green, ovoid, trigonous, 4–4.5 mm long, subleathery, distinctly veined, sparsely pubescent at margins, cuneate at base, gradually contracted into a short beak at apex; orifice shortly 2-lobed with minute teeth. Achenes dark brown at maturity, obovoid, compressed trigonous, 2.5–3 mm long, abruptly contracted into a short stipe at base; style slightly thickened at base, trigonous, conic, sparsely pubescent; stigmas 3.

FIGURE 3. Carex daxinensis Y. Y. Zhou & X. F. Jin, sp. nov. (A) habit; (B) staminate scale; (C) pistillate scale; (D) perigynium; (E) achene (drawn by Xiao-Feng Jin from holotype in HTC).
Distribution & Habitat:—Endemic to China. The species is known from the limestone mountains of the back of Leiping Township, Daxin County of Guangxi Zhuangzu Autonomous Region (Figure 2), and it grows in thickets on slope at 190–260 m elevation.

Phenology:—Flowers and fruits of Carex daxinensis were collected in May.

Etymology:—The specific epithet refers to “Daxin”, the locality of the collection.

Additional collections (paratypes):—CHINA. Guangxi Zhuangzu Autonomous Region: Daxin County, Leiping Township, Mt. Xiaoxuan, 107º05'32.72''E, 22 º38'39.22''N, in thickets on slope, elevation 200 m, 19 May 2013, X. F. Jin & Y. Y. Zhou 3023 (HTC!, ZM!).

Similar species:—Carex daxinensis evidently belongs to C. sect. Radicales (Kükenthal 1909: 480) Nelmes (1951: 389), characterized by having short perigynium beaks, involucral bracts leaf-like, spikes androgynous, styles thickened at base. It is similar to C. caudispicata F. T. Wang & Tang ex P. C. Li (1999: 170) in having leaf-like involucral bracts, leaves and culms stiff, spikes cylindrical, but differs by perigynia ellipsoid-ovoid, 4–4.5 mm long, staminate parts of spikes shorter than pistillate ones, leaves 2–3.5 mm wide. Characters distinguishing C. daxinensis from the related species from China are summarized in the key. The related species distribute from Hengduan Mountains to south-eastern Yunnan, with the exception of C. funhuangshanica F. T. Wang & Tang ex P. C. Li (1999: 168), which indicates this new species is allopatric.

Key to Carex daxinensis and the related species of sect. Radicales in China

1. Leaves subleathery, stiff; culms stiff………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………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FIGURE 4. Carex fangiana X. F. Jin & Y. Y. Zhou, sp. nov. (A) habit; (B) staminate scale; (C) pistillate scale; (D) perigynium; (E) achene (drawn by Xiao-Feng Jin from holotype in SZ).
**Etymology:**—The species is named in honor of Professor Wen-Pei Fang (1899-1983), who devoted his professional life to the study of Chinese *Rhododendron* L. (Ericaceae) and *Acer* L. (Aceraceae). Prof. Fang was one of the early founders of Herbarium of Sichuan University (SZ).

**Similar species:**—*Carex fangiana* belongs to *C.* sect. *Hymenochlaenae* (Drejer 1844: 10) L. H. Bailey (in Coulter 1885: 379), characterized by having long perigynium beaks, culms central, perigynia frequently membranaceous, shiny, style not thickened at base. It is morphologically similar to *C. nitidiutriculata* L. K. Dai (1999: 186), a species endemic to eastern Yunnan of China, but differs in having staminate spike solitary, perigynia glabrous, and leaves 6–9 mm wide. Characters distinguishing *C. fangiana* from *C. nitidiutriculata* are summarized in Table 1.

**TABLE 1.** Diagnostic characters distinguishing *Carex fangiana* from *C. nitidiutriculata*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>C. fangiana</em></th>
<th><em>C. nitidiutriculata</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>leaf</td>
<td>6–9 mm wide, adaxially scabrous</td>
<td>3–5 mm wide, adaxially smooth</td>
</tr>
<tr>
<td>involucral bracts</td>
<td>nearly equaling inflorescence</td>
<td>longer than inflorescence</td>
</tr>
<tr>
<td>staminate spike</td>
<td>solitary, 4–5 cm long</td>
<td>one or two, 1–3 cm long</td>
</tr>
<tr>
<td>perigynium</td>
<td>nearly equaling pistillate scale, brown, glabrous</td>
<td>much longer than pistillate scale, pale yellowish green, spinulose on beak margins</td>
</tr>
<tr>
<td>achene</td>
<td>obovoid</td>
<td>obovoid-ellipsoid</td>
</tr>
</tbody>
</table>

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**References**


