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Cover: Pseudo-flying animals and wind-dependent seed & spore dispersers – made with digital painting in Krita. © Melito Prinson Pinto



***Schoenoplectiella erecta* (Poir.) Lye ssp. *raynalii* (Schuyler) Beentje
(Cyperaceae) – a new record to India from Ossudu Bird Sanctuary,
Villupuram District, Tamil Nadu**

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Abstract: *Schoenoplectiella erecta* subsp. *raynallii* (Cyperaceae) is recorded for the first time from India and Asia. This taxon was collected in Ossudu Bird Sanctuary, Villupuram district of Tamil Nadu, southern India. Detailed description including microscopic study of the glume and nutlets with digital images, morphological characters, habitat, and key characters between the two subspecies are provided.

Keywords: Coromandel coast, India, migratory birds, new record, Pondicherry, wetland.

A new genus *Schoenoplectiella* was established by Lye (2003) with 26 species and it was separated from the genus *Schoenoplectus* (Rchb.) Palla. based on the rbcl suprageneric phylogeny (Muasya et al. 1998) both the genera were differentiated from the heterogeneous and un-natural genus, *Scirpus* L. Characteristically, *Schoenoplectiella* has members that are annuals, rarely perennial, rhizome very short hidden among the culmbases, prostrate or elongate, glumes entire at apex, and nutlets transversely rugulose to sharply ridged whereas *Schoenoplectus* has perennial, rhizome elongate,

creeping or ascending, glumes notched or emarginate or bifid, and nutlets generally smooth (Hayasaka 2012). Currently, the genus has 65 accepted species (POWO 2022) and these are distributed from warm temperate to tropical regions of Africa, America, Asia, and Madagascar (Verloove et al. 2016). In India, 10 species were recorded (Mao & Dash 2020) and only five species are known from Tamil Nadu (Narasimhan & Sheeba 2021).

During recurrent botanical surveys for the last three year (from September 2018 to August 2021) an interesting plant belonging to the genus *Schoenoplectiella* was collected from the shores of the freshwater Lake Ossudu, in Ossudu Bird Sanctuary, a protected area, in Tamil Nadu and Pondicherry regions, southeastern India. On critical microscopic examination and referring to available literatures (Smith 2003; Xanthos & Browning 2015) the collected voucher specimen was identified as *Schoenoplectiella erecta* ssp. *raynalii*. Our identification was confirmed further by comparing the isotype image deposited at K (A.M.Yalala 425–K000416875). Further

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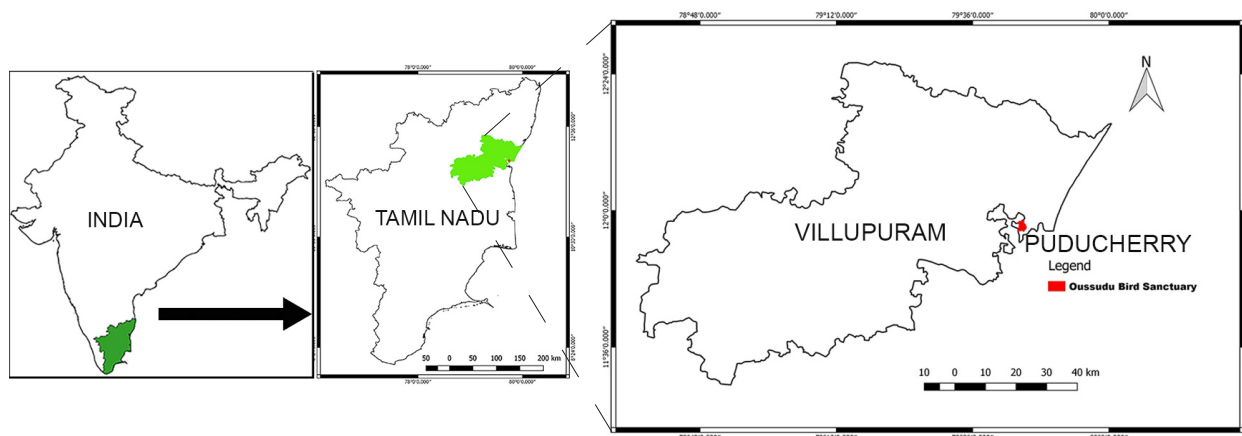


Figure 1. Study area – Ossudu Bird Sanctuary.

perusal of literatures (Cook 1998; Panda et al. 2002; Prasad & Singh 2002; Ansari et al. 2016; Kar et al. 2016; Mao & Dash 2020; Narasimhan & Sheeba 2021) we come to know that this taxon was not yet recorded in Asia, India, and regional floras; however, *Schoenoplectiella erecta* ssp. *erecta* was recorded from northern India. In the Lake Ossudu Bird Sanctuary, three *Schoenoplectiella* species also occur: *S. atriculata* (L.) Lye, *S. lateriflora* (J.F.Gmel.) Lye, and *S. juncooides* (Roxb.) Lye.

MATERIALS AND METHODS

Botanical exploration and ecological studies were conducted from September 2018 to August 2021 in Ossudu (Figure 1) along the Coromandel Coast, Villupuram district of Tamil Nadu. Ossudu Bird Sanctuary falls in two political boundaries, viz., Union Territory of Pondicherry and Villupuram district of Tamil Nadu. During the survey an unfamiliar sedge was found and collected from the eastern shores of Ossudu Lake and the collected specimen was processed and deposited at Herbarium, French Institute of Pondicherry (HIFP) for further studies. Camera attached light microscope was used to examine the morphological features of glume and nutlets to understand the morphological differences. Recent publications (Mao & Dash 2020; Narasimhan & Sheeba 2021) and consultation of herbaria (Madras Herbarium (MH), Rapinath Herbarium Tiruchirapalli (RHT), Deccan Regional Centre (DRC), Auroville Herbarium (AURO)) for the occurrence and international datasets (GBIF- the Global Biodiversity Information Facility—<https://www.gbif.org>, COL- Catalogue of Life—<https://www.catalogueoflife.org>, POWO- Plants of the World Online—<https://powo.science.kew.org/> and USDA- United States Department of Agriculture—<https://plants.usda.gov>) were referred for the global distribution

range of this species.

RESULTS

The inflorescence of *Schoenoplectiella* is capitata or anthellate. The anthella of spikelets are simple to decompound due to the presence of branched or unbranched peduncles with few to numerous sessile spikelets and they are densely crowded. This characteristic feature was recorded in both the inflorescence of *S. lateriflora* and *S. erecta*. On critical examination of the herbarium specimens deposited at AURO (4751, 10317, 11940), *S. lateriflora* was 10–20 cm high with decompound inflorescence, peduncles 3–15 mm high, style 3-branched, achene trigonous whereas *S. erecta* is more than 30 cm high, inflorescence decompound, peduncles 15–65 mm long, secondary peduncles to 8–12 mm long, style 2-branched and nutlet plano-convex.

The two known subspecies, *Schoenoplectiella erecta* ssp. *raynalii* is similar to *S. erecta* ssp. *erecta* but differs by its style and nutlets. Following key can be used to differentiate them:

1. Nutlet biconvex, style 2-fid, slightly wrinkled
..... *S. erecta* ssp. *erecta*
1. Nutlet plano-convex, style 3-fid, distinctly rugose *S. erecta* ssp. *raynalii*

Taxonomic treatment

Schoenoplectiella erecta (Poir.) Lye ssp. *raynalii* (Schuyler) Beentje Fl. Trop. E. Africa, Cyperaceae, 34, 2010. (Image 1)

Schoenoplectus erectus (Poir.) Palla ex J. Raynal ssp. *raynalii* (Schuyler) Lye, Nordic J. Bot. 3(2): 243. 1983.

Scirpus raynalii Schuyler, Notul. Nat. Acad. Nat. Sci.



Image 1. *Schoenoplectiella erecta* subsp. *raynalii*: A—The present collection | B—Isotype image from KEW | C—inflorescence in close view | D—plant in natural condition | E—dorsal, ventral and lateral view of glumes | F—gynoecium with 3-fid stigma | G—young and matured nutlet. © Balachandran & Uma Maheswari.

Philadelphia 438: 1, figs. 1, 3, 6. 1971.

Type: BOTSWANA, Maun district, 6.2.1964, *Yalala* 425 (K-K000416875!-Isotype-digital image seen)

Description

Annual herbs, culms densely tufted, 30–43 cm (including inflorescence bract), cylindrical, ridged when dry, 1.6–2 mm thick. Leaves 1–3, 2.5–13 cm long, rarely equalling the culm; sheaths brown, 5–9 cm long, ribbed, disintegrating to fibres. Inflorescence, pseudolateral, anthella-decompound in 2–5 pedunculate corymb, primary peduncle 0.5–6 cm long, secondary rachis 8–12 mm long; overtopped by lower bract, involucre bract stem like, erect, 4.5–13 cm long, secondary bract 0.5–4 cm long. Spikelets, in clusters, 1–5, 5–7 × 2–3 mm; green-cream, reddish brown when matured; ovoid-oblong, 3(5)–13(18) × 2–3.5 mm; glume straw-coloured, with brown mosaic, central region often greenish when fresh, ovate-obovate, 2.53.4(5) × 1.5 mm, smooth, mucronate, margins scarious. Perianth absent, stamens 3, style 3-fid. Achenes almost blackish brown when ripe, planoconvex when matured, obovoid, 1.2–1.6 × 1.1–1.5 mm, with sharp ridges along the margins, distinctly and transversely rugose.

Flowering and fruiting: from January–April.

Habitat: Along the shores of the fresh water lake at the elevational range between 30 and 40 m. It was found growing along with *S. lateriflorus* and *S. juncooides* of Cyperaceae, *Persicaria glabra* (Willd.) M.Gomez of Polygonaceae, *Ludwigia perennis* L. of Onagraceae, *Dinebra polystachyos* (R.Br.) E.A.Kellogg of Poaceae, *Aponogeton natans* (L.) Engl. & K.Krause of Aponogetonaceae.

Distribution: Africa, Asia, Australia, Mexico, and South America.

Specimen examined: India, Tamil Nadu, Villupuram district, Ossudu Bird Sanctuary, 11.9577° N, 79.7456° E, 18 m, 8 February 2020, Pradeep & Balachandran 27514 (HIFP!, two sheets).

Conservation status

Considered as 'Least Concern' on the IUCN Red List of Threatened Species (Mesterházy 2020), and in recent days the range of distribution has been extended from Africa, America to Asia, and Australia. Probably the migratory granivorous ducks (Mallards/the whistling ducks) might have played a major role in extending the distribution of this species. This study also proves the report of Kleyheeg et al. (2019) that the granivorous water birds disperse viable seeds of wetland plants over long distance during their migration. The censuses

of large flocks of such migratory granivorous wintering or breeding ducks were recorded during this study and previous ones (Perennou 1990; Davidar 2011; Mathevet et al. 2020).

Notes: As per the revision of Hayasaka (2012) and Xanthos & Browning (2015) the subspecies '*raynalii*' could be easily distinguished by having 3-fid stigmas, planoconvex nature of nutlet with distinct rugose surface, while its typical subspecies '*erecta*', has 2-fid stigma, biconvex nutlet with moderate wrinkled surface. The surface of *S. lateriflora* nutlet is otherwise same that of *S. erecta* ssp. *raynalii* but the former species has trigonous nutlet with 2-fid stigmas.

In *Schoenoplectiella*, interspecific natural hybridization exhibits range of variations in plant height, culm width below the inflorescence, shape and length of overtopping inflorescence, glume dimensions at apex, anther crest length, style branch and length, achene dimensions and surface sculpturing were very well studied (Browning 1992; Hayasaka 2012). Meanwhile the variation in the shape of inflorescence was overlooked by previous taxonomic accounts (Ohwi 1944; Koyama 1958). Though, in India we observed that the length of primary and secondary peduncles of the inflorescence is much longer than the (iso)type specimen from KEW image and specimen from the University of South Florida Herbarium (20709).

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