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Studies in African Cyperaceae 35. *Kyllinga carinalaevis* sp. nov. from west tropical Africa

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A minute new species of *Kyllinga*, i.e. *K. carinalaevis* Lye & Mesterházy, from Benin in west tropical Africa is described. It is one of three or four annual species of the genus, and the characters separating it from two other annual species are given. The species is ephemeral and occurs in a vegetation type which belongs to a Nanocyperion association. The species is probably critically endangered as it was found in a single locality out of the numerous sites that have been investigated in Benin in recent years.

The genus *Cyperus* L. is the next largest genus in Cyperaceae, but its circumscription is a matter of considerable disagreement. Goetghebeur (1998) considered several satellite genera as distinct, i.e. *Kyllinga* Rottb., *Pycreus* P. Beauv. and *Queenslandiella* Domin, but he included *Anosporum* Nees, *Sorostachys* Steud., *Juncellus* (Griseb.) C. B. Cl., *Mariscus* Vahl (Lye 1992), and *Torulinium* Desv. in *Cyperus* s.s. Hooper and Napper (1972) in 'Flora of west tropical Africa' also kept *Mariscus* and *Torulinium* as separate genera. On the other hand, Haines and Lye (1983) and Lye (1995, 1997) merged all these genera in *Cyperus*, as did Kern (1974) in 'Flora Malesiana'. However, recent floras such as 'Flora of North America' (Ball et al. 2002) and 'Flora of tropical east Africa' (Hoenselaar et al. 2010) have kept the genus *Kyllinga* separate. We have therefore in this paper accepted the genus *Kyllinga* as separate, although this separation is not supported by molecular data (Muasya et al. 2002, 2009, Simpson et al. 2007).

Kyllinga carinalaevis Lye & Mesterházy sp. nov. (Fig. 1–4)

Planta annua, ad 10 cm alta. Culmus 1–7 cm altus et 0.2–0.5 mm crassus, triangulatus, parum compressus, longitudinaliter sulcatus, glaber. Folia tantum in caulis parte inferiore 1–2 cm longa disposita; folia basalia 3–5 deminuta, pallida rubella-brunnea, manifeste multinervia, 5–10 mm longa, ad vaginas reducta et in acumine desinentia; folia superiora 1–2 laminata, laminais 1–2 cm longis et 1.0–1.5 mm latis; laminae planae, subtus glabrae, margine et secundum costas scabridae. Inflorescentia 4–6 mm lata, capitulata, virescens, bractea lata partim tecta. Bracteae involucrales plerumque 3, erectae vel effusae, bractea maxima 1–3 cm longa et 1.5–2.0 mm lata, basi ad 3 mm lata, margine pellucida. Spicula 1-flora, late ovata, 2.5 mm longa, 1.5–2.0 mm lata, e bractea basali et glumis 2 subequalibus oppositis composita, ex toto decidua. Glumae 2.5–3.0 mm longae et 1.5 mm latae, pallidae, apice acuminatae.

Type: northwest Benin: Atakora region, Boukoumbé, 1°06′00″N, 10°09′56″W, 232 m a.s.l., 7 Dec 2009, A. Mesterházy MABEN 56 (holotype: K, isotypes: BP, BENIN).

A minute tufted annual less than 10 cm tall. Culms 1–7 cm long and 0.2–0.5 mm thick, triangular to slightly compressed, longitudinally ridged, glabrous. Leaves from the lower 1–2 cm only; 3–5 basal leaves reduced to light reddish brown, prominently multi-nerved, 5–10 mm long flat sheaths ending in acute tips; 1–2 upper sheaths ending in 1–2 cm long and 1.0–1.5 mm wide green blades; blades flat, glabrous below, scabrid on margin and midrib towards the apex. Inflorescence a 4–6 mm wide greenish head partly concealed by the wide bracts. Involucral bracts usually 3, erect or spreading, the largest 1–3 cm long and 1.5–2.0 mm wide, but up to 3 mm wide at base, where it has a transparent marginal border. Spikelets 1-flowered, broadly ovoid, 2.5–3.0 mm long and 1.5–2.0 mm wide, consisting of a basal bract and 2 subequal opposite glumes, disarticulating as one unit when mature. Glumes 2.5–3.0 mm long and 1.5 mm wide, pallid with a wide, green, winged midrib ending in an acute tip. Achene 1.7–2.0 mm long and 1.2–1.4 mm broad, obovoid with oblique base and often somewhat twisted, papillate with papillae about 10 μm in diameter; the surface minutely scurfy (Fig. 4).

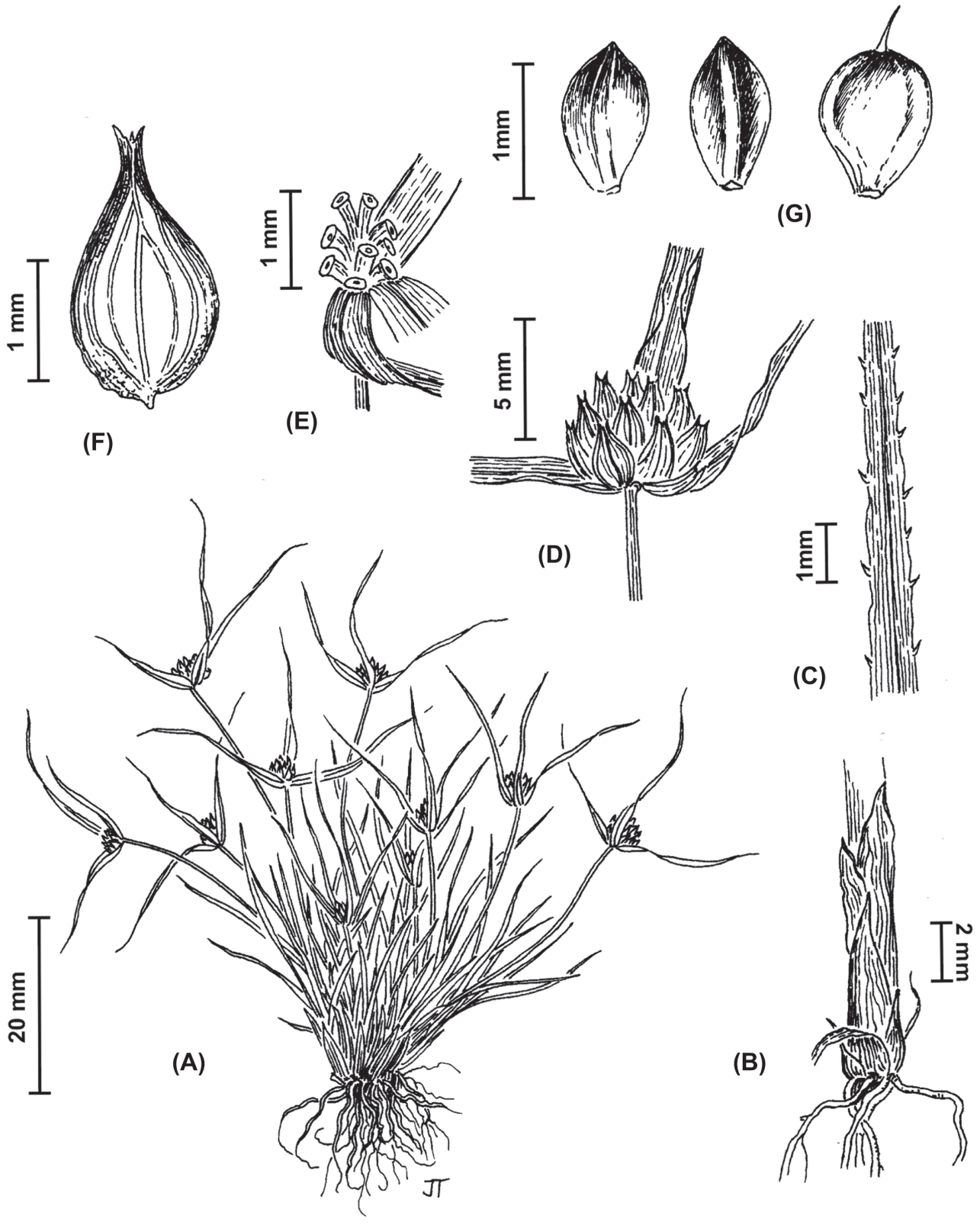

Figure 1. *Kyllinga carinalaevis* sp. nov. (A) habit, (B) basal part of culm, (C) details from leaf, (D) inflorescence, (E) receptacle of inflorescence, (F) spikelet, (G) achene, seen from three sides. Drawn from the type by Jana Taborska.

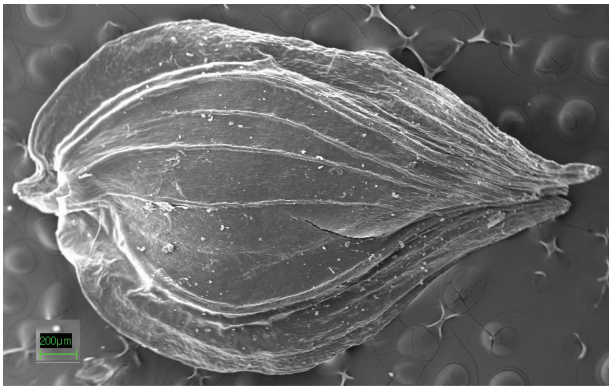

Figure 2. *Kyllinga carinalaevis* sp. nov. Spikelet. SEM photograph from the type.

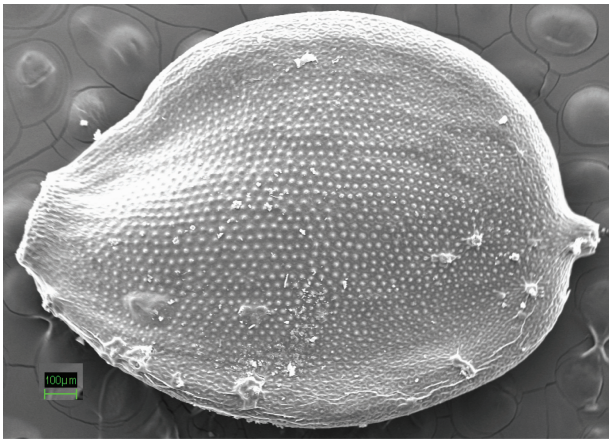

Figure 3. *Kyllinga carinalaevis* sp. nov. Achene. SEM photograph from the type.

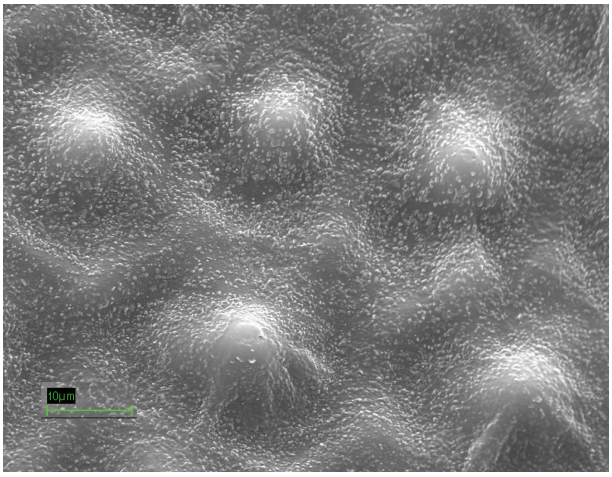

Figure 4. *Kyllinga carinalaevis* sp. nov. Details from achene surface. SEM photograph from the type.

Distribution

Kyllinga carinalaevis is only known from northwest Benin, i.e. from the type collection cited above. However, the locality is very close to Togo and the species might occur there as well.

Habitat and ecology

Kyllinga carinalaevis grows on a wet margin of a small shallow pond at 232 m altitude. The habitat is much trampled and grazed by cattle. The vegetation type belongs to a Nanocyperion association (Bagi 1987, Rodwell 1994). *Kyllinga carinalaevis* grows together with *Cyperus pustulatus* Vahl, *Fimbristylis littoralis* Gaud., *Pycreus flavescens* (L.) Reichenb., *Scleria sphaerocarpa* (E. A. Robinson) Napper and scattered annual grasses (Fig. 5). Species in this plant community are ephemeral and are adapted to develop in seasonally wet, nitrogen-poor, environments, but need relatively phosphorus-rich soils; they are therefore very sensitive to nitrogen deposition (Brouwer et al. 2001). *Kyllinga carinalaevis* is probably critically endangered as it was found in a single locality out of the numerous sites that have been investigated in Benin in recent years.

Similar species

Kyllinga carinalaevis has the habit of *K. squamulata* Vahl [*Cyperus metzii* (Steud.) Mattf. & Kük.], but differs in its glabrous winged keel (neither scabrid nor indented), the very different achene (both size and shape) and the thinner culm (Table 1). *Kyllinga pumila* is another species which often has an annual habit, but it differs in its usually compound inflorescence with one cylindrical central spike and 1–several smaller lateral spikes, and consequently by much larger number of spikelets. In addition, its much smaller achene is characteristic (Table 1).

Table 1. Morphological comparison of *Kyllinga carinalaevis* sp. nov. and closely related species.

	K. pumila	*K. carinalaevis*	*K. squamulata*
Culm length (mm)	10–45	1–7	2–20
Culm width (mm)	0.7–1.2	0.2–0.5	0.5–0.8
Leaf length (cm)	7–20	1–2	2–25
Leaf width (mm)	2.0–3.2	1.0–1.5	0.5–2.0
Number of involucral bracts	3–5	3	3
Involucral bracts: length (cm)	4–13	1–3	2–6
Inflorescence	compound	solitary	solitary
Inflorescense length (mm)	5–8	3–7	3–6
Inflorescense width (mm)	5–10	4–6	4–8
Number of spikelets	25–50	10–15	15–25
Spikelet length (mm)	2.0–2.5	2.5–3.0	2.5–4.0
Glume length (mm)	1.5–2.5	2.5–3.0	2.0–2.5
Keel of glumes	no wing	wing smooth	wing toothed
Achene shape (outline)	obovate	obovate	round
Achene length (mm)	0.9–1.2	1.7–2.0	2.0–2.5
Achene width (mm)	0.6–0.7	1.2–1.4	2.0–2.5

Figure 5. *Kyllinga carinalaevis* sp. nov. Habitat. Photo: A. Mesterházy, Dec 2009.

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