



Two new species and a new record of *Lasianthus* (Rubiaceae) in Laos

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Abstract

Two new species of *Lasianthus* (Rubiaceae), *L. bolavenensis* Tagane & Soulad., and *L. laoticus* Tagane, Soulad. & Nob. Tanaka from Bolaven Plateau, southern Laos, are described and illustrated, with their vernacular names and preliminary conservation status. In addition, *L. repoeuensis* Pierre ex Pit. is recorded in Laos for the first time.

Keywords: Bolaven Plateau, flora, Gentianales, Indochina, taxonomy

Introduction

The genus *Lasianthus* Jack (Rubiaceae), with over 190 species, is widely distributed in Old World, with one species extending to Australia, in mostly tropical to subtropical regions (Zhu 2011, 2012, Napiroon *et al.* 2020). In Southeast Asia, the species are diversified with more than 130 species, found from lowland evergreen forest up to lower montane mossy forests, and are ecologically important components in the forests. In Laos, 11 species with one subspecies of *Lasianthus* have been recorded (Zhu 2011, Newman *et al.* 2017 onward, Napiroon *et al.* 2020, Tagane *et al.* 2022).

During our floristic inventories of Bolaven Plateau, southern Laos (Souladeth *et al.* 2020, Tagane *et al.* 2020), we collected several interesting species of *Lasianthus*. Among them, further studies based on specimens and literature of related species revealed that the two taxa are clearly morphologically distinct from previously known taxa. Here, we describe and illustrate them as new species, *Lasianthus bolavenensis* Tagane & Soulad., and *L. laoticus* Tagane, Soulad. & Nob. Tanaka, along with their vernacular name and preliminary conservation assessments. In addition, we record the occurrence of *L. repoeuensis* Pierre ex Pitard (1924: 387) in Laos for the first time based on our collected specimens.

Materials & methods

Morphological observations

To assess the nobility of the new species and confirm distribution records in Laos, we consulted the taxonomic literature (Dang *et al.* 2015, 2016, 2019, 2020, Dang & Naiki 2019, 2020, Naiki *et al.* 2015, Napiroon *et al.* 2018, 2020, Pham 2000, Pitard 1924, Zhu 2001, 2011, 2012) and herbarium specimens housed in BKF, FOF, FU, HNL, KAG, TNS and VNM, and those digitized images available at JSTOR Global Plants (<https://plants.jstor.org/>), Muséum National d'Histoire Naturelle (<https://www.mnhn.fr/>) and Chinese Virtual Herbarium (<http://www.cvh.ac.cn/>). The measurements for the description below are based on the herbarium specimens we collected in our field surveys.

Taxonomy

New species

Lasianthus bolavenensis Tagane & Soulad., sp. nov. Figures 1 & 2

TYPE:—LAOS. Champasak Province, Dong Hua Sao National Park [Bolaven Plateau], Paksong District, near Nong Luang Village, in lower montane forest, near a stream, 15°04'31.58"N, 106°12'30.72"E, 1226 m elev., *P. Souladeth, S. Tagane, D. Kongxaysavath, S. Rueangruea, S. Suddee, Y. Suyama, E. Suzuki L3337* [fl. & fr.] (holotype FOF!, isotype KAG155702!, TNS).

Lasianthus bolavenensis is characterized by glabrous twigs, glabrous leaves except with sparse hairs on midrib and secondary veins abaxially when young, 4 or 5 pairs of secondary veins, and semi-orbicular bracts, by which combination it can be distinguished from the other species of *Lasianthus* in Laos and its surrounding countries. In Indochina, it is similar to *L. bidouensis* Dang & Naiki in Dang *et al.* (2019: 191), an endemic species to southern Vietnam, in having almost glabrous twigs and leaves, elliptic-oblong lamina, 5-merous flowers, pinkish-white calyx, and bluish fruits, but different in having smaller leaf size (4–11.3 × 1.6–3.8 cm in *L. bolavenensis* vs. 16–24 × 6–8.5 cm in *L. bidouensis*), fewer secondary veins (4 or 5 vs. 6 or 7), larger anthers (2.8 mm long vs. 1–1.2 mm long), and glabrous style (vs. pubescent) (Table 1).

Table 1. Comparison of *Lasianthus bolavenensis* with two morphologically similar species. Data on *L. bidouensis*, and *L. inodorus* subsp. *inodorus* were retrieved from Dang *et al.* (2019) and Zhu (2012).

Characters	<i>Lasianthus bolavenensis</i>	<i>L. bidouensis</i>	<i>L. inodorus</i> subsp. <i>inodorus</i>
Plant height	1.5 m tall	Up to 3 m tall	2–3 m tall
Lamina size	(4–)5.5–11.3 × (1.6–)2.1–3.8 cm	16–24 × 6–8.5 cm	10–20 × 2.5–6 cm
Number of secondary veins	4 or 5 pairs	6 or 7 pairs	6 or 7 pairs
Stipules	triangular, 2–2.5 mm long	triangular to broadly triangular, 5.5–6.5 mm long	triangular to ovate-lanceolate, 3–5 mm long
Bract size	1–2 mm long	5–8 mm long	3–6 mm long
Anther length	2.8 mm long	1–1.2 mm long	-
Hairiness of style	glabrous	pubescent	-
Fruit shape and color	oblong, bluish	ovoid or ellipsoid, deep red	ovoid, dark orange-red turning black when mature

Description:—Shrub, 1.5 m tall. Twigs glabrous, blackish when dry, terete; internode 1.7–4(–7.5) cm. Leaves opposite, petiolate; petiole 0.8–1.3 cm long, glabrous; blade ovate-elliptic, elliptic-oblong, elliptic, (4–)5.5–11.3 × (1.6–)2.1–3.8 cm, coriaceous, glabrous except on midrib and secondary veins abaxially which is sparsely hairy, adaxially dark grayish brown, abaxially dark brownish yellow to gray-green, apex acuminate to aristate, tip pointed ca. 1.2 mm long, base cuneate, sometimes oblique, margin entire, midrib slightly concave adaxially, prominent abaxially, secondary veins 4 or 5 pairs, prominent abaxially, tertiary veins parallel. Stipule triangular, 2–2.5 mm long, apex acute, densely pubescent near margin. Inflorescence axillary, cymose, 1–4 flowered, sessile; bract semi-orbicular, 1–1.2 mm long, apex truncate, margin densely pubescent. Flowers subsessile; calyx pinkish white, ca. 6 mm long, tube ca. 4 mm long, glabrous, lobes triangular, ca. 2 mm long, apex acute, pubescent near apex; corolla pinkish white to white, cylindrical-campanulate, ca. 1 cm long, tube ca. 8.5 mm long, outside villous in upper 3/4, inside villous in upper 1/2, lobes 5, triangular, ca. 1.5 mm long, apex acute, villous. Stamens 5, inserted in corolla tube, anthers ca. 2.8 mm long, filament basally connate to corolla, free part ca. 0.2 mm long; ovary 5-locular, style 4 mm long, glabrous, stigma 4-lobed, ca. 2 mm long. Fruits subglobose or oblong, 1.1–1.2 cm long, ca. 5 mm in diam., glabrous, blue when ripe; pyrenes 5. Seeds 5, ca. 6 mm long, blackish brown when dry.

Additional specimen examined:—LAOS. Champasak Province, Dong Hua Sao National Protected Area, Seua Waterfall near Ban Nong Luang, 15°04'02.6"N, 106°12'29.9"E, 1147 m elev., 19 February 2019, *P. Souladeth et al. L2501* [fl.] (BKF, FOF!, KAG128750!).

Distribution:—LAOS (so far known only from the Bolaven Plateau, Champasak Province).

Habitat and Ecology:—The species was found in wet evergreen forest at elev. 1140–1280 m. Flowering specimens were collected in December and February, and fruiting in December.

Etymology:—This specific epithet *bolavenensis* refers to the type locality, Bolaven Plateau.

Vernacular name:—ຊ້າງສານບໍລະເວນ [(Xangsan Bolaven, “Xangsan” means *Lasianthus* in general in Lao and “Bolaven” refers to the Bolaven Plateau where the species occurs), proposed here].



FIGURE 1. Isotype of *Lasianthus bolavenensis* Tagane & Soulad. (Souladeth *et al.* L3337 (KAG155702)).

Preliminary conservation assessment:—Critically Endangered (CR). From our observations by five field surveys in 2018–2020 (Souladeth *et al.* 2020, Tagane *et al.* 2020), *Lasianthus bolavenensis* is locally common but narrowly restricted in a small area on Bolaven Plateau: in wet evergreen forest at elevation between 1140–1230 m, and we estimate the area of occupancy is less than 10 km² and mature individuals less than 1000. The most area of its habitat is located within the protected area of Dong Hua Sao National Park (formerly Dong Hua Sao National Protected Area), but some of the vicinities are being converted to coffee plantations, which might bring negative impact for the survival of this species. Given this situation, we propose Critically Endangered (CR) according to B2b(ii, iii)(IUCN 2012) for the first conservation assessment for this species.

Note:—*Lasianthus bolavenensis* is also similar to *Lasianthus inodorus* Blume (1826–1827: 998) subsp. *inodorus*, widely distributed in Bangladesh, Cambodia, China, India, Indonesia (Sumatra, Java), Thailand, and Vietnam, in glabrous twigs and leaves (or sparsely puberulous on lower leaf surface) and sessile inflorescence, but different in having 4 or 5 pairs of secondary veins (vs. 6 or 7 pairs), smaller bracts 1–1.2 mm long (vs. 3–6 mm long), and blueish oblong fruits (vs. dark orange-red turning black when mature and ovoid) (Table 1).

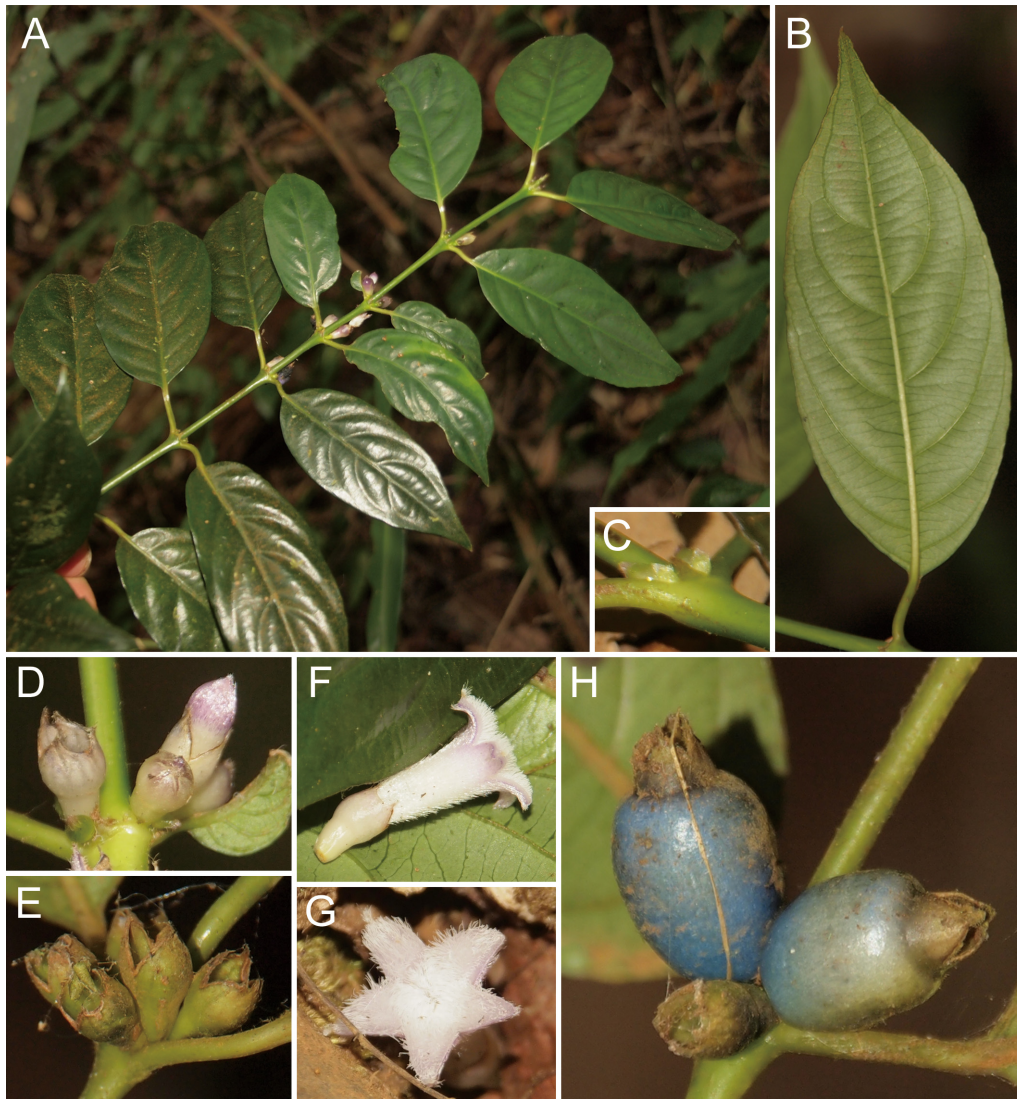


FIGURE 2. *Lasianthus bolavenensis* Tagane & Soulad. A. Flowering twig; B. Abaxial leaf surface; C. Stipule; D. Flower bud and calyces; E. Calyces after anthesis; F. Flower (side view); G. Flower (front view); H. Fruits. Materials A & D from Souladeth *et al.* L2501; B, C, E–H from Souladeth *et al.* L3337.

***Lasianthus laoticus* Tagane, Soulad. & Nob. Tanaka, sp. nov.** Figures 3 & 4

TYPE:—LAOS. Attapeu Province: Sanamxai District, roadside, at edge of evergreen forest, 14°47'18.18"N, 106°25'24.90"E, 183 m elev., 6 July 2019, P. Souladeth, S. Tagane, N. Tanaka, K. Souttakone, Y. Suyama, K. Phengmala, N. Ishii L3024 (holotype FOF!, isotypes KAG129297!, TNS!).

Lasianthus laoticus is similar to *L. kailarsenii* Poopath, Vajrodaya & Napiroon in Napiroon *et al.* (2018: 208) of Thailand and *L. longipedunculatus* Parker (1925: 430) of Myanmar and Thailand in having conspicuous pedunculate cymes, but distinguished by appressed hairy twigs and petiole (vs. glabrous), reticulate tertiary veins (vs. parallel), and smaller triangle stipule ca. 1.8 mm long (vs. lanceolate, 3–4 mm long in *L. kailarsenii* and triangular, 2–5 mm long in *L. longipedunculatus*). In addition to these vegetative traits, *L. laoticus* differs from *L. kailarsenii* in having cylindrical-campanulate corolla with triangular lobes 3 mm long (vs. tuber, lobes oblong-lanceolate 1.5–2 mm long), longer style 4 mm long (vs. 1.5–2 mm), and from *L. longipedunculatus* in having shorter peduncles 1–3 cm long (vs.

4–10 cm long), smaller linear bracts ca. 2.2 mm long (vs. leaf-like, linear-lanceolate, 8–12 mm long), and triangular calyx lobes ca. 1 mm long (vs. oblong-lanceolate, 4–4.5 mm long) (Table 2).

Table 2. Comparison of *Lasianthus laoticus* with three morphologically similar species. Data on *L. kailarsenii*, and *L. longipedunculatus* and *L. lancilobus* were retrieved from the protologue Napieroon *et al.* (2018), Parker (1925) and Zhu (2012), as well as their type specimens, respectively.

Characters	<i>Lasianthus laoticus</i>	<i>L. kailarsenii</i>	<i>L. longipedunculatus</i>	<i>L. lancilobus</i>
Lamina	ovate-oblong, 3.5–13 × 1.4–4.1 cm	lanceolate to lanceolate-elliptic, 5–7 × 2.5–3 cm,	oblong, 15–20 × 4–6 cm	oblong, 6–13 × 2.5–3.5 cm
Petiole length	1–3 mm	1 mm	1–2 mm	6–8 mm
Hairlines on twig and petiole	appressed hairy	glabrous except base which is sparsely hirsute	glabrous	(sparsely) hirsute
Number of secondary veins	8–11 pairs	6–8 pairs	6–8 pairs	5–6 pairs
Tertiary veins	reticulate	parallel	parallel	subparallel
Stipules	triangular, ca. 1.8 mm long	lanceolate, 3–4 mm long	triangular, 2–3(–5) mm long	Lanceolate, ca. 3 mm long
Peduncle length	1–3 cm	2.5–4 cm	4–10 cm	2.5–3 cm
Bracts	linear, ca. 2.2 mm long	lanceolate, 2–3 mm long	leaf-like, linear-lanceolate, 8–12 mm long	linear, up to 15 mm long
Calyx lobes	triangular, ca. 1 mm long	triangular, 1–1.5 mm long	oblong-lanceolate, 4–4.5 mm long	lanceolate, 5 mm long
Corolla lobes	triangular, ca. 3 mm long	oblong-lanceolate, with lobes 1.5–2 mm long	oblong, 2 mm long	-
Style length	4 mm	1.5–2 mm	-	-

Description:—Shrub, to 1 m high. Current year twig 2–3 mm in diam., flattened, appressed brownish hairy, glabrescent; internode 1.3–4.2 cm. Leaves opposite, petiolate; petiole 1–3 mm long, densely appressed hairy; blade ovate-oblong, 3.5–13 × 1.4–4.1 cm, subcoriaceous, adaxially dark yellow green, glossy, glabrous, abaxially gray green, densely hairy on midrib to tertiary veins, apex acuminate to aristate, tip pointed, 0.8–1.4 mm long, base cordate, margin finely undulate, midrib sunken adaxially, prominent abaxially, secondary veins 8–11 pairs, prominent abaxially, tertiary veins reticulate. Stipules triangular, ca. 1.8 mm long, brownish hairy outside, especially denser near margin and apex. Inflorescence axillary, cymose, solitary to 7-flowered; peduncle 1.3–3 cm long, pubescent, glabrescent; bract linear, ca. 2.2 mm long, pubescent. Flowers subsessile to short-stalked; pedicels up to 2.2 mm long; calyx obconical, sparsely pubescent, tube ca. 2 mm long, lobes 4, triangular, ca. 1 mm long; corolla white with a faint tinge of yellow, cylindrical-campanulate, tube 6–9 mm long, outside glabrous, inside villous in upper 1/2, lobes triangular, ca. 3 mm long, apex apiculate, outside glabrous, inside villous, stamens 4, exerted from corolla, filaments basally connate to corolla, free part ca. 1.2 mm long, glabrous, anthers ca. 2.2 mm long, ciliolate; ovary 4-locular, style ca. 4 mm long, glabrous, stigma 4-lobed, ca. 0.9 mm long. Fruits drupaceous, subglobose or ovoid, 5–6 mm long, ca. 5 mm in diam., crowned by the persistent calyx, blackish brown when ripe, sparsely appressed hairy on the surface; the persistent calyx lobes 4, linear to linear-lanceolate, ca. 1 mm long, apex acute, hirsute; pyrenes 4, grooved on the dorsal curved face, obovoid, ca. 4 mm long, 2 mm wide.

Additional specimen examined:—Champasak Province, Dong Hua Sao National Protected Area, 14°53'44.73"N, 106°01'2.36"E, 158 m elev., 13 December 2018, *S. Tagane et al.* L2222 [young infl.] (FOF, KAG128322).

Distribution:—Laos (so far known only from the two provinces, Attapeu and Champasak Provinces, located at the southern basin of Bolaven Plateau).

Habitat and Ecology:—The species was found in lowland evergreen forest at 150–190 m elev. Flowering and fruiting specimens were collected in July.

Etymology:—This specific epithet *laoticus* is derived from the country name where this species was discovered.

Vernacular name:—ຊ້າງສານລາວ [(Xangsan Lao, “Xangsan” means *Lasianthus* in general in Lao and “Lao” refers to the country where the species is discovered), proposed here].

Preliminary conservation assessment:—Endangered (EN). To date, *Lasianthus laoticus* is known only from two populations with each ca. 30 mature individuals in the lowland evergreen forest in lower elevations at the southern basin of Bolaven Plateau, at elevation of 158 and 183 m. Considering the distance between the two localities is ca. 18 km and same environment is found in the area, the estimated extent of occupancy for this species is 900 km². The

localities we collected the above specimens are along a recently constructed logging road, and are being gradually deforested. Therefore, we suggest the category of this species as Endangered according to the IUCN criteria B1ab(i, ii, iii) (IUCN 2012). More accurate data on its population size and number of individuals is needed for developing a conservation plan.



FIGURE 3. Isotype of *Lasianthus laoticus* Tagane, Soulad. & Nob.Tanaka. (Souladeth et al. L3024 (KAG129297)).

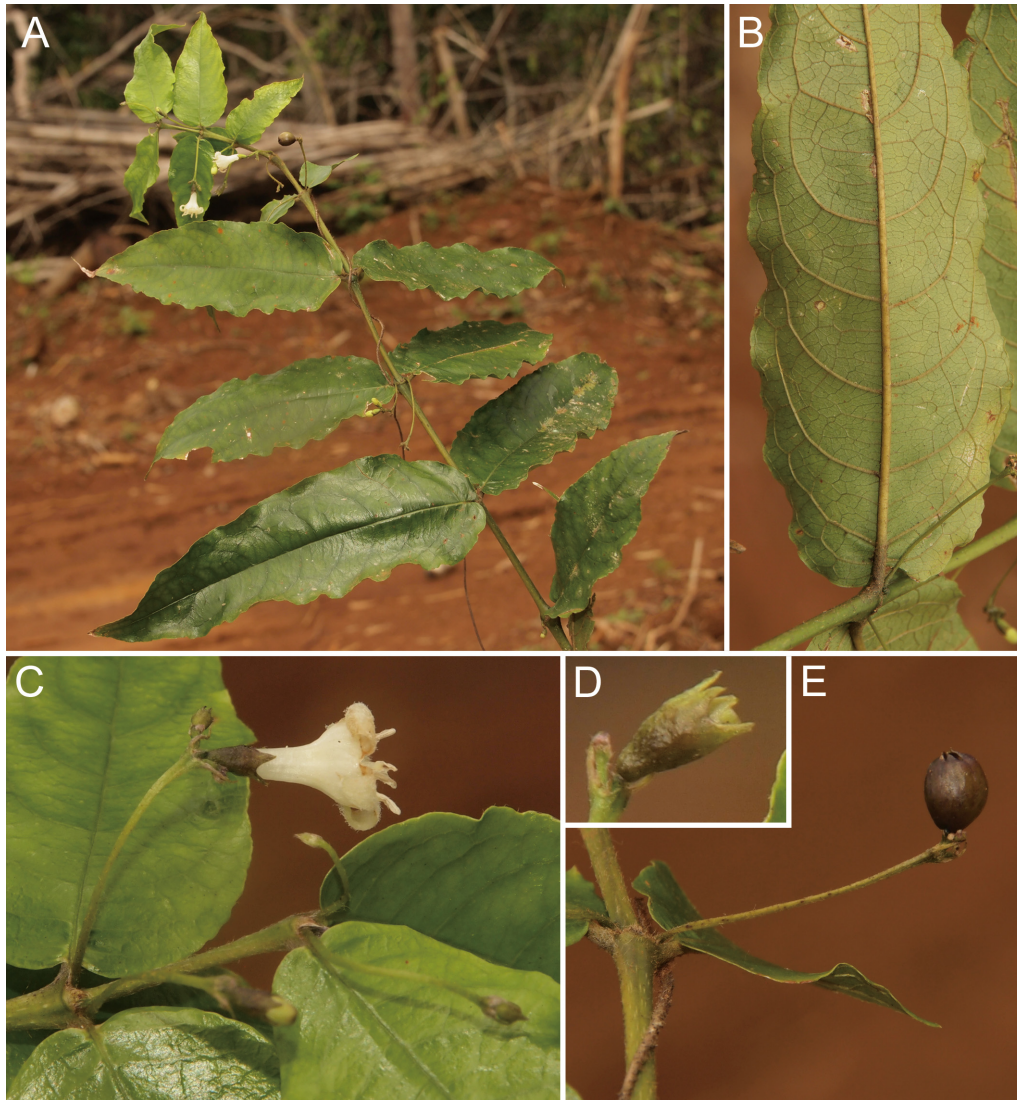


FIGURE 4. *Lasianthus laoticus* Tagane, Soulad. & Nob.Tanaka. A. Flowering twig; B. Portion of abaxial leaf surface; C. Inflorescence; D. Calyx; E. Fruit. All from Souladeth et al. L3024.

Notes:—Among the species of *Lasianthus* in Laos, *L. laoticus* is easily distinguished by its slender peduncles (vs. inflorescence sessile or subsessile in the other species). It is also similar to *L. lancilobus* of West Kalimantan in lamina size and slender peduncles but different from *L. lancilobus* in having shorter petiole 1–3 mm long (vs. 6–8 mm long in *L. lancilobus*), cordate leaf base (vs. acute to cuneate), 8–11 pairs of secondary veins (vs. 5–6 pairs), and small triangular calyx lobe 1 mm long (vs. lanceolate, 5 mm long) (Table 2).

New record

Lasianthus repoeuensis Pierre ex Pitard (1924: 387). Type:—CAMBODIA. Montibus Knang Krepoeu, May 1870, *L. Pierre 1257* (holotype A00096531 image!, isotypes P02285238, P3981160, images!). Figure 5

Specimen examined:—LAOS. Attapeu Province, Sanamxai Diistrict, Bolaven Plateau, in lowland evergreen forest, 14°48'19"N, 106°26'39"E, 223 m elev., 6 July 2019, *P. Souladeth et al. L3067* (FOF, KAG, TNS).

Distribution:—Cambodia, Laos, Thailand, Vietnam.

Vernacular name:—ຊ້າງສານສະປີ [(Xangsan Speu, “Xangsan” means *Lasianthus* in general in Lao and “Speu” refers to “Knang Krepoeu”, the type locality of this species, which is currently known as Kampong Speu Province), proposed here].

Notes:—*Lasianthus repoeuensis* is distinguished from the other *Lasianthus* species in Laos by having lamina oblong-elliptic, elliptic-obovate, 9–17 × 2.8–4.3 cm, glabrous, adaxially blackish brown when dry, with 14–16 pairs of secondary veins, and stipule broadly triangular, 4–5 mm long.

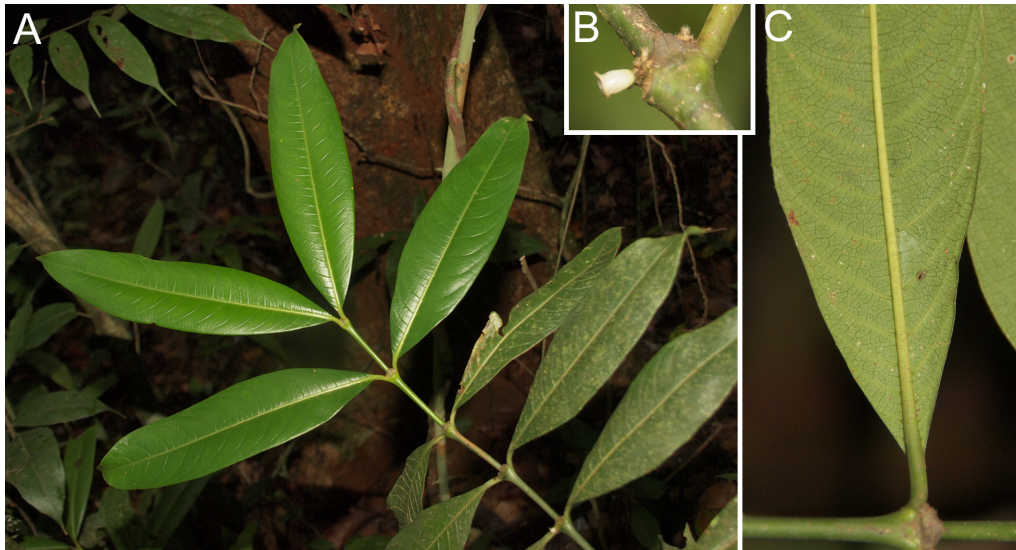


FIGURE 5. *Lasianthus repoeuensis* Pierre ex Pit. A. Leafy twig; B. Calyx; C. Portion of abaxial leaf surface. All from Souladeth et al. L3067.

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