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A New Species and Subspecies of *Carex* L. (Cyperaceae) from Arunachal Pradesh, India

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ABSTRACT: *Carex sanjappae* M. Bhaumik & M.K. Pathak and *Carex speciosa* Kunth ssp. *varmae* M. Bhaumik & M.K. Pathak a new species and subspecies respectively are described and illustrated from Arunachal Pradesh, India. New species *Carex sanjappae* M. Bhaumik & M.K. Pathak belongs to the section 'rarae', characterized by longer spikes, utricle longer, wider and truncate aperture at apex. Comparative analyses of characters of closely related species are given in a table. Whereas new subspecies *Carex speciosa* ssp *varmae* M. Bhaumik & M. K. Pathak is worth recognizing by its longer, strongly hispidulous utricles and narrower leaves. A dichotomous key is provided for easy recognition from other subspecies.

KEY WORDS: Arunachal Pradesh, *Carex*, India, new species, subspecies.

INTRODUCTION

The cosmopolitan genus *Carex* L. represented about 1,800 species mainly in temperate and cold regions of the world (Mabberley, 2008). In India it is represented by 160 species (Karthikeyan *et. al*, 1989) and 43 species from Arunachal Pradesh (Bhaumik, 2009).

In course of our floristic studies in different districts of Arunachal Pradesh, India, several *Carex* L. specimens were collected. After careful analysis and literature studies shows two collections are distinct. So these are described and illustrated here.

The new species *Carex sanjappae* characterised by solitary terminal androgynous spike and stigmas are three. So it comes under C. B. Clarke's Sub Genus II. Eucarex and section Rarae (Clarke, 1894).

Carex eremostachya S.T. Blake apparently looks alike by habit but differs in broader leaf blade, shorter and wider spikes, ovate, longer and wider female glumes, longer and bidentate aperture of utricle. Due to presence of stipe at utricle base it shows some resemblance with *Carex stipitiutriculata* P. C. Li but it differs by much shorter spikes, narrower, needle like leaf blades in comparison to my specimens (Blake, 1947).

Section Rupestres of Flora of China comes close where regressive branch rachilla present at base (Dai et al, 2010). In spite of regressive branch rachilla *C. sanjappae* have strongly nerved utricle and gradually narrowed at base unlike to its section.

Carex speciosa is a polymorphic species and distributed widely in Southeast Asia (Noltie, 1993, 1994; Kern and Nooteboom, 1979). Present state of our knowledge, there are four valid subspecies (Govaerts *et al*., 2010). Two are Sino Himalayan but others are restricted to Thailand. One of our collections does not fit to the so far described subspecies of *C. speciosa*. So it is named as *Carex speciosa* ssp. *varmae* M. Bhaumik & M. K. Pathak and described here.

TAXONOMIC TREATMENTS

Carex sanjappae M. Bhaumik & M. K. Pathak *sp. nov*.
Fig. 1

Carice rarae rhizomate stolonifero, spicis longioribus (1.7-2.5 cm longis), utriculo longiore latioreque (3.2-4 mm longo, 1.3-2 mm lato) stipitato maturitate non effuso, apertura truncata differt.

Carex sanjappae M. Bhaumik & M. K. Pathak *sp. nov*. differs from *C. rara* Boott by stoloniferous rhizome, longer spikes (1.7-2.5 cm), utricle longer and wider (3.2-4 × 1.3-2 mm), stipitate, not spreading at maturity, aperture truncate.

Type: India. Arunachal Pradesh, Mehao Lake, Lower Dibang Valley district, 1,300 m, 17.04.1999, *Bhaumik 2443A-C* (Holotype: CAL, *Bhaumik 2443A*; Isotype: ARUN, *Bhaumik 2443 B-C*). Known only from type locality.

Rhizome stoloniferous, widely spreading, forming mats. Clum 3-11 in each point on rhizome, 15-40 cm tall, strongly trigonous towards apex, angle scabrulous. Leaves lower 3/4 part of the clum, shorter than or just exceeding the inflorescence, flat, grass like, scabrous at margin, 0.8-2 mm broad; bladeless sheath elliptic –

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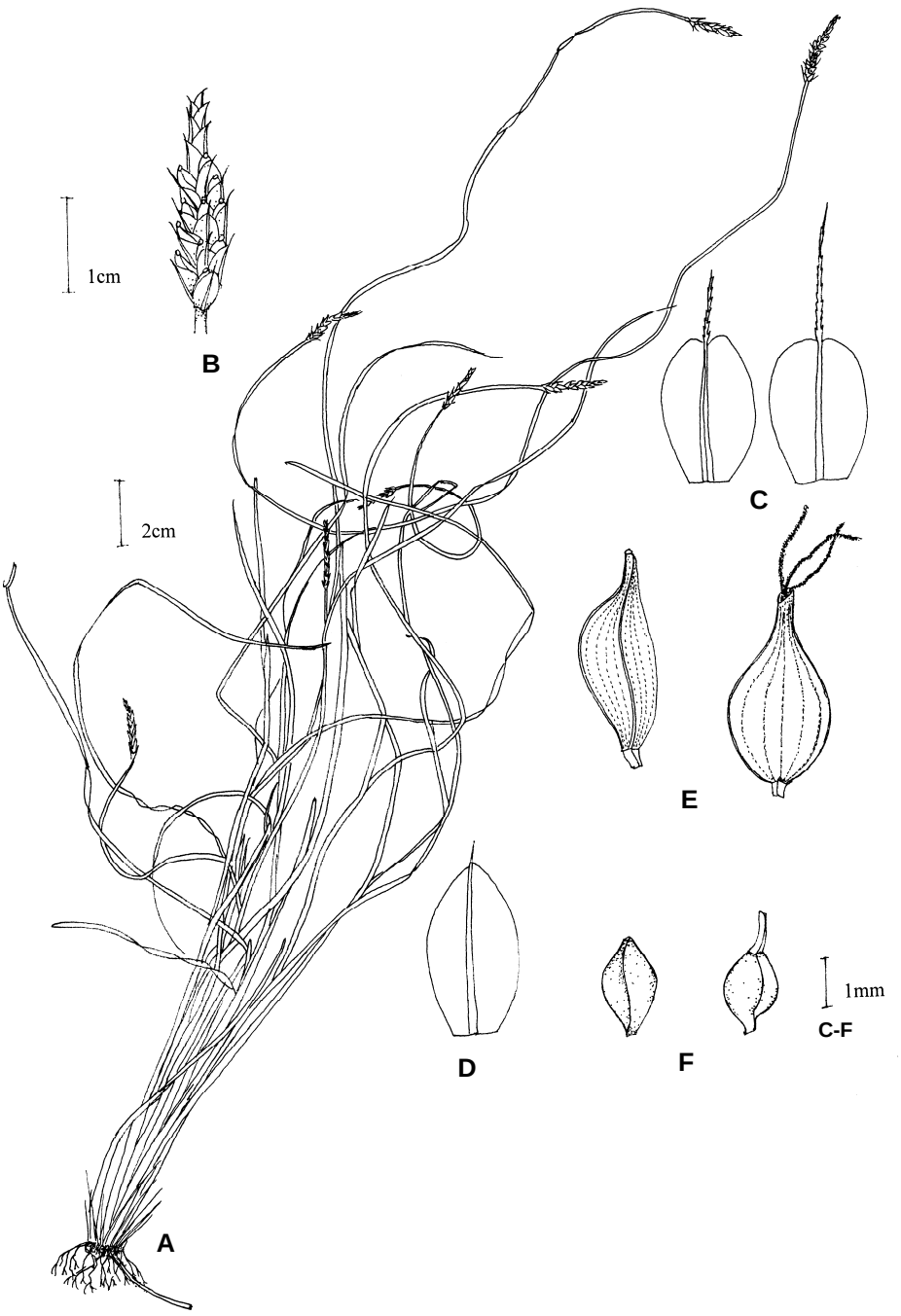


Fig. 1. ***Carex sanjappae*** **M. Bhaumik and M. K. Pathak. A: Habit. B: Spikelet. C: Female glume. D: Male glume. E: Utricle. F: Nutlet.**

lanceolate, acute, glabrous, brown, nerves raised, not disintegrated into fibers. Spikes solitary, erect, terminal, androgynous, 1.7-2.5 cm × 2-3 mm, male part 4-9 mm long, utricle 8-17, moderately densely placed on rachis, one overlapping others. Female glume oblong, 2-3 × 1.8-2.2 mm, excluding awn, truncate to rounded at top, midrib broad, 3-nerved extended into 0.5-2 mm long, scabrid awn. Utricle ellipsoid, obscurely trigonous, stipitate, 3.2-4 × 1.3-2 mm, gradually narrowed into beak, glabrous, membranous, 3-5-nerved on each face, nerves raised, pale yellow, aperture truncate; stigma 3, *c*. 1 mm long. Male glumes elliptic – lanceolate, 3.8-4 ×

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Table 1. Comparison of characters among *Carex sanjappae sp. nov*., *C. rara* and *C. eremostachya*.

Characters	*C. sanjappae*	*C. rara*	*C. eremostachya*
Rhizome	Stoloniferous, prostrate.	Short, slender.	Creeping, prostrate.
Culm	Tufted, 15-40 cm long, trigonous, scabrous.	Tufted, 10-50 cm, trigonous.	20-25 cm long, trigonous, scabrous.
Leaf	Just exceeding inflorescence; blade 0.8-2 mm wide; basal sheath brownish, not becoming fibrous.	Half or as long as culm, setaceous; blade *c*. 0.6 mm wide; basal sheath pale brown, not becoming fibrous.	Exceeding inflorescence; blade 2-2.5 mm wide.
Spike	Solitary, erect, androgynous, 1.7-2.5 cm long, 2-3 mm wide.	Solitary, androgynous, 1.3-2 cm long, 3-4 mm wide.	Solitary, erect, androgynous, ebracteate, 1-1.2 cm long, 5 mm wide.
Female glume	Oblong, 2-3 × 1.8-2.2 mm, excl. awn, truncate to rounded, midrib broad, 3-nerved.	Ovate-obtuse, 1.5-2 × 0.8-1.2 mm.	Ovate, 3.5-4 mm acute to acuminate, 3-nerved, reddish brown.
Male glume	Elliptic-lanceolate, 3.8-4 × 1.5-1.8 mm, membranous, pale yellow.	Ovate-lanceolate, 2-2.5 × 0.8-1mm, acute.	-
Utricle	Ellipsoid, obscurely trigonous, stipitate, 3.2-4 × 1.3-2mm, glabrous, 3-5 strongly nerved on each face, gradually narrowed into beak, aperture truncate.	Ovoid pyramidal, 2-2.8 × 1-1.2 mm, many ribbed, glabrous, spreading, beak short, aperture transverse or scarcely notched.	Suberect, 4.5 × 1.2 mm, membranous, elliptic, trigonous, glabrous, 15-nerved, aperture bidentate.
Nutlet	Oblong, *c*. 2 × 1 mm, strongly trigonous, pale yellow.	Ellipsoid, trigonous, 2-2.5 mm long	Oblong-obovoid, 1.8 × 1.2 mm, acuminate.

1.5-1.8 mm, glabrous, membranous, pale yellow. Nutlet oblong, *c*. 2 × 1 mm, strongly trigonous, pale yellow, covering almost whole part of utricle.

Flowering and Fruiting**:** April – June.

Habitat: Growing on Lake bed. The area annually inundated during rainy season.

Etymology: The species has been named after Dr. M. Sanjappa, ex Director, Botanical Survey of India for his contribution in Indian plant Taxonomy.

A comparative analysis of characters among *Carex sanjappae sp. nov*., *C. rara* and *C. eremostachya* are given in Table 1. Characters of *C. rara* after Clark (1894) and *C. eremostachya* after Blake (1947) and Nelmes (1951). *C. sanjappae* shows longer spikes, utricle longer and wider and truncate aperture at apex. Where as *C. rara* have smaller and narrower utricle and aperture is transverse or scarcely notched. *C. eremostachya* characterized by narrower utricle and aperture is bidentate.

Carex speciosa ssp ***varmae*** M. Bhaumik & M. K. Pathak *ssp. nov*. Fig. 2

A subspeciebus spiculata dilatata et pinetorum utriculis longioribus (5.5-7.8 mm longis) undique valide hispidulis gradatim in rostro (c. 2 mm longo) angustatis, glumis femineis longioribus (4.5-5.2 mm longis) acuminatis differt.

Carex speciosa ssp. *varmae* M. Bhaumik & M. K. Pathak *ssp nov*. differs from *Carex speciosa* ssp. *dilatata* Noltie, *Carex speciosa* ssp. *pinetorum* Noltie by much longer utricles (5.5-7.8 mm), strongly hispidulous in all faces, gradually narrowed into beak (*c*. 2 mm long); female glumes longer (4.5-5.2 mm), acuminate.

Type: India. Arunachal Pradesh, Upper Siang district, Pao to Titapuri Camp, 3,000 m, 10.09.2009, *Bhaumik 13226A*; Sikyak to Kanebango camp, 2,900 m, 08.09.2009, *Bhaumik- 13259A*; Singa-Sitoma camp, 1,800-2,400 m, 21.07.2010, *Bhaumik 36855 A-C* (Holotype: *Bhaumik 13226A*, CAL; Paratype: *Bhaumik 36855A*, CAL and *Bhaumik 13259A & 36855 B-C*, ARUN).

Rhizomes short, stout, not stoloniferous. Plants 50-70 cm tall. Bladeless sheath reddish brown. Leaves mostly basal, 2-3 on upper part of culm, 3-5 mm wide. Culms 45-58 cm long. Inflorescence on upper four nodes; spikes (-5) 7, 1-2 in each nodes, all androgynous, similar, 2.5-4.8 cm long, 2-4 mm wide (excl. peduncle), male part 1-2 cm long, female part 1.5-3 cm long, unequally 1-6 cm long peduncled. Female glumes oblong, 4.2-5.2 × 2-3 mm, acute to aristate, base encircling axis, 1-keeled, glabrous, straw coloured, margins hyaline, membranous. Utricle ellipsoid, strongly trigonous, 5.5-7.8 × 1.2-2 mm, 5-10 nerved in each faces, unequally developed, hirsute all along, angles scabrous, beak 2-3 mm long, aperture shortly notched. Male glumes

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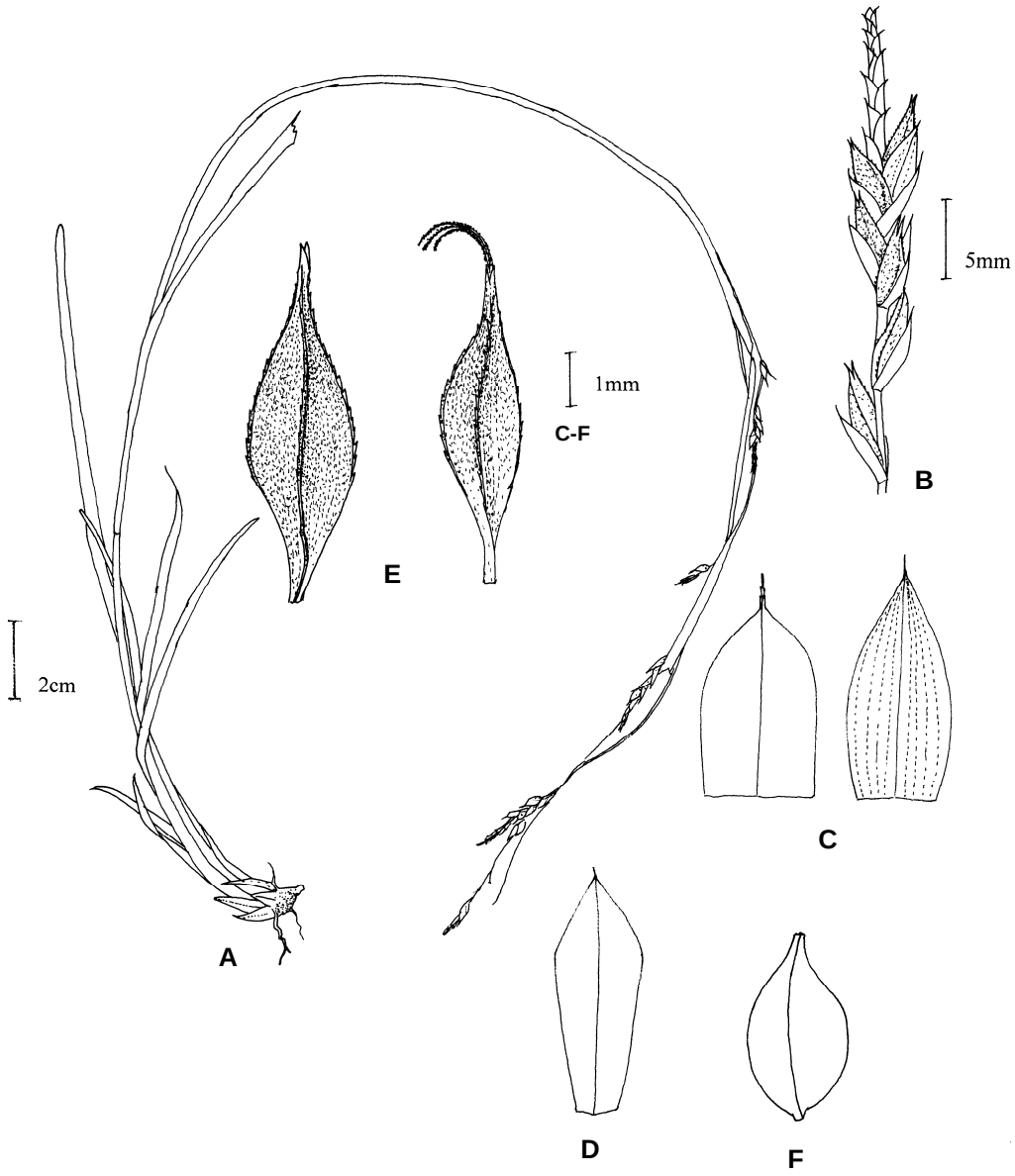


Fig. 2. *Carex speciosa* Kunth ssp. *varmae* M. Bhaumik and M. K. Pathak. A: Habit. B: Spikelet. C: Female glume. D: Male glume. E: Utricle. F: Nutlet.

oblanceolate – lanceolate, 4.2-5 × 1-1.5 mm, acute, brownish yellow, margins hyaline. Nutlet ellipsoid, trigonous, 3.2-3.5 × 1.5-1.8 mm, brownish, glabrous, angles thickened, shortly stalked.

Flowering and Fruiting: August – October.

Habitat: Semi dense temperate forest floor, mainly on forest edges or semi open hill slopes, scattered, common but localized at an elevation of 1,800-3,000 m.

Etymology: The subspecies has been named after Dr. S. K. Varma, Professor of T.M. Bhagalpur University, Bhagalpur, India for his contribution in Indian Cyperaceae.

The new subspecies *Carex speciosa* ssp. *varmae* M. Bhaumik & M. K. Pathak has narrower leaf blades (3-5 mm), much longer utricles (5.5-7.8 mm). Utricles gradually narrowed into beak and strongly hispidulous in all faces. This combination of characters differs from other sub species *viz*. ssp. *dilatata*, ssp. *pinetorum*, ssp. *platyrhina*, where utricles are much shorter. Only ssp. *latifolia* have longer utricles (5.5-6.2 mm) but leaf blades

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much wider (9-20 mm) and culms distinctly winged, more over from different geographical origin. A dichotomous key provided here for easy recognition of subspecies.

Key to the subspecies of *Carex speciosa*

1a. Utricle upto 5 mm long ……..……2
1b. Utricle more than 5 mm long ……...……5
2a. Spike upto 2 cm long; utricle beaked indistinct; nerves more than 15 in each faces of utricle ……... ssp. *speciosa*
2b. Spike more than 2 cm long; utricle beaked distinct; nerves less than 10 in each faces of utricle ……...…….. 3
3a. Utricle less than 4 mm long ……..…..…….. ssp. *pinetorum*
3b. Utricle more than 4 mm long ……..…..…..4
4a. Leaf blade 10-16 mm wide; female glumes 3-3.5 mm long, sub acute ……..……..…..... ssp. *dilatata*
4b. Leaf blade 5-6 mm wide; female glumes upto 3 mm long, acute ….. ……... ssp. *platyrhina*
5a. Culm distinctly winged; leaf blade 9-20 mm wide ….. ssp. *latifolia*
5b. Culm not winged; leaf blade 3-5 mm wide ……..……. ssp. ***varmae***

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印度阿魯納恰爾邦莎草科薹屬（*Carex* L., Cyperaceae）的新種與新變種

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摘要：本文描述分布自印度阿魯納恰爾邦莎草科薹屬的新種 *Carex sanjappae* M. Bhaumik & M.K. Pathak 以及新亞種 *Carex speciosa* Kunth ssp. *varmae* M. Bhaumik & M.K. Pathak。*Carex sanjappae* 屬於單穗薹草組（section rarae），具有較長的穗、較長而寬的胞果且其頂端呈現平截的開口；文中並列表比較該新種與其他相近的物種。而 *Carex speciosa* Kunth ssp. *Varmae* 可以其較長且具短硬毛的胞果及較窄的葉片作為辨識的依據；本文也提供的檢索表，以利該亞種的辨識。

關鍵詞：阿魯納恰爾邦、薹屬、印度、新種、亞種。

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