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## Research article

# Two new species of *Melastoma* L. (Melastomataceae) from Limestone Karst, Khammouane Province, central Laos

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**Abstract.** Two new species, *Melastoma calcicolum* Souvann. & Tagane sp. nov. and *M. souladethianum* Souvann. & Nob.Tanaka sp. nov. (Melastomataceae), are described from limestone karst habitats in Khammouane Province, central Laos. Descriptions, photographs, distribution, habitat, phenology, and initial conservation statuses of both newly described species are given. A key to the species of *Melastoma* in Laos including currently reported species is provided. These discoveries result from extensive fieldwork conducted between 2022 and 2025 in protected areas including Phou Hin Poun National protected area and Phou Pha Marn area. *M. calcicolum* sp. nov. is distinguished from *M. saigonense* by its terete twigs, narrow lanceolate leaves, spaced penicillate emergences on the hypanthium, stalk of emergences on hypanthium shorter, glabrous sepals, and longer styles, while *M. souladethianum* sp. nov. differs from *M. pellegrinianum* by its terete branches, small inflorescences with 2–4 flowers, and sparsely bristled hypanthium with strigose hairs. Both species are currently known only from their type localities, occurring in exposed limestone areas, and are preliminarily assessed as Endangered and Critically Endangered based on IUCN criteria due to their restricted distributions and small population sizes. These findings highlight the high botanical diversity and endemism of Laos's limestone ecosystems and underscore the importance of continued botanical exploration in the region.

**Keywords.** Limestone flora, Myrtales, new description, new taxa, Southeast Asia.

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## Introduction

The genus *Melastoma* L., belonging to the family Melastomataceae, includes around 100 species (Ng *et al.* 2020; POWO 2025) primarily distributed in Southeast Asia, India, and extended to Japan and Australia. In Southeast Asia and the surrounding region, five species are known in China (one endemic, Chen & Renner 2007), eight in Thailand (Renner *et al.* 2001), 17 in Vietnam (Meyer 2001; Ho 2003), and five in Cambodia (Meyer 2001). The genus also presents a high diversity and endemism in Borneo (40 species endemics to Borneo, Wong 2016). In Laos, five species (one with two subspecies) of *Melastoma* have been recorded so far: *M. malabathricum* L., *M. malabathricum* subsp. *normale* (D.Don) Karst.Mey., *M. orientale* Guillaumin, *M. pellegrinianum* (H.Boissieu) Karst.Mey., *M. saigonense* (Kuntze) Merr. and *M. sanguineum* Sims (Renner *et al.* 2001; Newman *et al.* 2017–present). Meyer (2001) and Wong (2015) presented a detailed morphological description of *Melastoma*.

Recently, four new species of Melastomataceae were described in different genera than *Melastoma* in Laos: *Sonerila bolavenensis* Soulad., Tagane & Suddee (Souladeth *et al.* 2021), *S. erectifolia* Phonep., Soulad. & Tagane, *S. souvannii* Phonep. & Soulad. (Phonepaseuth *et al.* 2021) and *Perilimnastes aura* Souvann. & Lamxay (Souvannakhommane *et al.* 2024). This suggests a significant number of new species remain to be discovered. In this paper, we describe two new species of *Melastoma*, *M. calcicolum* Souvann. & Tagane sp. nov. and *M. souladethianum* Souvann. & Nob.Tanaka sp. nov., both were discovered in limestone areas in central Laos.

## Materials and methods

Eight field trips were carried out in limestone karst of central Laos, including Nam Kading National Protected Area in Bolikhamxai province, The Rock Viewpoint at Phou Pha Marn and Phou Hin Poun National Protected Area in Khammouane province, from July 2022 to April 2025. A total of 2510 voucher specimens were collected: of these 14 were identified as *Melastoma*. The specimens were collected along with photographic data and deposited in the FOF, KAG, and VNM herbaria (the herbarium acronyms

follow the Index Herbariorum (Thiers, 2016–continuously updated). Descriptions and photographs were prepared based on the living plants and herbarium specimens. Comparisons of diagnostic characters were based on the type specimens, as well as digital images of specimens kept at the AAU, BKF, BM, E, K, P and PE herbaria that are available online, and in relevant taxonomic literature (Guillaumin 1913; Meyer 2001; Renner *et al.* 2001; Ho 2003; Chen & Renner 2007). The morphological terminology used follows Wong (2016). Preliminary conservation assessments are made following the Guidelines for Using the IUCN Red List Categories and Criteria Version 16 (IUCN 2024).

## Taxonomic Treatment

Class Magnoliopsida Brongn.  
Order Myrtales Juss. ex Bercht. & J. Presl.  
Family Melastomataceae Juss.  
Genus *Melastoma* L.

*Melastoma calcicolum* Souvann. & Tagane sp. nov.

urn:lsid:ipni.org:names:77372121-1

Figs 1, 3

## Diagnosis

Similar to *Melastoma saigonense* (Kuntze) Merr., but differs in its terete young twigs (vs. (sub) quadrangular), narrower leaves (ovate-lanceolate to lanceolate, length/width ratio 2.8–4.1 vs. ovate to elliptic, length/width ratio 1.8–2), penicillate emergences spaced apart (vs. densely covered by penicillate emergences), stalk of emergences on hypanthium 1–1.5 mm long (vs. 3–5 mm long), glabrous sepals except for ciliate margins (vs. outer surface densely covered with bristles), and longer styles (20–25 mm long vs. 15–20 mm long).

## Etymology

The specific epithet refers to the limestone habitat.

## Type material

### Holotype

LAOS • Khammouane Province, Hinboun district, Phou Hin Poun National Protected Area, Khoun Kongleng walking trail; 203 m a.s.l.; 6 Sep. 2024; *Tagane et al.* Z1704; holotype: FOF [FOF0007160]; isotypes: KAG [KAG188367], VNM.

### Paratypes

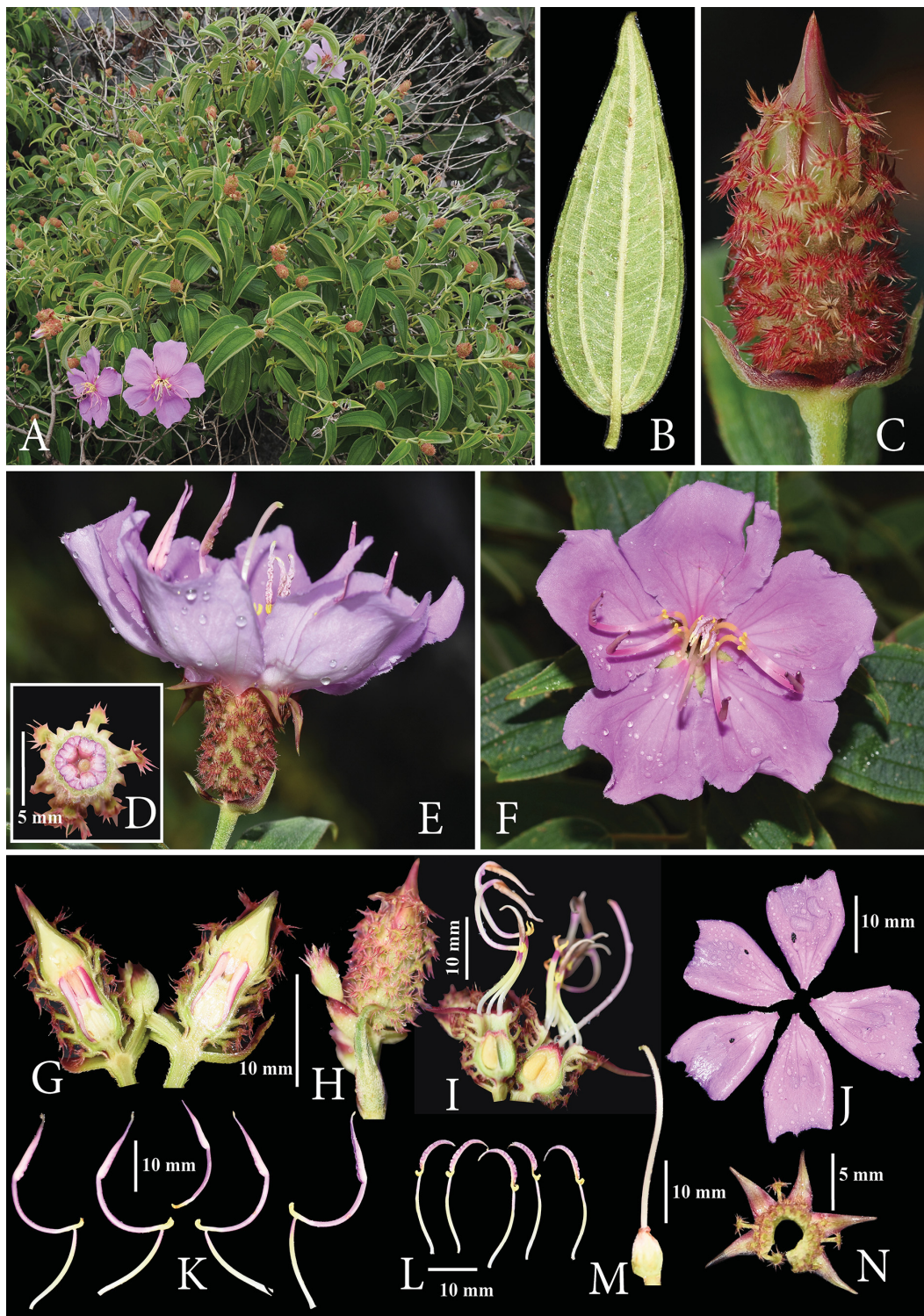
LAOS • Khammouane province, Hinboun district, Phou Hin Poun National Protected Area, Khoun Kongleng walking trail; 194 m a.s.l.; 6 Sep. 2024; *Tagane et al.* Z1693; FOF [FOF0007159] • same data as for preceding; KAG [KAG188355], VNM.

## Vernacular name

ເອນອ້າຊຸນກອງແລງ En R Khoun Kongleng (meaning: ‘Khoun Kongleng's *Melastoma*’).

## Description

Deciduous shrubs, up to 2.5 m tall. *Twigs* terete, densely covered with light pale yellow, lanceolate, ascending bristles when young, older twigs grayish to brown, terete, glabrescent to sparsely covered with bristles; internode 0.4–2.4 cm. *Leaves* opposite, crowded at the top of twigs; lamina ovate-lanceolate to lanceolate, (2–)3.5–8 × (0.5–)0.9–2.9 cm, length/width ratio 2.8–4.1, base obtuse to rounded, rarely



**Fig. 1.** *Melastoma calcicolum* Souvann. & Tagane sp. nov. **A.** Habit. **B.** Abaxial leaf surface. **C.** Close-up of flower bud showing the penicillate emergences. **D.** Horizontal cross-section of ovary. **E.** Lateral view of flower. **F.** Top view of flower. **G.** Vertical cross-section of flower bud. **H.** Flower bud. **I.** Vertical cross-section of the flower with petals removed. **J.** Petals. **K.** Long stamens. **L.** Short stamens. **M.** Pistil. **N.** Bottom view of hypanthium showing the 5 sepals. Photos from holotype (*Tagane et al.* Z1704) A, C by S. Tagane; B, D, G–N by K. Souvannakhoummane and E–F by P. Phonepaseuth.

cuneate, margins entire, apex acute to acuminate, acumen up to 1.5 cm long, adaxial surface grayish green, minutely scabrid with conspicuously abundant elongate wavy spicule-like rows of crystalliferous cells which are typically proximal to long hairs, hairs 0.4–1.2 mm long, abaxial surface dull yellow-brown to light yellowish brown, covered with bristles 0.4–1.2 mm long on the midrib and longitudinal nerves, and 0.3–0.5 mm long on the secondary veins; longitudinal nerves running from base to apex 4 in addition to the midrib, impressed adaxially, prominent abaxially; secondary veins subparallel, 0.8–1.5 mm apart, inconspicuous adaxially, slightly prominent abaxially; tertiary veins branching into a conspicuous reticulate network; petioles, slightly concave adaxially, 0.4–1.8 cm long, ca 1 mm in diameter, indumentum as in young twigs. *Inflorescences* terminal cymes of three (rarely five) flowers, or flowers solitary. *Pedicels* slender, 5–10 mm, ca 2.5 mm in diameter, with white fine soft strigose hairs. *Bracts* two, caducous, dull yellow brown with dark-purple margin, ovate to broadly ovate, 4–6 × 2.5–5 mm, densely covered with light yellow, lanceolate, appressed bristles except on the dark-purple marginal portion, apex acute. *Hypanthium* narrowly funnel-shaped or campanulate, 6–12 × 6–8 mm, densely covered with light pale yellow bristles and dark reddish penicillate emergences, penicillate emergences 0.5–2 mm long, stalk of emergences 1–1.5 mm long, spaced apart between penicillate emergences, crowned by 40–56 bristles; bristles 0.5–1.2 mm long; sepals 5, pink to light green to dark purple, narrowly triangular, 8–10 × 2–2.5 mm, glabrous except for ciliolate margins, apex narrowly attenuate; intersepal emergences penicillate, 4–5 mm long, crowned by 40–56 bristles; bristles 0.5–1.2 mm long; hypanthium stalk ca 1 mm long, reddish brown. *Petals* 5, broadly obovate, 24–30 × 20–26 mm, purple, glabrous on both surfaces except for a few bristles near the apex, apex broadly obtuse. *Stamens* anisomorphic comprising 5 longer stamens and 5 shorter stamens; longer stamens 35–42 mm long; filaments 17–30 mm long, yellowish; anthers 8–12 mm long, pale purple, connectives 10–15 mm long, strongly incurved, with a yellow basal bifurcate extension, glabrous; shorter stamens 20–22 mm long; filaments 14–18 mm long, yellowish; anther 8–9 mm long, linear-rostrate, pale purple; connective not prolonged, with a yellow basal bifurcate extension, glabrous. *Pistil* 32–35 mm long; ovary ovoid to ellipsoid, 8–10 × 6–8 mm, greenish, densely covered with bristles at upper part; style filiform, slightly curved apically, 20–25 mm long, glabrous, stigma blunt. *Fruits* baccate, subglobose to ellipsoid, 9–12 × 7–9 mm, with persistent hypanthium scales as described above.

### **Distribution, habitat and phenology**

This species is so far known only from the type locality in Phou Hin Poun National Protected Area, Hinboun District, Khammouane Province, central Laos. It grows on an exposed limestone hilltop, where it is associated with *Terminalia calamansanai* (Blanco) Rolfe (Combretaceae), *Phyllanthus mirabilis* Müll.Arg. (Phyllanthaceae), *Tetrastigma fruticosum* Soulad., Phonep. & Tagane (Vitaceae), *Falconeria insignis* Royle (Euphorbiaceae), *Pouzolzia zeylanica* var. *calcicola* Friis & Wilmot-Dear (Urticaceae), *Paraboea* sp. (Gesneriaceae), *Pandanus* sp. (Pandanaceae), *Dracaena* sp. (Asparagaceae), and *Aetheolirion stenolobium* Forman (Commelinaceae). Flowering is from August to September and fruiting from September to November. The leaves are deciduous from the late dry season in October to the beginning of the rainy season in May.

### **Preliminary conservation status**

*Melastoma calcicolum* sp. nov. is known only from the type locality, where we observed one population with about 80 mature individuals. Despite being in a protected area, it is slightly exposed to disturbs caused by ecotourism activities such as the construction of restaurants and walkways. The Area of Occupancy (AOO) is 4 km<sup>2</sup>. The Extent of Occurrence (EOO) can be regarded as the area of Phou Hin Poun NPA, 500 km<sup>2</sup>, as the same type of exposed limestone karst habitat can be seen widely in the NPA, and the species could be locally abundant. Given this situation, it is preliminarily assessed as Endangered (EN) under the IUCN criteria B2a, b (iii).

## Notes

The penicillate hypanthium emergences are a good character for this species. In Indochina, only *M. saigonense* and *M. orientale* have similar hypanthium emergences. However, the new species is easily distinguished from *M. saigonense* by the characters provided in the diagnosis above, and from *M. orientale* by its larger flowers. In addition, the habitats of the three species are completely different: *M. calcicolum* sp. nov. is restricted to exposed limestone rocks, whereas *M. saigonense* and *M. orientale* grow on dry or swampy ground, in exposed places with full sun or exposed grasslands (Meyer 2001).

*Melastoma souladethianum* Souvann. & Nob.Tanaka sp. nov.

urn:lsid:ipni.org:names:77372122-1

Figs 2, 3

## Diagnosis

Similar to *Melastoma pellegrinianum* (H.Boissieu) Karst.Mey., but it differs in having terete young branches (vs. quadrangular in *M. pellegrinianum*), inflorescences with 2–4 flowers (vs. more than 15), hypanthia sparsely covered in bristles with sparse strigose hairs (vs. bristles without strigose hairs).

## Etymology

The specific epithet honors Dr. Phetlasy Souladeth, curator of the FOF herbarium of the National University of Laos, who led our field trips and is an excellent plant taxonomist. She has greatly contributed to elucidating the flora of Laos and has described more than 30 new species and recorded over 100 species to Laos' flora.

## Type material

### Holotype

LAOS • Khammouane Province, Khounkham District, The Rock Viewpoint at Phou Pha Marn, limestone karsts; 455 m a.s.l.; 19 Mar. 2024; *Tagane et al. Z1213*; holotype FOF [FOF0007123]; isotypes KAG [KAG187615], VNM.

### Paratypes

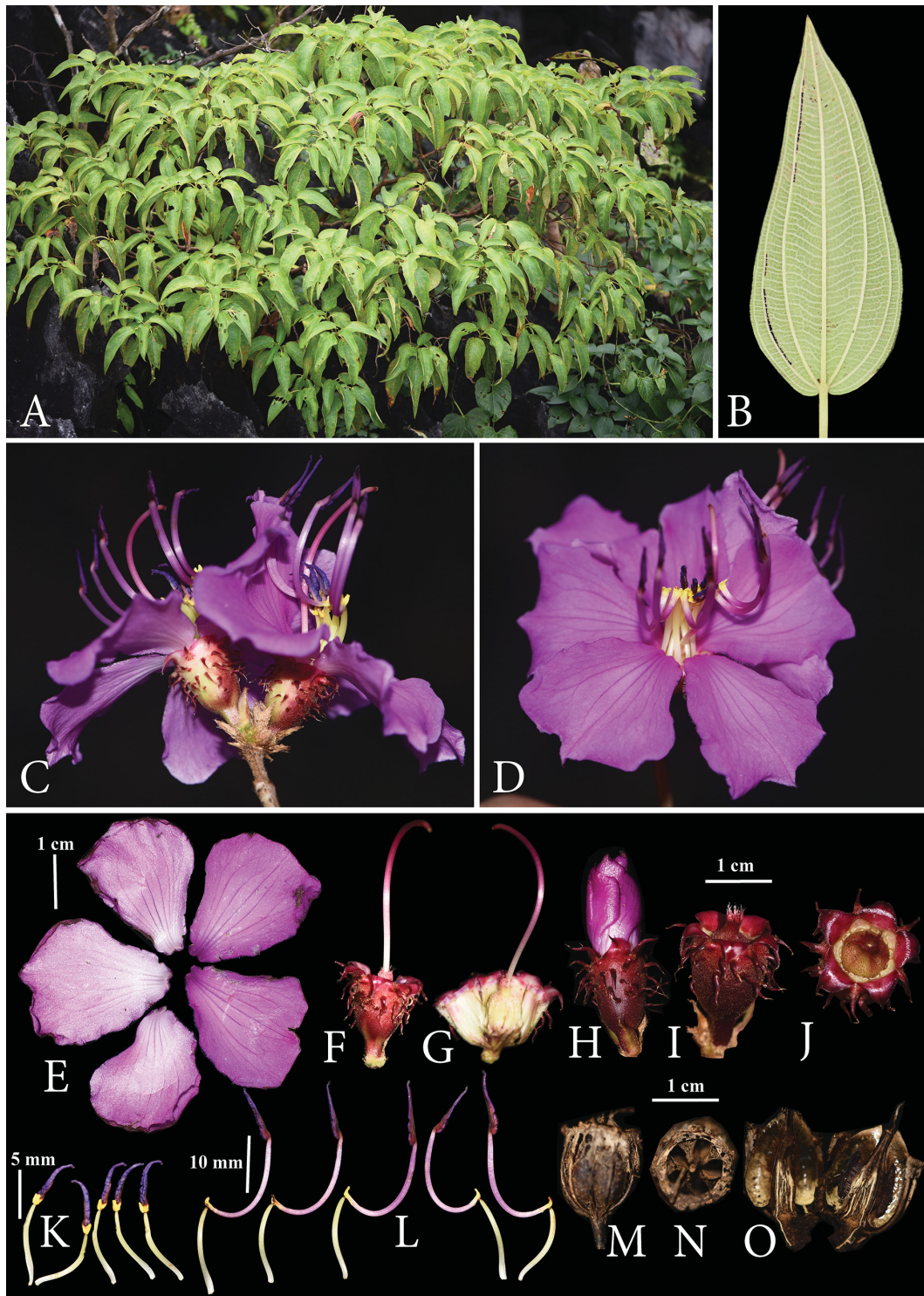
LAOS • Khammouane Province, Khounkham District, The Rock Viewpoint at Phou Pha Marn, limestone karsts; 455 m a.s.l.; 9 Sep. 2024; *Tagane et al. Z1915*; FOF [FOF0006984] • same data as for preceding KAG [KAG188567], VNM • same locality as for preceding; 2 July 2022, *Souladeth et al. PPM16*; FOF; • same locality as for preceding; 454 m a.s.l.; 8 Mar. 2025, *S. Tagane et al. Z2396*; FOF [FOF0007645], KAG [KAG201118], VNM.

## Vernacular name

ເອນອ້າເພັດຊິມພູ En R Phetsomphou (meaning: purple diamond's *Melastoma*').

## Description

Deciduous shrubs, up to 2.5 m tall. *Twigs* terete, slightly zigzag, older twigs grayish to brown, glabrous; younger twigs green, sparsely covered with bristles and narrowly linear scales of 1–1.5 mm long at the base. *Leaves* opposite, crowded at the top of twigs, lamina lanceolate, 8–12 × 3–5.5 cm, base slightly cordate to rounded, margin denticulate, apex acuminate; adaxially surface dark green, covered with white strigose hairs which are longer (0.4–1 mm long) and incurved along the margins, abaxially surface light green, sparsely covered with white strigose hairs which are denser on the midrib, longitudinal veins and secondary veins (0.4–1.2 mm long); longitudinal nerves running from base to apex, 4–6 in addition to the midrib, prominent abaxially; secondary veins subparallel, 4–10 mm apart, adaxially inconspicuous, abaxially immersed in the lamina; tertiary veins branching into a conspicuous reticulate network; petioles



**Fig. 2.** *Melastoma souladethianum* Souvann. & Nob.Tanaka, sp. nov. **A.** Habit. **B.** Abaxial leaf surface. **C–D.** Flowers. **E.** Petals. **F.** Hypanthium & pistil. **G.** Vertical cross-section of hypanthium showing ovary. **H.** Flower bud. **I.** Lateral view of young fruits. **J.** Top view of young fruit. **K.** Short stamens. **L.** Long stamens. **M.** Lateral view of mature dry fruit. **N.** Top view of mature dry fruit. **O.** Vertical cross section of mature dry fruit. Photos C–L from holotype (*Tagane et al.* Z1213) and A–B; M–O paratype (*Tagane et al.* Z1915) by K. Souvannakhoummane.

2–3.5 cm long, ca 1 mm in diameter, covered by strigose hairs of 0.4–1.4 mm long. *Inflorescences* cluster on terminal twigs with 2–4 flowers. *Pedicels* slender, 2–6 mm, ca 3 mm in diameter, with dark red to brown fine soft strigose hairs. *Bracts* rosetted, caducous, lanceolate, 6–10 × 2–3.5 mm, strigose with light green to pink hairs. *Hypanthium* funnel-shaped, 10–15 × 8–12 mm, sparsely covered with dense bristles and sparsely strigose hairs, bristles 6–12 mm long, up to 0.5 mm wide at the base, apex markedly acuminate, margin entire; sepals 5, broadly triangular to lanceolate, 3–3.5 × 4–6 mm, apex markedly acuminate, pink to light green, with sparse minute bristles on margins and apex. *Petals* 5, broadly obovate, 28–30 × 20–25 mm, purple, with minute bristles on outside surface, apex acute to obtuse. *Stamens* anisomorphic comprising 5 longer stamens and 5 shorter stamens; longer stamens 40–45 mm long; filaments 27–35 mm long, yellowish; anthers ca 10–12 mm long, purple; connective strongly incurved, 18–25 mm long, with a basal bifurcate yellow extension, glabrous; shorter stamens 10–15 mm long, filaments yellowish, ca 6–10 mm long, linear-rostrate; anthers dark purple, connective not prolonged, with a yellow basal bifurcate extension, glabrous. *Pistil* ca 35 mm long; ovary ovoid to ellipsoid, 8–12 × 5–6 mm, greenish, densely covered with bristles from middle part to apex; style filiform, curved apically, 27–32 mm long; stigma truncate. *Fruits* dry capsule, dehiscent, splitting longitudinally from apex, ellipsoid to cup shaped, 10–14 × 6–8 mm, strigose to glabrescent; seeds numerous, brownish.

### **Distribution, habitat and phenology**

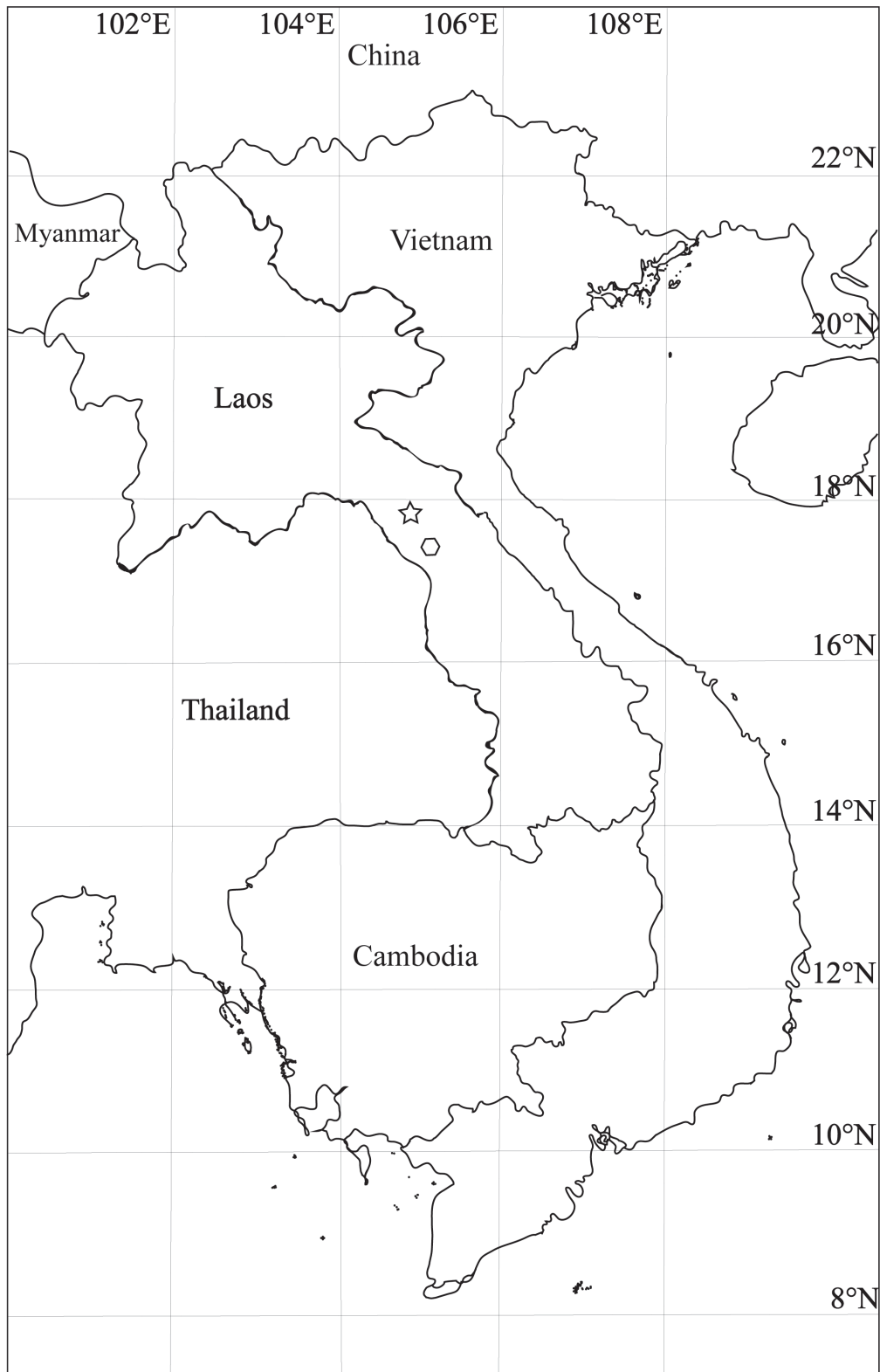
*Melastoma souladethianum* sp. nov. is so far known only from the type locality in Phou Pha Marn limestone karst, Khounkham District, Khammouane Province. It grows in open areas on limestone karst, where it is associated with *Sterculia* sp. (Malvaceae), *Phyllanthus mirabilis* Müll.Arg. (Phyllanthaceae), *Microchirita* sp. (Gesneriaceae), *Ficus* sp. (Moraceae) and *Pentacme siamensis* (Miq.) Kurz (Dipterocarpaceae). Flowering is from March to April, and fruiting from May to June. The leaves come out in May at the beginning of the rainy season and fall in January in the middle of the dry season.

### **Preliminary conservation status**

To date, we have observed only one population with fewer than 20 mature individuals. Neither seedlings or saplings could be observed, not even during the rainy season. The area of occupancy (AOO) is 4 km<sup>2</sup> and the extent of occurrence (EOO) follows the area of the Phou Pha Marn Karst, which is 32 218 km<sup>2</sup>. This species is preliminarily assessed as Critically Endangered (CR) under categories B2 and D.

### **Notes**

*Melastoma souladethianum* sp. nov. blooms from March to May (dry season), before the emergence of its leaves. In contrast, most other species of *Melastoma* in Laos and the surrounding region flower in the rainy season and into the beginning of dry season from June to the end of October and while in leaf. This specific character might be an adaptation to the survival and reproduction under the severe environment of the limestone karst. Phylogenetic studies including *M. souladethianum*, sp. nov. with related taxa, as well as ecological studies, including pollination syndromes and seed dispersal strategies, may provide further interesting insights into the reproductive strategy, evolution and speciation of *Melastoma*.



**Fig. 3.** Distribution of *Melastoma calcicolum* Souvann. & Tagane sp. nov. (hexagon shape) and *Melastoma souladethianum* Souvann. & Nob.Tanaka sp. nov. (star shape).

### Key to the species of *Melastoma* in Laos

1. Hypanthium with penicillate or stellate emergences ..... 2  
– Hypanthium with simple scales, bristles, or hairs ..... 4
2. Hypanthium 3–6 mm long; petals 6–8 mm long ..... *M. orientale* Guillaumin  
– Hypanthium 6–13 mm long; petals 15–30 mm long ..... 3
3. Young twigs (sub)quadrangular; lamina ovate to elliptic; stalk of emergences on hypanthium 3–5 mm long ..... *M. saigonense* (Kuntze) Merr.  
– Young twigs terete; lamina ovate-lanceolate to lanceolate; stalk of emergences on hypanthium 1–1.5 mm long ..... *M. calcicolum* Souvann. & Tagane sp. nov.
4. Fruits apically dehiscent dry capsule ..... 5  
– Fruits longitudinally or transversely dehiscent fleshy capsule ..... 6
5. Young branches terete ..... *M. souladethianum* Souvann. & Nob.Tanaka sp. nov.  
– Young branches quadrangular ..... *M. pellegrinianum* (H.Boissieu) Karst.Mey.
6. Hypanthium covered with spreading bristles ..... *M. sanguineum* Sims  
– Hypanthium covered with appressed scales ..... 7
7. Branches covered with scales ..... *M. malabathricum* L.  
– Branches pilose ..... *M. malabathricum* subsp. *normale* (D.Don) Karst.Mey.

### Discussion

The species of *Melastoma* in Laos were previously represented by five species (one with two subspecies) (Renner *et al.* 2001; Newman *et al.* 2017–present), our new findings increase the number of *Melastoma* species in the country to seven. The documentation of these two new *Melastoma* species will be helpful to understand how the limestone habitats of Laos can be differentiated from other areas in Southeast Asia. According to the Flora of Southeast Asia, most species of *Melastoma* are found in grasslands, deciduous forests, and evergreen forests (Meyer 2001; Renner *et al.* 2001; Ho 2003; Chen & Renner 2007), with no mention of limestone habitats. In contrast, both new species grow on exposed limestone with very limited moisture during the dry season in Laos. It is remarkable to observe *Melastoma souladethianum* flowering without leaves, displaying exceptionally beautiful blooms present during the dry season, while *M. calcicolum* flowering with leaves present during the rainy season. This case presents an intriguing opportunity for further studies on conservation, pollination and physiological adaptations.

About 30,000 km<sup>2</sup> of Laos is covered by limestone, which accounts for around 12.6% of the country, mainly in the northern and central regions (Waltham & Middleton 2000; Clements *et al.* 2006). The type localities of the two new species are both in Khammouane Province in central Laos, which is known to be one of the core sites for biodiversity in Laos as well as a biodiversity hotspot for Indochina. Indeed, several mammals including the Laotian rock rat (*Laonastes aenigmamus*) (Jenkins *et al.* 2005), Laotian langur (*Trachypithecus laotum*) (Coudrat *et al.* 2020), Southern white-cheeked gibbon (*Nomascus siki*) (Nguyen *et al.* 2020), and reptiles including the limestone-dwelling agamid lizard (*Laodracon carsticola*) (Sitthivong *et al.* 2024) and Khunxham Gecko (*Gekko khunxhamensis*) (Sitthivong *et al.* 2021), are endemic to this area in Khammouane Province and its vicinity. For vascular plants, the studies of these areas are very limited (Newman *et al.* 2007), but our recent botanical inventories have already discovered several endemic species from this area: *Drynaria deuansavanhii* Vongthavone & Tagane (Polypodiaceae), *Hemionitis khammouanensis* Vongthavone & Phonep, (Pteridaceae) (Vongthavone *et al.* 2025), *Gomphandra laotica* Soulad., V.S.Dang & Tagane (Stemonuraceae) (Souladeth *et al.* 2025),

*Orophea phouphamarnensis* Kongx, Soulad. & Tagane (Annonaceae) (Kongxaisavath *et al.* 2025), *Lysionotus calcicola* Phonep., Soulad. & Souvann. (Gesneriaceae) (Souvannakhoummane *et al.* 2025), *Nymphanthus namkadingensis* Tak.Yamam., Tagane & Soulad. (Phyllanthaceae) (Yamamoto *et al.* 2024), and *Tetrastigma fruticosum* Soulad., Phonep. & Tagane (Vitaceae) (Tagane *et al.* 2025). These findings confirm that the limestone areas of Laos harbor a high biodiversity value, including both flora and fauna. The two new *Melastoma* species here described are also reinforcing the idea of a specific flora with high endemism in this area. Moreover, in our preliminary study, among 45 vascular plant taxa collected from an exposed limestone hilltop, 21 (46%) are undescribed, indicating that the plant diversity is still underestimated and more efforts in botanical inventories and subsequent taxonomic studies are required for elucidating the flora of the region.

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