SHORT COMMUNICATION

**CALAMUS PSEUDOERECTUS** (ARECACEAE), A NEW SPECIES FROM THE EASTERN HIMALAYA, INDIA

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**Calamus pseudoerectus** (Arecales or Palmaceae), a new species from the eastern Himalaya, India

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Abstract: Calamus pseudoerectus (Arecales or Palmaceae), a new species of rattan from the hilly slopes of Mukti and Mahananda rivers at Darjeeling District of West Bengal in the eastern Indian Himalaya, is described and illustrated. This species closely resembles two Indo-Myanmar species, C. erectus Roxb. and C. arborescence Griff. It, however, is distinguished by its short and extremely slender stem, spine ornamentation, pendulous, long-branched inflorescence, and minute fruits with fimbriate scales. A comparative study among C. pseudoerectus sp. nov., C. erectus Roxb., and C. arborescence Griff. is provided. Conservation status of this species is proposed as Endangered (EN) as per IUCN.

Keywords: Calamus arborescence, Calamus erectus, new taxa, Palmae, Rattans.

**Calamus** L. is the largest genus of the family Arecales (Palmae), with about 520 species worldwide, mostly distributed in the Asia-Pacific region and Africa (Dransfield et al. 2008; Baker 2015; Baker & Dransfield 2016). The spiny climbing and non-climbing rattans, the source of the commercial rattan cane, are distributed from tropical Africa, India to Fiji, southern China through Malay Archipelago to New Guinea. The lower hills of the eastern Himalaya and the Terai parts are quite rich in *Calamus* species, with 28 species reported from China (Pei et al. 1991), seven from Bangladesh (Alam 1990), eight from Bhutan (Noltie 1994), and nine from Nepal (Paudel & Chowdary 2005). In India, Beccari (1894) reported 72 species of *Calamus* from undivided British India for the first time; presently, around 36 species and three varieties of *Calamus* are recorded from various parts of the Himalaya, Western Ghats, and the Andaman & Nicobar Islands (Basu & Basu 1987; Renuka 1987; Basu 1992). A total of 18 species of the genus *Calamus* L., *Plectocomia* Mart. ex. Bl., and *Daemonorops* Bl. were reported from various altitudes of West Bengal (Mondal & Chowdhury 2018). During exploration of palms and canes in the various lower hills and riverine forests along small streams (‘khola’) and rivers of the Darjeeling Himalaya, a few interesting specimens of *Calamus* were collected from Muktikhol (26°49'26"N & 88°13'22"E, 822m) and Choklong riverine...
Calamus pseudoerectus sp. nov. Mondal et al.

forests (26°51′42″N & 88°21′45″E, 609m) of Mahananda Wildlife Sanctuary on the hillslopes of the Mukti and Mahananda rivers, respectively. After extensive morphologic comparisons in key herbaria (Herbarium, BSI, Central National Herbarium (CAL), Herbarium, BSI, Eastern Regional Centre, Shillong (ASSAM), Herbarium, BSI, Sikkim Himalya Regional Center, Gangtok (BSHC), and Herbarium, University of North Bengal (NBU), matching with some digital herbarium of Herbarium, Royal Botanical Garden, Kew (K), Herbarium, National Taiwan University (TAI) Herbarium, Royal Botanical Garden, Edinburgh (E), and extensive literature search (Renuka 1987; Alam 1990; Pei et al. 1991; Basu 1992; Noltie 1994; Paudel & Chowdhary 2005; Baker & Couvreur 2012; Govaerts et al. 2013; Baker & Dransfield 2014), it was found that it is a new species for science. The new taxon is carefully described and illustrated and a comparison of diagnostic morphologic characters with two allied Indian species, C. erectus Roxb. (Hort. Bengal. 72. 1814) and C. arborescence Griff. (Calcutta J. Nat. Hist. 5.33.1845), are presented (Table 1). Of the 36 species in India, two species, C. erectus and C. arborescence, are completely different from the others in respect of lack of knee, cirrus, and flagella. Similar character-bearing species from southeastern Asia are C. acaulis A.J. Hend., N.K. Ban & N.Q. Dung from Vietnam and C. oxyccarpus Becc., C. macrorhynchus Burret, C. erectus Roxb., and C. dianbaiensis C.F. Wei from China. The new species is close to this group and lacks knee, cirrus, and flagella.

**Taxonomic treatments**

*Calamus pseudoerectus* sp. nov.

S. Mondal, S.K. Basu & M. Chowdhury, Betgara, Otla bet [Nepali] (Image 1; Fig. 1).

Similar to *Calamus erectus* Roxb. and *C. arborescence* Griff. in respect of having similar types of ocrea and devoid of knee, flagella, and cirri, but distinct by big, branched inflorescence, minute and scattered spines, and very small fruits with fimbriate fan-shaped scales. It further differs by having scattered spines on leaf sheath and rachis, while in *C. erectus* and *C. arborescence*, spines are clustered and whorled. It is further characterized by pendulous big inflorescence, sheath with white and brownish-black powdery dust, conspicuous ocrea, oblong fruits, 5mm × 1mm, brown.

**Holotype:** 10044 (CAL), 08.ii.2018, India, West Bengal, Darjeeling District, Muktkhola hillslopes, 26°49′26″N & 88°13′22″E , 822m, coll. S. Mondal & M. Chowdhury.

**Isotype:** Calcutta University Herbarium (CUH), NBU (10044).

Cluster-forming rattan, erect up to 11m long. Stem solid, with sheaths 18–20 cm diameter, without sheaths 12–13.5 cm diameter; internodes 5–9.8 cm long, 12.1–13.2 cm diameter. Leaf eciirrate, 1.56–3.37 m long; flagella absent; sheath blackish-brown, caducous scales, sparsely variable sized blackish-brown armed with minute and few long flat spines along zone of adnation between inflorescence and sheath; knee absent; petiole 1–1.2 m long, young petiole with white powdery dust, mature petiole base with dense brown dust, covered with irregular small spines, base flat, leaf sheath closed with spongy, thick sheath fibers on both edges; leaflets 38–43 on each side of rachis; rachis 1.3–1.8 m long; glabrous, rarely spines on both edges, leaflets linear-ensiform, 41–75 cm × 2.1–4.1 cm, leaflets alternate in equidistance at base and terminal part, but opposite at middle; green beneath, narrowly elliptic to linear, mid leaflets 71–76.5 cm × 4.8–5.6 cm; apical leaflets 39.6–41.8 cm × 1.6–2.1 cm, apical leaflet scarcely united at base; fine spines 3–6 mm long, on major veins of both abaxial and adaxial surfaces; inflorescences long, looping, 2.10–2.40 m long, non-flagelliform, branched to 1 order, one pistillate and one staminate flower lies in each node; pistillate flowers deeply embedded on rachis node, sterile stamine flower lies at base of pistillate flowers; prophyll strictly tubular, 14–32 cm × 4.8–3.1 cm tightly sheathing, opening asymmetrically at apex, with brown indumentums similar to that of the sheath, very sparsely armed with minute recurved spines, sometimes with fine bristles around bract opening; peduncular bracts one or two, peduncular up to 1.12m long, 1.3cm diameter, with irregular spine on margin and adaxial surface, rachis bract 5.6–14.4 cm × 3.3–5.2 cm, similar to prophylls; primary branches (rachillae) 25.6–134.2 cm apart, rachillae 2–3 at each nodes; rachillae alternate, straight, 10.3–27.6 mm × 1.6–2.5 mm; rachilla bracts 1.3–1.6 cm × 2.3–2.8 cm, similar to prophylls; floral bracteoles tubular, 0.7–1.4 cm × 1.8–2.5 cm, asymmetrically opened; pistillate flowers oval, 0.6–0.4 cm × 0.4–0.5 cm, sessile, lacking indumentums; calyx 0.4cm diameter, connate at base, three-lobed; lobes 0.6cm × 0.4cm; corollatubular at base, 0.4–1.1 cm × 1.6cm long, tip three-lobed; lobes triangular, 0.6mm long; ovary globose; stigma three, prominent; sterile stamine flower narrow, 0.7cm × 0.3cm, solitary, sessile, attached at base of pistillate flowers, calyx 0.4cm diameter, connate at base, three-lobed; lobes 0.6cm × 0.4cm; tubular at base, corolla 0.4–1.1 cm × 1.6cm, tip three-lobed; lobes triangle, 0.6cm long; sterile stamens six; separate fertile male plants not seen. Fruits very...
small, ellipsoid, 0.7–0.8 mm × 0.3–0.4 mm, rusty brown, with three distinct stigmatic projection, 0.1–0.2 mm long, covered with longitudinal rows of scales, reddish brown, 0.4–0.8 mm × 0.3–0.5 mm, scales not regular, fan-shaped, margins fimbriate, arranged in nine rows; one-seeded. Seeds oblong, 0.5cm × 0.1cm, brown.

Phenology: Flowering: December–February; Fruiting: February–May.

Distribution: India (West Bengal, Darjeeling District).

Habitat: Hill slopes of riverine forests at lower hills, associated with bushes of Lantana camara L., Mikania micrantha Kunth, Pandanus nepalensis H. St. John, Curcuma aromatica Salisb., Alstonia nerifolia D. Don, and Wallichia caryotoideae Roxb.

Uses: Leaves are used as thatch; local peoples use fruits for diabetes.

Etymology: The specific epithet is given as the new species is quite closer to the Indian rattan C. erectus.

Additional specimen examined (paratypes): 10212 (NBU), one specimen collected on 12.iv.2018, West Bengal, Darjeeling District, Shivkhola hillslopes, 26°51'42"N & 88°21'45"E, 609m, coll. S. Mondal & M. Chowdhury.

Notes: This species was discovered from the lower hills of Darjeeling District of India around 16km away from Siliguri City. Calamus pseudoerectus is presently known from four populations in the lower hill forests of Darjeeling District of West Bengal in the eastern Himalaya. Three populations were found at Murtikhola and one population at Shivkhola area of Mahananda WS.
Each population is with an average of 10–15 individuals. Altogether, 40–60 individuals were observed. We examined several pistillate inflorescences and every time found minute fruits with seeds and fimbriate scales. The present study did not record staminate specimens. Given the size of the area is about 60km$^2$ (area of occupancy <500km$^2$ and area of occurrence <5000km$^2$), number of locations four (≤5), and threats to the habitat, we recommend *Calamus pseudoerectus* under the status of Endangered (EN; IUCN Standards & Petitions Subcommittee 2014). The type locality is the part of the Himalayan hotspot (Myers et al. 2000) and faces tremendous adverse anthropologic pressure including tea gardens, road and house construction, huge forest resource collections by local people, and ecotourism. As *C. pseudoerectus* grows in the open forest of Mahananda WS where human infiltration is huge due to the presence of nearby tea gardens and ecotourism sites, the existing habitat needs to be protected by the forest department for the sake of in situ conservation of this new species.
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