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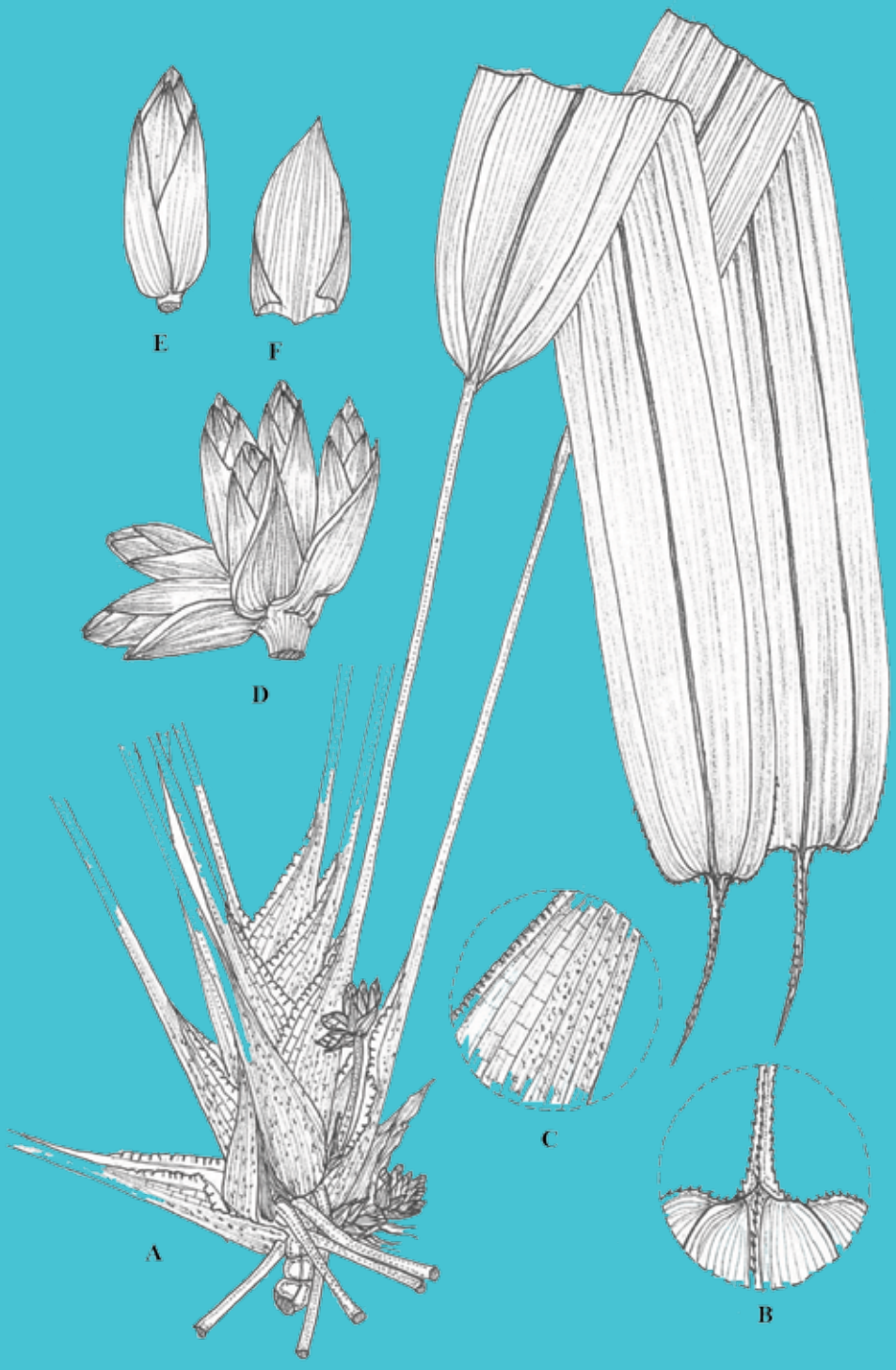

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Cover images: *Mapania sembilingensis* Miraadila, Shabdin & Meekiong. A. Habit; B. Leaf apex details; C. Sheath margin details; D. Capitate inflorescence; E. Spike; F. Spicoid bract [Drawing by Meekiong, K.].

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TWO NEW SPECIES AND ONE NEW GEOGRAPHICAL RECORD FOR SARAWAK, MALAYSIA (CYPERACEAE: MAPANIOIDEAE)

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ABSTRACT
MIRAADILA, M. I., SHABDIN, Z. & MEEKIONG, K. 2016. Two new species and one new geographical record for Sarawak, Malaysia (Cyperaceae: Mapanioideae). *Reinwardtia* 15(2): 129 – 135. — *Mapania hidiriana* and *M. sembilingensis*, two new species from Sarawak, Malaysia are described and illustrated. *Mapania hidiriana* can be differentiate from *M. meditensis* by elongated lanceolate inflorescences. Whilst, *M. sembilingensis*is differ from *M. multiflora* and *M. hispida* by the floral and fruit morphologies. In additional, *M. spadicea* Uittien, a new geographical record for Sarawak is also presented.

Keywords: Cyperaceae, *Mapania, Mapania hidiriana, Mapania sembilingensis,* Sarawak.

ABSTRAK
MIRAADILA, M. I., SHABDIN, Z. & MEEKIONG, K. 2016. Dua jenis dan satu catatan baru sebaran geografi (Cyperaceae: Mapanioideae) untuk Sarawak, Malaysia. *Reinwardtia* 15(2): 129 – 135. — *Mapania hidiriana* dan *M. sembilingensis* adalah dua jenis baru dari Sarawak, Malaysia dipertelakan dan diilustrasikan. *Mapania hidiriana* dapat dibedakan dari *M. meditensis* karena mempunyai perbungaan melanset memanjang. Morfologi bunga dan buah *M. sembilingensis* berbeda dengan *M. multiflora* dan *M. hispida*. Sebagai tambahan, *M. spedicea* Uittien, mempunyai sebaran geografi sampai Sarawak.

Kata kunci: Cyperaceae, *Mapania, Mapania hidiriana, Mapania sembilingensis,* Sarawak.

INTRODUCTION

Cyperaceae are the third largest in the monocotyledon family and seventh largest in the angiosperms with 106 genera and 5,387 species (Govaerts *et al*., 2007). They form a huge, morphologically diverse, geographically widespread, ecologically and economically important family (Naczi, 2005). Nevertheless, there are many species which are narrowly distributed, specific to certain habitats and of conservation concern (Naczi & Ford, 2008). The difficulty of assessing levels of endemism was noted by Goetghebeur (1998), due to the lack of recent revisions and reliable checklists as many species are known from only a single specimen or locality (Shabdin & Meekiong, 2012). All members of Cyperaceae in general are problematic to identify, due to the lack of good discontinuous morphological characters. Asian species, especially, show a wide range of morphological variation, where the appearance of the whole inflorescence changes as it matures, although individual structures remain constant in shape and size (Simpson, 1992; Shabdin *et al*., 2013a).

The diversity of *Mapania* species in Sarawak is tremendous, with 31 out of 71 world's total number are recorded includes three newly described species; *M. sapuaniana* Shabdin (2013a); *M. multiflora* Shabdin (2013b), *M. meekiongii* (Miraadila & Shabdin, 2016) and *M. kadimiana* Shabdin, Meekiong & Miraadila (Shabdin *et al*., 2016). Our recent field excursions collected many interesting specimens that morphologically not matching with the existing species recorded for Sarawak. Among many specimens, three were confirmed; two as a new species and another one was a new record from Sarawak. All the three species are presented here.

MATERIALS AND METHODS

Botanical collections were conducted from April to December 2014 which covers various localities from western to eastern parts of Sarawak. Sample collections and herbarium specimens' preparation were made accordingly to the standard Herbarium Specimen Collection (Bridson & Forman, 1992). Samples identification

and verification were conducted at the Herbarium of Sarawak Forest Department (SAR) and Herbarium of Universiti Malaysia Sarawak.

THE NEW SPECIES

1. **Mapania hidiriana** Miraadila, Shabdin & Meekiong *spec. nov*. Fig. 1. — Type: Malaysia, Sarawak, Miri Division, Wilma Oil Palm Plantation, fragmented forest, May 2015, *Hidir M. et al. MY0078* (Holotype SAR!; Isotype Herbarium of Universiti Malaysia Sarawak).

Similar to *M. meditensis* and *M. cuspidata* in term of appearances by having petiolate and oblong-lanceolate leaves. The new species can be differentiated by absences of culm (*vs*. presence in *M. cuspidata*) and elongated lanceolate inflorescences (*vs*. elliptic and always obscured in the leaf sheath in *M. meditensis*).

Slightly robust, rhizomatous, rhizome 5–7 cm long, 3–4 mm diam. *Cataphylls* present; 8–10; 1–10 × 1–2 cm, yellowish green or greenish and becoming light brown and papery when dry. *Culm* absent. *Leaves* petiolate, strongly 3-ranked, up to 55 cm long, leaf-blade oblong, oblong-lanceolate, 28–50.5 × 4–6.5 cm, apex abruptly narrowed, obtuse to rounded, cuspidate to long cuspidate, 5–8 cm, base abruptly narrowed into pseudopetiole, coriaceous, 3-nerved, secondary nerves distinctly, septate-nodulose when dry, margins entire at first and slightly serrulate toward the apex, pseudo-petiole present, longer than leaves, 33–52 cm, channelled along; $^1/_3$ of the lower part gradually developed into sheath, 5–8 cm wide, margins with thin yellowish green layer, slightly wavy. *Inflorescence* sessile, up to 30 inflorescences or more per plant, ovoid or elongated lanceolate, 2–5 cm long, 4–8 mm diam. Light brown to brown, lower bract shorter, 6–8 × 4–6 mm, spicoid bracts 14–16 × 3.5–4 mm, floral bracts 6, free, lowest 2 bracts oblong, 14–16 × 2 mm, obtuse, light to mid brown, striate with brownish, keel, narrowly winged, upper bracts linear, 14–5 × 1 mm, acute, glabrous; staminate flower 1–2 per spicoid, anthers linear oblong, up to 6 mm long or more; filament 12–14 mm long, stigma branches 3, style 3 mm long. *Fruit* not seen.

Ecology and distribution. Fragmented forest in the oil palm plantation. Sarawak, Borneo.

Etymology. The epithet name is given after Hidir Marzuki, laboratory assistant and plant collector in Universiti Malaysia Sarawak who collected the type specimen.

Specimen examined. Malaysia, Sarawak, Miri Divison, Suai, Wilma oil palm plantation, fragmented forest, May 2015, *Hidir M. MY 0078* (Type specimen).

Notes. *Mapania hidiriana* might be superficially confused with other petiolate-leaved species such as *M. cuspidata,* and *M. meditensis* because the inflorescences are hardly seen and sometimes sub-terranean.

Conservation status. The status of this species is unknown since we collected it from a single locality.

2. **Mapania sembilingensis** Miraadila, Shabdin & Meekiong *spec. nov*. Fig. 2. — Malaysia, Sarawak, Limbang Division, Bukit Sembiling Recreation Park, hill mixed dipterocarp forest, on the slope, Dec 2014, *Miraadila, M. I., Meekiong, K. & Burhanuddin MY0065* (Holotype SAR!; Isotype Herbarium of Universiti Malaysia Sarawak).

In common with *M. multiflora*, but has a distinct slender and short culm with capitate inflorescence (*vs*. long culm with paniculate inflorescence in *M. multiflora*). Fruits obovoid shape with short apiculate apex (*vs*. broadly ellipsoid fruits in *M. hispida*).

Moderately robust, rhizomatous, rhizome 3–6 cm, 4–5 cm diam., stilt roots sometimes present. *Cataphylls* ovate to lanceolate, 4–12 × 2–5 cm, acute to obtuse, fibrous when dried. *Culm* 1–to several, lateral, 3–5 cm × 2–3 mm, hispid, right greenish yellow. *Leaves* basal, 5–7, up to 50 cm long; leaf blade oblong to linear-oblong, 20–45 × 4–6.5 cm, apex abruptly narrowed, acute to rounded, cuspidate to long cuspidate with cauda *ca.* 4.5 cm long, 3-nerved, secondary nerves distinct, septate-nodulose when dried; margins sparsely serrulate to serrate toward the apex, leaf base gradually to abruptly narrowed into canaliculate, 12–20 × 0.2–0.4 cm pseudo-petiole, coriaceous, light green to mid green, yellowish to dark green; sheath ovate to lanceolate, 6–8 × 2–4 cm, apex narrowed or abruptly narrowed, light green to yellowish green, mid-brown to light brown. *Involucral bract* 3–4, obscured by the sheath, glumaceous, ovate to lanceolate, 6–8 × 2–3 mm, acute; lower bract shorter; coriaceous, glabrous, light brown. Peduncle short, 3–5 cm long, glabrous, light green to yellowish green, light brown. *Inflorescence* terminal, capitate, composed of 3–5 spikes; spike elliptic to oblong, 8–12 × 2–3 mm, apex obtuse, acute or gradually blunt, light greenish yellow; greenish light brown; spicoid bract lanceolate, 8–10 × 2–3 mm, apex gradually blunt, light greenish brown; floral bract 6, free, lowest 2 bracts linear-oblong, 6–8 × 0.3–0.5 mm, keeled, wingless, hispid, upper bracts linear, 6–7 × 0.3 mm, flat ± keeled, glabrous; staminate flowers 3 per spicoid, anther linear, up to 3 mm long; stigma branches 3, style 10 mm long. *Fruit* obovoid, 2–3 × 2–2.5 mm, apex shortly apiculate, blackish light brown.

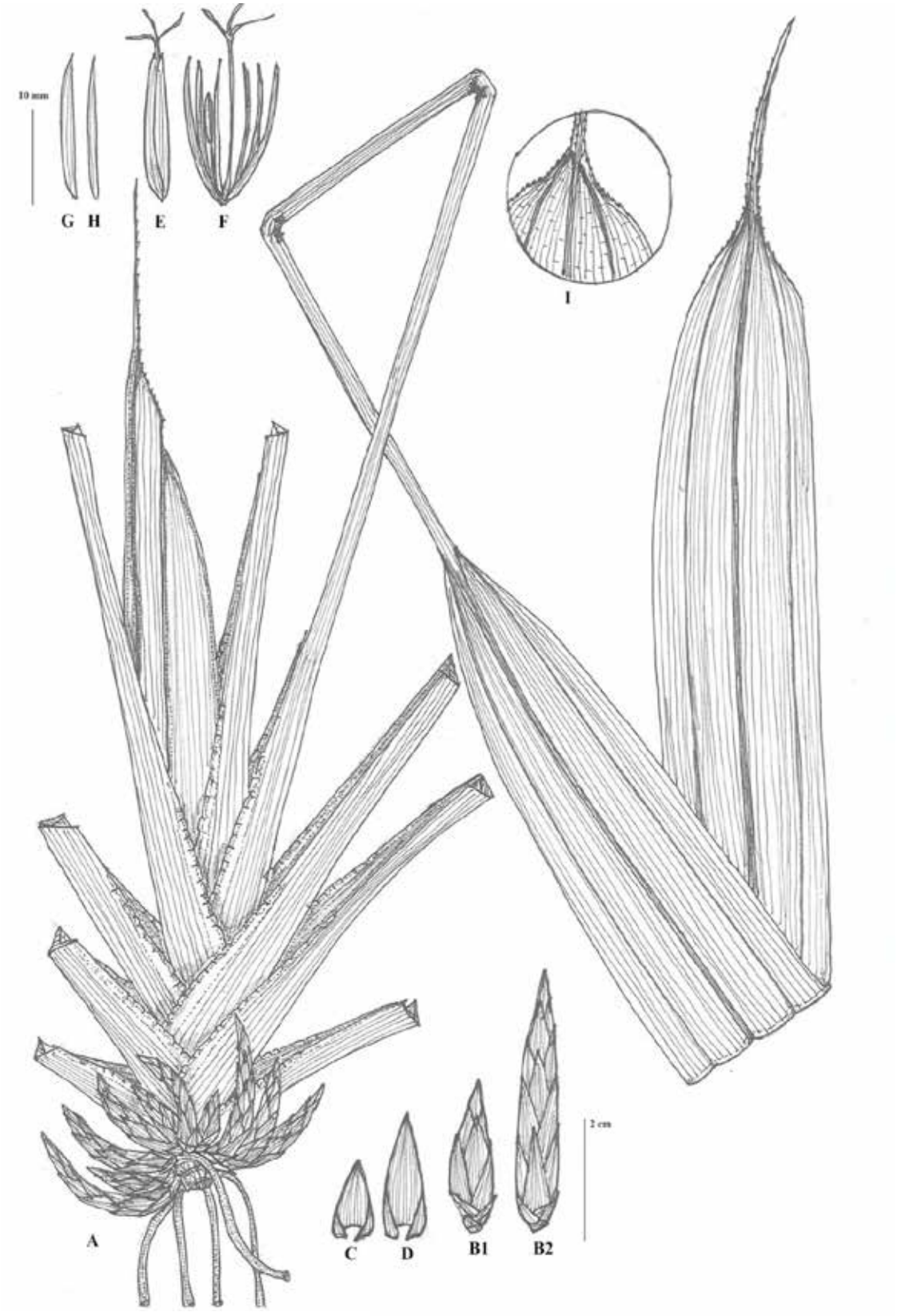

Fig. 1. *Mapania hidiriana* Miraadila, Shabdin & Meekiong. A. Habit; B1, B2. Spike; C. Lowest spicoid bract; D. Spicoid bract; E. Unopened spicoid; F. Opened spicoid; G. Lower floral bract; H. Inner floral bract; I. Detail leaf apex. (Drawing by Meekiong, K. based on specimen *MY 0078*).

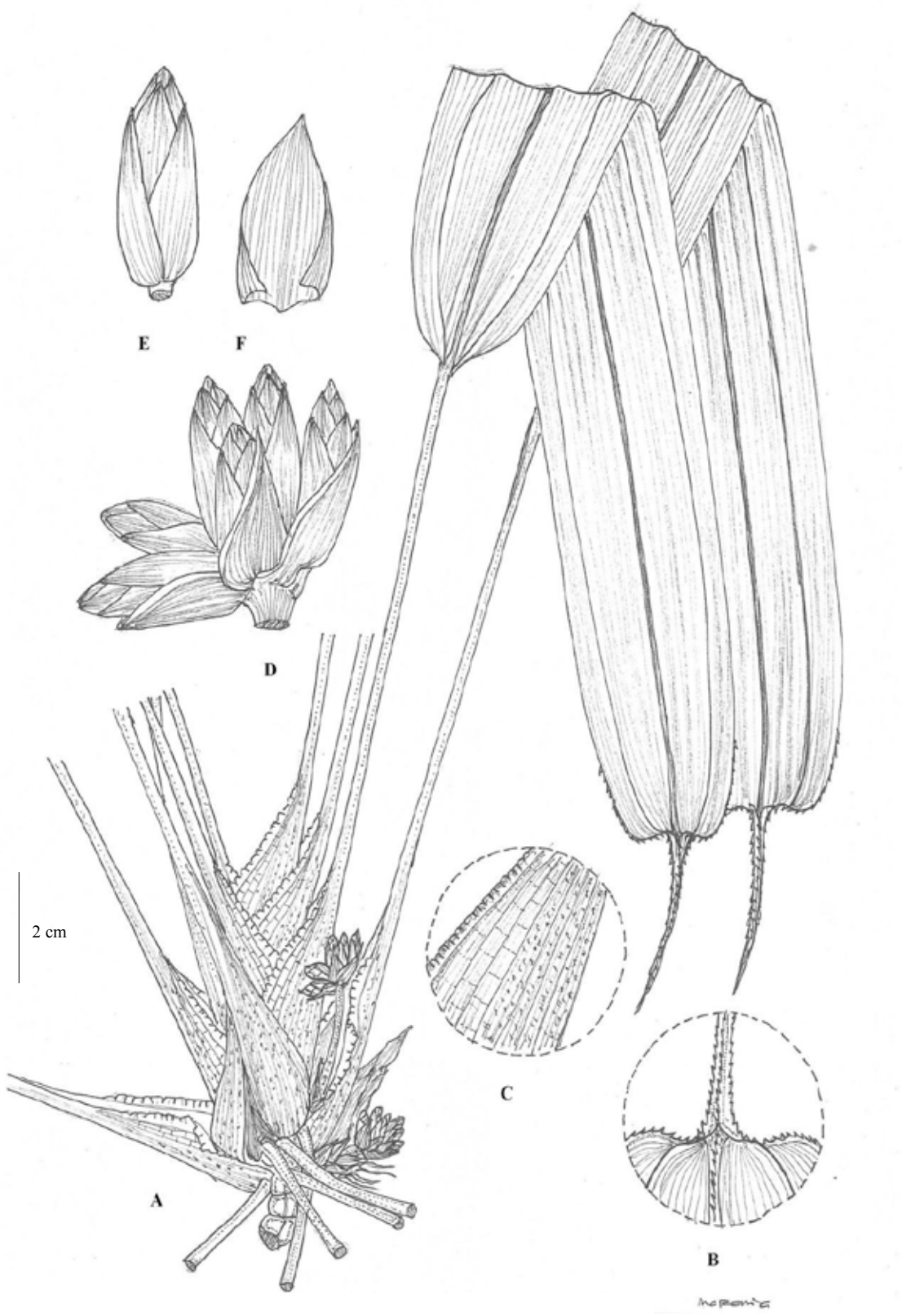

Fig. 2. *Mapania sembilingensis* Miraadila, Shabdin & Meekiong. A. Habit; B. Leaf apex details; C. Sheath margin details; D. Capitate inflorescence; E. Spike; F. Spicoid bract. Based on specimen *Miraadila et al., MY 0068* (Drawing by Meekiong, K.).

Ecology and distribution. Lowland mixed dipterocarp forest at altitude 50–100 m, on the slope and wet place near the stream. Borneo (Sarawak), so far only recorded from the type locality (Bukit Sembiling) in Limbang.

Etymology. Named for Gunung Sembiling, Limbang, the type locality.

Specimen examined. Malaysia, Sarawak, Limbang Division, Bukit Sembiling Recreation Park, hill mixed dipterocarp forest, on the slope, Dec 2014, *Miraadila, M. I., Meekiong, K. & Burhanuddin MY0065* (type specimen).

Notes. Closely related to *M. multiflora, M. sembilingensis* has a capitate inflorescence while *M. multiflora* has a paniculate inflorescence. The hispid culm might be confused with *M. hispida* but the fruit differs by its obovoid shape with a short apiculate apex, while the fruit of *M. hispida* is usually broadly ellipsoid.

Conservation status. The status of this species is unknown since we collected it from a single locality.

THE NEW RECORD

MAPANIA SPADICEA Uittien, Fig. 3. – *Rec. Trav. Bot. Neerl.* 33: 150 (1936); D.A. Simpson, *A Revision of the Genus Mapania* (*Cyperaceae*): 89 (1992). Type: Borneo, Kalimantan, *Endert 3348* (Holotype BO!; isotype K, L).

Robust, rhizomatous; rhizome 12–18 mm diam. *Cataphylls* ovate to lanceolate, 0.6–4 × 0.2–1 cm, obtuse to acute. *Culms* 1–2 per plants, more or less erect or lateral, 3.5–23 cm × 2.9–4 mm, terete, mostly scabrid, greenish. Leaves basal, crowded and strongly 3-ranked, up to 147 cm long, leaf-blade narrowly linear, 98–140 cm × 0.9–1.4 cm, apex very gradually narrowed, acuminate, base very gradually narrowed into sheath, thickly coriaceous, dark green, 1–nerved to indistinctly 3–nerved, secondary nerve indistinct to distinct, strongly inverse w-shaped in cross section, smooth to indistinctly septate-nodulose when dry, margins densely serrulate, pseudopetiole absent, sheath lanceolate, 5.5–8 × 0.8–1.8 cm, apex very gradually narrowed, thickly coriaceous, somewhat shiny, mid- to dark chocolate brown. Involucral bract several, glumaceous, lanceolate, 1.4–3 × ± 0.8 cm, acute, coriaceous, greenish at first becoming dark brown, somewhat scabrid, nerves indistinct. Inflorescence terminal, composed of 1 spike, spike elliptic to lanceolate, 2.5–5 × 1–1.3 cm, acute to subobtuse, brown; spicoid bracts lanceolate, 13–14 × 2.2–4 mm, obtuse, sub-coriaceous, often splitting from the base, mid-brown, glabrous, nerves indistinct; floral bract 6, free, lowest 2 bracts linear to linear lanceolate, 12.8–13.7 × 0.3–0.7 mm, acute, flat to somewhat keeled, sometimes sparsely hispid on margin; staminate flowers 3 per spicoid, anthers linear, 5–8 mm long, stigma branches 3, style 6 mm long. Fruit ellipsoid, 5–5.5 × 2.5–2.7 mm, apex tri-angular, base conical-stipitate; exocarp succulent, thin without sculpturing, slightly wrinkled, dull mid-brown with 2 indistinct lateral costae.

Ecology and distribution. Mixed dipterocarp forest, on slope in gully, clay loam soils. Borneo (previously recorded only from Brunei and Kalimantan)

Specimen examined. Malaysia, Sarawak, Sibu Division, Sg Apeng, Sibu–Bintulu Road, *M. I. Miraadila, B. Bourhanudin & K. Meekiong, MY0068* (Herbarium of Universiti Malaysia Sarawak); Brunei, Temburong, tributary of Sungai Temburong, Machang, 19 Aug. 1990, *Wong WKM1962* (K!). Indonesia, Kalimantan, W Kutai, Long Temelen, 26 Aug 1925, *Endert 2874* (K!, SING!).

Notes. A new record for Sarawak. This species is similar to *M. angustifolia* and *M. kadimiana* in having strongly 3-ranked leaves with chocolate brown sheaths but can be differentiated by the single spike per culm.

Conservation status. The populations at Sg Apeng, on the Sibu–Bintulu road, is close to the roadside and the areas surrounded by agricultural activity. It is believed that these populations may soon be gone. Since the species was described from Kalimantan it may have been expected that it would also be found in Sarawak.

DISCUSSSION

The study of the *Mapania* in Sarawak is far from complete. Available data have mostly come from coastal and accessible areas, whereas mostly the inland areas, particularly along the Kalimantan border are still in cryptic. With the discovery of these two taxa, the number of *Mapania* in Sarawak now has increase to 32 species. It is believe that the number of *Mapania* species in Sarawak may increase up to 40 species as many specimens are yet to be identify and many more in the forest are still awaiting for discovery.

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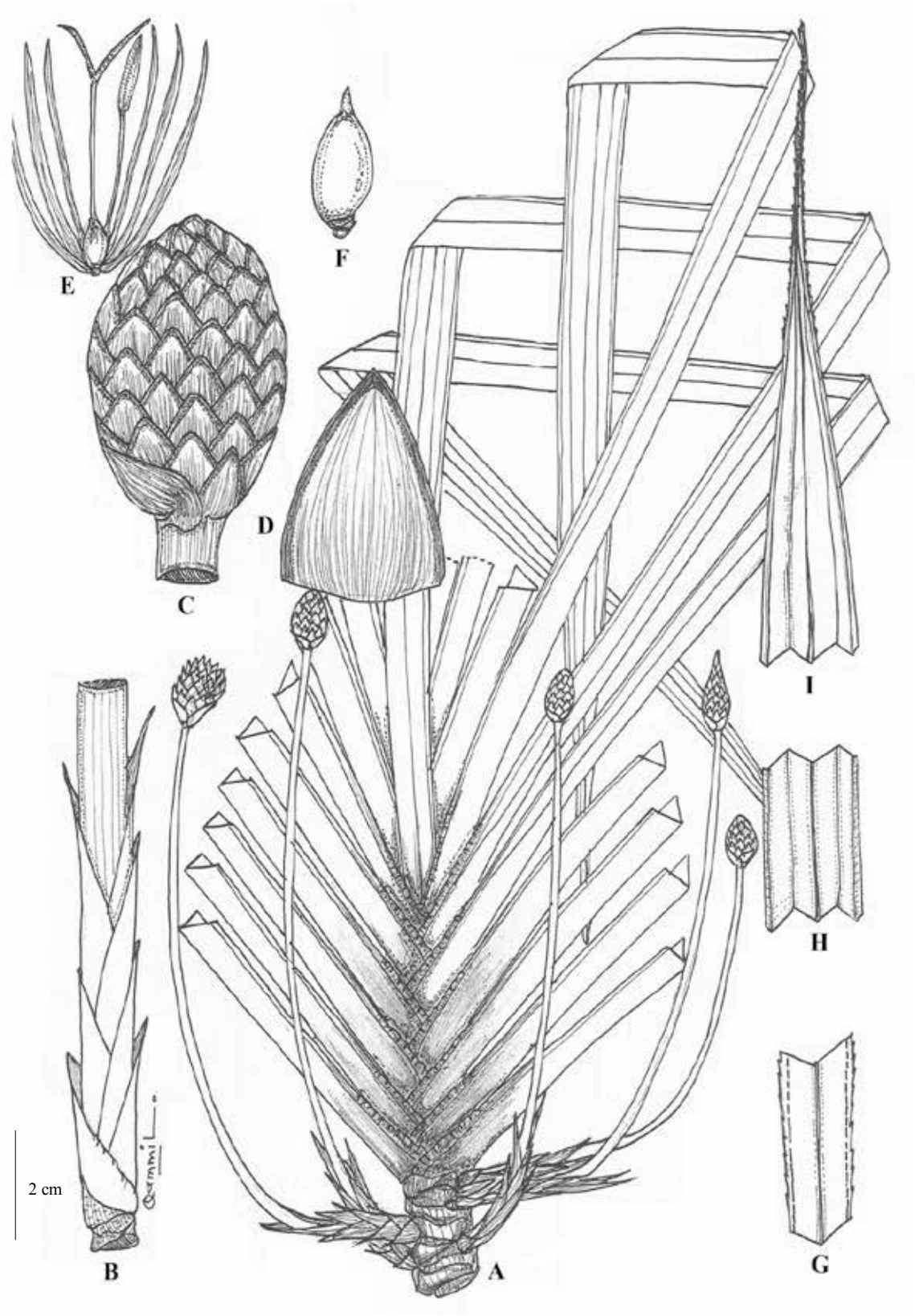

Fig. 3. *Mapania spadicea.* A: habit; B: involucral bract; C: inflorescence (spike); D: spicoid bract; E: floret; F: fruit; G: leaf base; H: leaf (middle part); I: leaf apex. Based on specimen *Miraadila et al., MY 0068* (Drawing by Meekiong, K.).

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