

Two new records of *Xyris* L. (Xyridaceae) for Thailand

PHONGSAK PHONSENA*, PRANOM CHANTARANOTHAI*,¹ & AMORNRAT MEESAWAT*

ABSTRACT. *Xyris borneensis* Rendle and *X. linifolia* P.Royen, are newly recorded for Thailand. The petals, capsules and seeds of *X. linifolia* are described for the first time. A provisional conservation status for each species is given.

KEY WORDS: Conservation status, taxonomy, Thailand, *Xyris*, Xyridaceae

INTRODUCTION

The family Xyridaceae (with five genera, but only one genus, *Xyris* L. in Asia) was published in the Flora of Thailand comprising 11 species (Hansen, 1987). In the process of taxonomic revision of Xyridaceae in Thailand and SE Asia, recently additional material was collected, and among these collections two new records for Thailand were found. The first species, *X. borneensis* Rendle, was hitherto included in *X. bancana* Miq. by Hansen (1979a; 1983; 1987). However, we examined type material of both names and found that *X. borneensis* is different from *X. bancana*. Also the anatomy of leaves and micromorphological details of the fertile bract confirm their distinction. The second species, *X. linifolia* P.Royen, discovered in Bueng Kan Province, NE Thailand was not known from Thailand even though it was recorded from a nearby places in Laos (Hansen, 1979b: 1983; 1987; Van Royen, 1954). Hansen (1987) included this species in his key, at the time only known from Laos assuming that it was likely to occur in Thailand. He did not include a description because no Thai material of *X. linifolia* had yet been collected.

MATERIALS AND METHODS

The descriptions and illustrations below are based on Thai collections. Measurements of

morphological characters were taken from living mature plants in flower and/or in fruit. Leaf width was measured in the median part of the blade. Sepal, petal, stamen and pistil morphology was measured from fully opened flowers. Seed and fertile bract morphology was investigated by scanning electron microscopy (SEM) and light microscopy (LM).

DESCRIPTION OF TWO NEW RECORDS FROM THAILAND

1. *Xyris borneensis* Rendle, J. Bot. 37: 506. 1899; Malme, Bull. Jard. Bot. Buitenzorg, III, 10: 387. 1929; P.Royen in Steenis, Fl. Males., Ser. 1, Spermat. 4: 370. 1953.— Type: Malaysia, Sabah (North Borneo), *Burbridge 1877–78* (holotype **BM!**; isotype **K!**). Fig. 2.

Tufted perennial herb, 20–40(–75) cm tall. *Leaves* subterete or linear, wiry, twisted, 6–30(–40) cm by 0.4–1.2 mm, forming a ligule 0.5–1 mm long; blade basally rugulose with short transverse ridges, margin entire, apex bluntly-oblique. *Scape* terete or subterete with 7–8 low ridges below spike, 20–40(–75) cm by 0.5–1 mm. *Spike* ellipsoid, 5–7 by 3–4 cm. *Sterile bracts* 4–8, greenish- to reddish-brown, elliptic to ovate, 4–6 by 2–3 mm, margin entire, lacerate at apex. *Fertile bracts* greenish- to reddish-brown, ovate to elliptic, 6–8 by 4–6 mm,

* Applied Taxonomic Research Center, Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen 40002, Thailand.

¹ Corresponding author. Email: pranom@kku.ac.th

margin lacerate near apex; stomate field ovate to elliptic, 3–6 by 2.5–5 mm, with papillose epidermis. *Lateral sepals* pale brown, 3–4 by 0.7–1 mm, crest ciliate at least in the upper half. *Petal limbs* obovate, yellow, 4–8 by 2–4 mm, margin distally entire. *Staminodes* bibrachiate, branches elongate-penicillate, ca. 1.5 mm long. *Anthers* oblong, 1.2–1.5 mm long, shallowly bifid, deeply sagittate; filaments ca 1 mm long. *Style* terete, 3–3.5 mm long, distally 3-branched, branches ca. 1.5 mm long. *Capsules* ellipsoid to obovoid, dark brown, 5–6 by 2.5–3 mm. *Seeds* brown, translucent, ovoid, 0.4–0.5 mm long, 0.2–0.3 mm in diam, with 14–16 longitudinal ridges and with 6–9 transverse ridges.

Thailand.— PENINSULAR: Trang [Sikao, Hat Chao Mai NP, 21 Aug. 2010, Phonsena & Sutthisaksopon 6548 (BK!, BKF!, KKKU!, L!); Songkhla [Thepha, 14 June 1992, Laesen et al. 4291 (A!, PSU!); Pattani, 17 March 1923, Kerr 7882 (K!).

Distribution.— Peninsular Malaysia, Indonesia (Banka, Billiton), Borneo (Kalimantan, Sarawak, Brunei, Sabah).

Ecology.— On open, sandy soil, wet places in strand vegetation, at sea level up to 150 m, except a specimen of *de Vogel et al.* 8134 (L!), which was collected from Nabawan, Sabah at 700 m altitude. Flowering August to September; the flowers usually open mid-morning (ca. 10.00 a.m.) and persist until mid-afternoon (ca. 2.00 p.m.).

Vernacular.— Kathin sai (กระถิ่นทราย).

Conservation status.— Although this species is found in strand vegetation, which is under threat from human disturbance, its wide distribution means a conservation status of Least Concern (LC) (IUCN, 2001) is most appropriate.

Notes.— *Xyris borneensis* was placed by Hansen (1979a) in the synonymy of *X. bancana* Miq. along with *X. ridleyi* Rendle, *X. glauca* Malme, *X. chinensis* Malme and *X. subcomplanata* Malme, reporting that *X. borneensis*, from Borneo, has subterete leaves but that it is otherwise similar. Many specimens were misidentified as *X. bancana*. However, we hold a distinct view: for example, the stomate field of *X. borneensis* is covered with papillae (versus non-papillose in *X. bancana*), the epidermal cells at the base of the leaf of *X.*

borneensis possess striate papillae (versus a row of minute papillae in *X. bancana*), the leaf of *X. borneensis* possesses a large air space at the central of section (versus many dispersed air spaces between vascular bundles in *X. bancana*) and the leaf of *X. borneensis* possesses six compound vascular bundles and two single vascular bundles (versus 11 compound vascular bundles and three single vascular bundles in *X. bancana*) (Table 1 and Figure 4E–I). Therefore, we regard *X. borneensis* as a species in its own right.

2. *Xyris linifolia* P.Royen, Blumea 7: 477. 1954; B.Hansen, Acta Phytotax. Geobot. 30, 4–6: 192: 1979; in Leroy, Fl. Cambodge, Laos & Viet-Nam 20: 157, Pl. 31, 8. 1983; in Smitinand & Larsen, Fl. Thailand 5, 1: 131. 1987.— Type: Laos, Mt Kan, *Smiles s.n.* (holotype K!). Fig. 3.

Solitary perennial herb, 25–55(–65) cm tall, base abruptly dilated and bulbous. *Bulb* ovoid, 1.5–3 by 0.8–1.4 cm. *Leaves* 1(or 2) per plant, subterete to terete, twisted, without a ligule; blade smooth, 20–40 cm by 0.8–1.5 mm, margin entire, apex bluntly oblique to acute. *Scape* terete, twisted, 25–55(–65) cm by 0.7–1.5 mm. *Spike* ovoid to ellipsoid, 0.9–1.4 by 0.6–1.1 cm. *Sterile bracts* 4–8, reddish- or dark brown, elliptic to ovate, 4–6 by 3–5 mm, margin entire, lacerate at apex. *Fertile bracts* reddish- or dark brown, ovate, 5–7 by 4–5 mm, margin entire; stomate field ovate to elliptic, 1.8–2 by 1–1.2 mm. *Lateral sepals* hyaline, 5.5–7 by 1–1.5 mm, crest entire or coarsely serrate. *Petal limbs* yellow, obovate, 10–12 by 8–10 mm, margin distally lacerate. *Staminodes* bibrachiate, branches elongate-penicillate, 3–3.5 mm long. *Anthers* oblong, 2.5–3 mm long, shallowly bifid, deeply sagittate; filaments 1–1.5 mm long. *Style* terete, 3.5–4.5 mm long, distally 3-branched, branches ca 2.5 mm long. *Capsules* brown, obovoid to ellipsoid, 4–6 by 3–4 mm. *Seeds* yellowish-brown or brown, translucent, ellipsoid, 0.9–1 mm long, ca. 0.3 mm in diam., with 9–11 dark brown, longitudinal ridges and with 1 or 2 transverse ridges.

Thailand.— NORTH-EASTERN: Bueng Kan [(Si Wilai, Na Sing, Ban Na Sai, 22 Sept. 2009, Phonsena & Boonsuk 6426 (BKF!, L!); 25 Sept. 2009, Phonsena & Boonsuk 6626 (KKU!); 28 Nov. 2010, Phonsena & Sutthisaksopon 6540 (KKU!, QBG!); Phon Charoen, Ban Nong Paen,

Table 1. Main differences between *Xyris borneensis* Rendle and *X. bancana* Miq.

Characters	<i>X. borneensis</i>	<i>X. bancana</i>
Habitat	lowland plant, in strand vegetation at sea level up to 150 m alt. (except a specimen of de Vogel <i>et al.</i> 8134, L)	lowland or lower montane plant, in various forest types (include strand vegetation) from sea level up to 1300 m alt.
Leaf: shape	subterete or linear, wiry	flat, linear
size	6–30(–40) cm by 0.4–1.2 mm	30–70 cm by (1–)4–9 mm
indumentum	rugulose, striate when dry	not rugulose and striate when dry
Leaf anatomy:		
epidermal cells at the median part of leaf	without papillae	with a row of minute papillae
epidermal cells at the base of leaf	with striate papillae	with a row of minute papillae
air space	with a large air space at the central of section	with many dispersed air spaces between vascular bundles
vascular bundles	6 compound vascular bundles, 2 simple vascular bundles	11 compound vascular bundles, 3 simple vascular bundles
Stomate field:		
size	3–6 by 2.5–5 mm	1.5–2 by 1–2 mm
indumentum	papillose	non-papillose

26 July 2009, *Phonsena* 6394 (**BKF!**, **KKU!**); Bueng Khong Long, Pho Mak Khaeng, Ban Dong Chomphu, 8 Aug. 2010, *Phonsena & Sutthisaksopon* 6547 (**KKU!**).

Distribution.— Laos.

Ecology.— On open, grassy places, sandy soil in deciduous dipterocarp forest, at 180–200 m altitude. Flowering June to October; the flowers open during late morning (ca. 10.30 a.m.) and persist until mid-afternoon (ca. 2.00 p.m.).

Vernacular name.— Kathin nam khong (กระถิ่นน้ำโขง).

Conservation status.— *Xyris linifolia* is found in a small area in deciduous dipterocarp forest of the Mekong basin of Laos and Thailand. Only three localities in Thailand are known, each consisting of a small population. Its habitat is changing rapidly due to disturbance by logging

activities and various types land uses. An Endangered (EN), rating (IUCN, 2001) is merited.

Notes.— Van Royen (1954) in his original description of *X. linifolia*, indicated that the single known collection at the foothill of Mt Kau, Siam was made by Smiles in 1893. Hansen (1983) argued that Mt Kau should be Mt Kan, not in Siam (Thailand) but in Laos, where Smiles travelled along the Mekong River at the time. However, Hansen (1987) included this species in his key for the treatment in the Flora of Thailand, without a description, assuming that it was likely to occur in Thailand also.

ACKNOWLEDGEMENTS

The first author would like to thank the directors, curators and staff of A, BK, BKF, BM, C, K, L, P, PSU and QBG for their assistance during my visits. Financial support from the Graduate School,



Figure 1. Distribution of *Xyris bancana* (▲), *X. borneensis* (★) and *X. linifolia* (●).

Khon Kaen University, is acknowledged. Thanks are due to Dr Brigitta Duyfjes (L) for valuable help in preparing the manuscript, to Mr Phanom Sutthisaksopon and Mr Boonchuang Boonsuk for assistance in fieldwork and to Mr Theerawat Srisuk and Mr Woranart Thammarong (Department of Biology, Faculty of Science, Khon Kaen University) for the beautiful drawings.

REFERENCES

- Hansen, B. (1979a). Notes on Asian species of *Xyris*. *Botanisk Tidsskrift* 74 (1):22.
- . (1979b). The genus *Xyris* in Thailand and Indochina. *Acta Phytotaxonomica et Geobotanica* 30 (4–6): 192.
- Hansen, B. (1983). Xyridaceae. In: J.S. Leroy (ed.), *Flore du Cambodge du Laos et du ViêtNam* 20: 151–164. Muséum National d'Histoire Naturelle, Paris.
- . (1987). Xyridaceae. In: T. Smitinand & K. Larsen (eds.), *Flora of Thailand* 5(1): 130–138. The Forest Herbarium, Royal Forest Department, Bangkok.
- IUCN (2001). IUCN Red List Categories and Criteria Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.
- Van Royen, P. (1954). Some new Australasian species of *Xyris*. *Blumea* 7: 477. 1954.

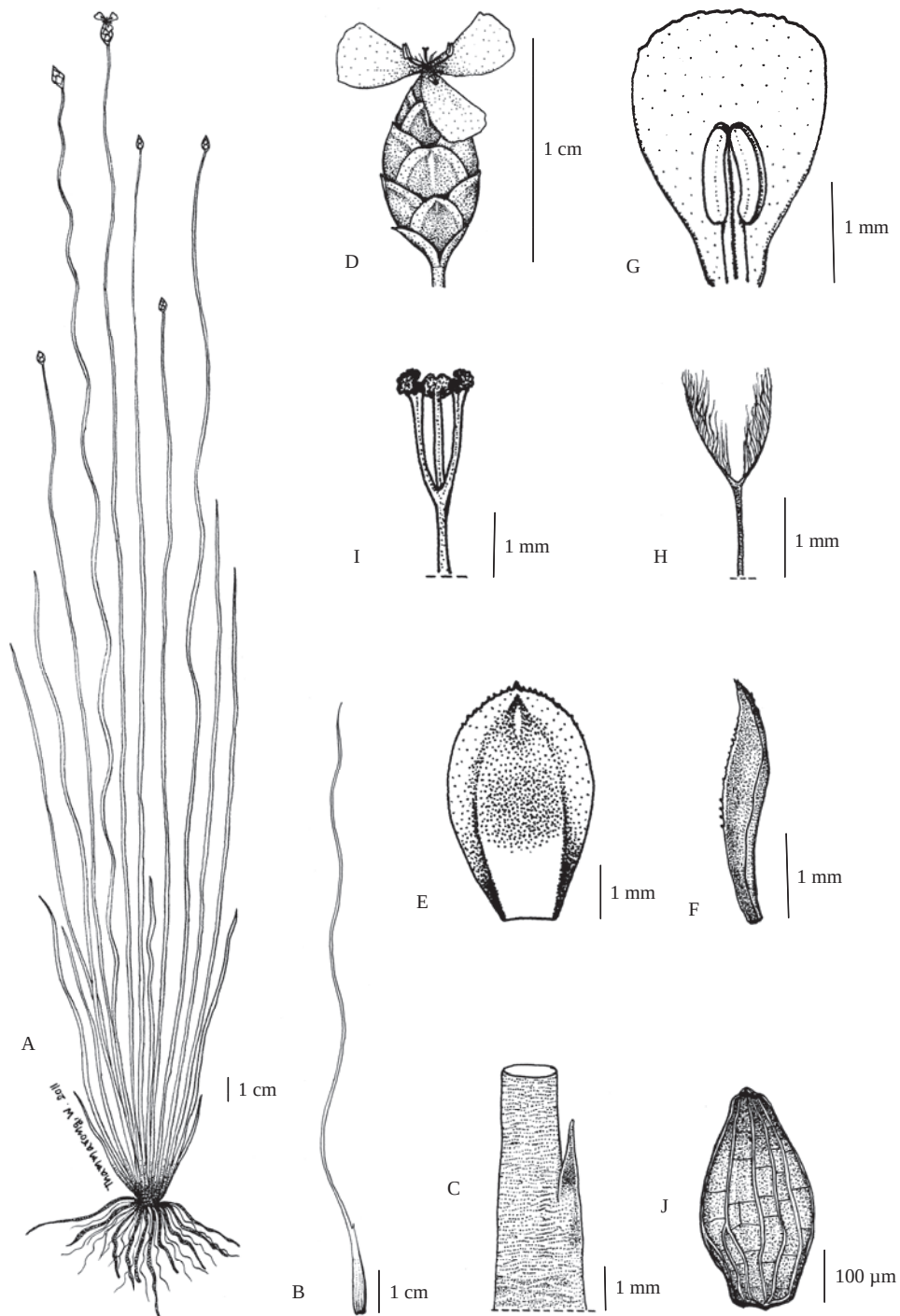


Figure 2. *Xyris borneensis* Rendle: A. Habit; B. leaf; C. junction of leaf showing a ligule; D. spike; E. fertile bract; F. lateral sepal; G. petal limb and stamen; H. staminode; I. style; J. seed. All from *Phonsena & Sutthisaksopon 6548* (KKU). Drawn by W. Thammarong.

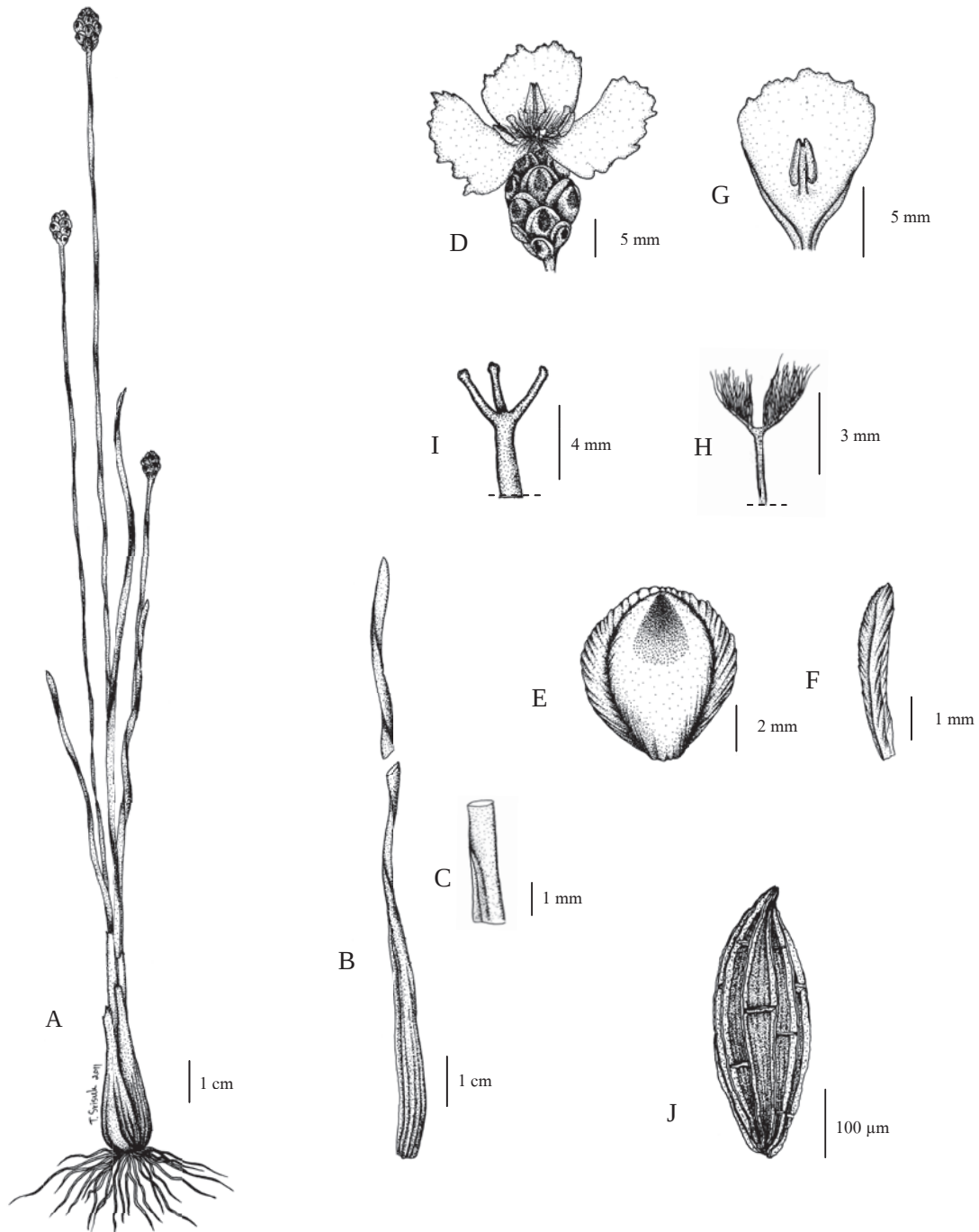


Figure 3. *Xyris linifolia* P.Royen: A. habit; B. leaf lamina and leaf apex; C. junction of leaf and sheathing; D. spike; E. fertile bract; F. lateral sepal; G. petal limb and stamen; H. staminode; I. style; J. seed. A–I from *Phonsena & Sutthisaksopon 6540* (KKU); J from *Phonsena & Boonsuk 6426* (KKU). Drawn by T. Srisuk.

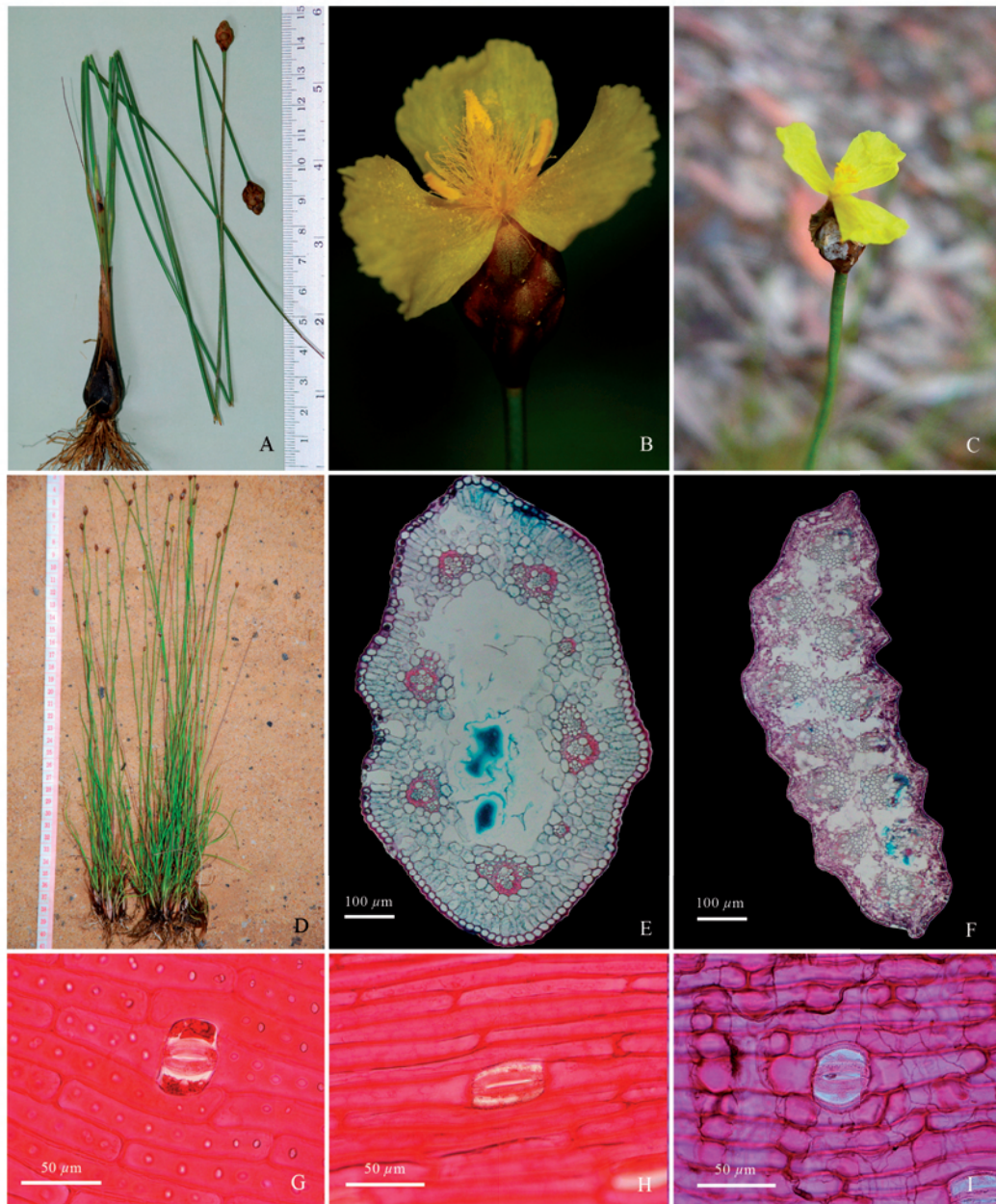


Figure 4. *Xyris linifolia* P.Royen: A. habit; B. inflorescence.— *X. borneensis*: C. inflorescence; D. habit; E. vascular bundle in transverse section of leaf.— *X. bancana*: F. vascular bundle in transverse section of leaf; G. epidermal cells and stoma at the median part of leaf showing rows of minute papillae.— *X. borneensis*: H. epidermal cells and stomata at the median part of leaf; I. epidermal cells and stoma at the base of leaf showing striate papillae. A from P. Phonsena 6394 (KKU); B from P. Phonsena & P. Sutthisaksopon 6540 (KKU); C, D, E, H & I from P. Phonsena & P. Sutthisaksopon 6548 (KKU); F & G from P. Phonsena 6698 (KKU). Photographed by P. Phonsena (A, B, D–I) and P. Sutthisaksopon (C).