

Short Communication

Peliosanthes cambodiana, A New Record for The Flora of Vietnam with Focus on Its Anatomical Characteristics

Nga Nguyen-Phi^{1,2}, Viet Hoang^{1,2}, Triet Tran^{1,2}, Thu Trang Le-thi³, Hong Truong Luu^{4,5}, Hong Thien Van^{6*}

1) Faculty of Biology and Biotechnology, University of Science, Ho Chi Minh City, No. 227 Nguyen Van Cu Street, Cho Quan Ward, Ho Chi Minh City, Vietnam, 700000

2) Vietnam National University, Ho Chi Minh City, Linh Xuan Ward, Ho Chi Minh City, Vietnam, 700000

3) Faculty of Pharmacy, Nguyen Tat Thanh University, No. 300A Nguyen Tat Thanh Street, Xom Chieu Ward, Ho Chi Minh City, Vietnam, 700000

4) Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Nghia Do Ward, Ha Noi, Vietnam, 100000

5) Institute of Advanced Technology, Vietnam Academy of Science and Technology, No. 1D, TL29 Street, An Phu Dong Ward, Ho Chi Minh City, Vietnam, 700000

6) Institute of Biotechnology and Food Technology, Industrial University of Ho Chi Minh City, No. 12 Nguyen Van Bao Street, Hanh Thong Ward, Ho Chi Minh City, Vietnam, 700000

* Corresponding author, email: vanhongthien@iuh.edu.vn

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ABSTRACT

This report documents *Peliosanthes cambodiana* as a newly recorded species in the flora of Vietnam, with its distribution identified on Phu Quoc and Tho Chu Islands. Additionally, the anatomical characteristics of the leaf sheath, leaf, and root of the studied species are described here for the first time.

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Peliosanthes Andrews, a genus belonging to the subfamily Convallarioideae of the family Asparagaceae (Chase et al. 2009; Tanaka & Nguyen 2023), comprises about 80–85 accepted species widely distributed in Southeast and South Asia, including Thailand, Myanmar, Malaysia, Indonesia, Laos, Vietnam, Nepal, Bangladesh, India, and Bhutan (Tanaka 2019; Borah & Tanaka 2024). In Vietnam, Pham (2000) listed one species, *Peliosanthes teta* André, and its subspecies, *P. teta* subsp. *humilis* (Andr.) Jess (Pham 2000). Additionally, twenty-two species and one variety belonging to the genus *Peliosanthes* have been identified as the new or additional species for the flora of Vietnam (Tanaka 2004; Averyanov 2011; Averyanov & Tanaka 2013; Averyanov et al. 2015; Averyanov et al. 2016a; Averyanov et al. 2016b; Nguyen et al. 2017; Luu et al. 2024). Studies have revealed the potential benefits of some species belonging to the genus *Peliosanthes*. For instance, *P. teta* is a medicinal plant and it has been reported to have medicinal values, including treatment for earaches, improved circulation, energy tonic properties, and postpartum care (Rahman et al. 2007; Walker 2017). Furthermore, the cytotoxic and free radical scavenging activities of *P. teta* were also reported (Al-Zubaidi et al. 2024). More recently, Do et al. (2025) successfully isolated β -sitosterol, a bioactive compound, from the ethanol extracts of the *P. micrantha* rhizomes using a newly developed HPLC method.

Peliosanthes cambodiana Aver. et N.Tanaka, a new species to science, was described by Averyanov et al. (2013) which the type specimen was collected from Kampong Saom Province, southern Cambodia. Vislobokov et al. (2020) described a new species from Vietnam, *Peliosanthes curviandra*, whose abaxial leaf epidermis characteristics were smooth, like those of two specimens of *P. cambodiana* found in Cambodia and Vietnam. Of these, the voucher specimen, 2017.13515, of *P. cambodiana* in Vietnam was collected from Phu Quoc Island, Kien Giang Province and deposited at the Main Botanic Garden of the Russian Academy of Science in Moscow (MBG) (Averyanov et al. 2013). Unfortunately, no official publications have documented the presence of *P. cambodiana* in the flora of Vietnam so far.

In 2014 and 2023, we conducted some field trips to Phu Quoc and Tho Chu islands, southern Vietnam and discovered some herbaceous populations belonging to the genus *Peliosanthes*. Our careful examination of its morphological traits indicates that the specimens from these islands are *P. cambodiana*. Thus, in the current study, *P. cambodiana* is recorded as an additional species for the flora of Vietnam with focus on its micro-morphological traits for the first time.

Peliosanthes cambodiana Aver. et N.Tanaka, Taiwania, 58(4): 233 (2013) (Figure 1)

TYPE: LE (holotype), Kampong Saom province, Cambodia, 26 November 2012.

Evergreen herb, rhizome short, 1.5–2.5 cm long, ca. 0.5 cm in diameter with many numerous thick roots, 3–5 cm long, ca. 0.3 cm in diameter. Stem erect, short, ca. 0.5 cm tall. Leaf blade elliptic to oblong, 18–22 cm long, 3–6 cm wide, dark green on the upper surface, pale green on the lower surface, glabrous, glossy, and coriaceous, apex acute or obtuse, margin serrulate; 6–8 longitudinal veins with subperpendicular secondary veinlets; petiole cylindrical, green to dark green, 20–25 cm long, ca. 0.3 cm in diameter, straight. Inflorescence hysteranthous, 8–10 cm long, flowers spirally arranged; sterile bracts surrounding peduncle, creamy white to purple, 0.7–1.6 cm long, 0.3–0.5 cm wide, herbaceous, acuminate, cuneate; peduncle erect, creamy white to purple, straight, 3–5 cm long, ca. 0.5 cm in diameter; rachis straight, white to creamy white, 4–7 cm long, ca. 0.5 cm in diameter; at the base of each pedicel are two floral bracts, creamy white to purple, cuneate, acute apex; outer

bracts (0.5–0.7 cm x ca. 0.1 cm) are longer than inner bracts (0.1–0.4 cm x ca. 0.1 cm). Pedicels pale green to white, 0.5–0.7 cm long, 0.4–0.7 mm in diameter, straight, cylindrical. Flowers solitary, growing in the bract axil. Perianth segments purple to black, incurved, ovate, ca. 1.5 mm long, ca. 1 mm wide; corona purple to black, cylindrical, 1.8–2.0 mm wide; anthers dull yellow, 6, ca. 0.4–0.6 mm wide; ovaries 1.2–1.5 mm long, ca. 1.2 mm, indistinctly hexagonal, 3-locular; ovules creamy white, 2 ovules per 1 lobe of the ovary.

Studied specimens: *Viet Hoang & Nga Nguyen-Phi TCS315, TCS316, TCS317, TCS318, TCS319, and TCS320* (PHH!), 07 March 2023, Tho Chu Island, Vietnam; *Hong Truong Luu, Tran Quoc Trung Nguyen & Quoc Dat Nguyen PQ01, PQ02, PQ03, PQ04* (SGN!), 09 December 2014, Phu Quoc Island, Vietnam.

Distribution: the species is found in Kampong Saom Province, Cambodia; Tho Chu and Phu Quoc Islands, Kien Giang Province, Vietnam

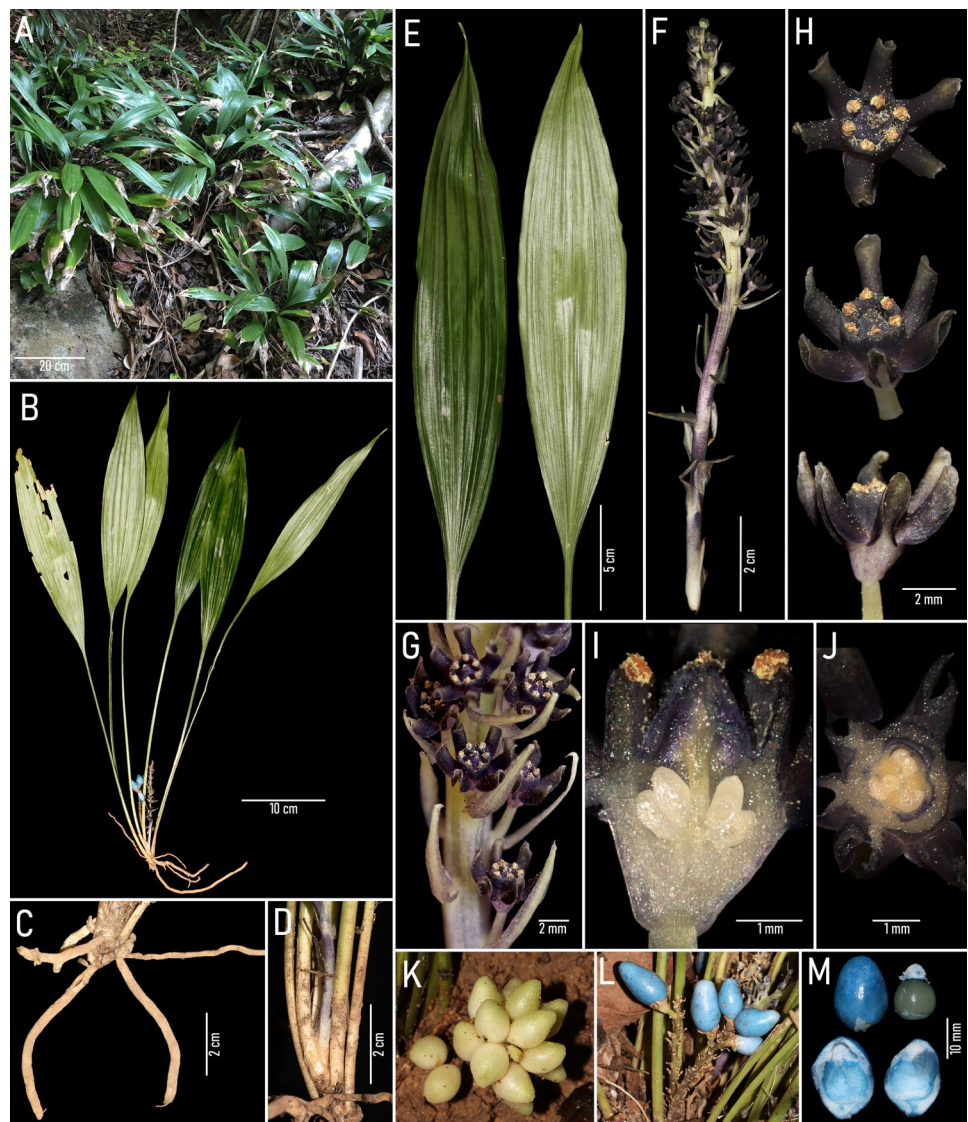


Figure 1. *Peliosanthes cambodiana* Aver. et N.Tanaka. A. Habit. B. Whole plant. C. Roots. D. Petioles. E. Leaves. F-G. Inflorescence. H. Flowers in frontal and side views. I. Longitudinal section of ovary. J. Cross section of ovary. K-L. Infructescences with different colours. M. Longitudinal section of fruit.

Anatomical characteristics of the *Peliosanthes cambodiana*

Root (Figure 2)

The cross-section has a nearly circular shape, divided into two regions; the cortex, which occupies 2/3 of the radius, and the stele, which occupies 1/3 of the radius. Cortex: the piliferous layer consists of a layer of polygonal cells,

irregular in size, with thin cellulose walls or cork impregnated, and short root hairs. The cortical parenchyma includes 26–32 layers of polygonal cells, nearly uniform in size, arranged haphazardly with small intercellular spaces. The endodermis is U-shaped. Stele: the pericycle consists of one to two layers of polygonal cells with cellulose walls, nearly uniform in size, arranged alternately with the endodermis. The vascular system consists of 18–22 phloem bundles alternating with 18–22 protoxylem bundles per ring, separated by medullary rays. The phloem bundles form oval clusters of polygonal, irregular cells. The protoxylem bundles consist of two to five xylem vessels, polygonal and centripetally differentiated. There are 18–24 phloem vessels forming a ring below the primary phloem and protoxylem; the metaxylem vessels are often connected to the protoxylem bundles. The medullary rays consist of a row of horizontally flattened polygonal cells with cellulose walls. The medullary parenchyma is divided into two regions: two to three cell layers below the metaxylem vessels have thick cellulose walls, and six to eight innermost cell layers have thin cellulose walls.

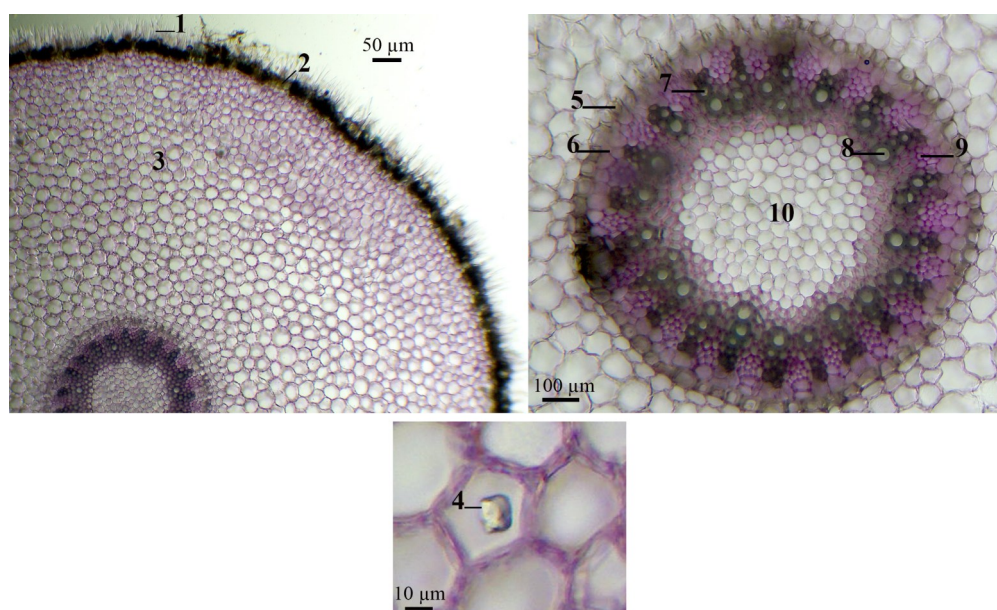


Figure 2. Cross-section of root. 1: root hairs, 2: piliferous layer, 3: parenchyma, 4: cell containing cubic calcium oxalate crystals, 5: U-shaped endodermis, 6: pericycle, 7: protoxylem, 8: metaxylem, 9: phloem, 10: medullary parenchyma.

Leaves (Figure 3)

The leaf blade is convex and concave on both sides, thickened at the vascular bundles and concave between the bundles. The upper and lower epidermis consist of a single layer of polygonal cells, with the outer surface covered with cutin. The collenchyma consists of three to six layers of cells concentrated in convex areas. The vascular bundles are arranged in a row; the vascular bundles at the midrib are the largest and become smaller towards both sides of the leaf blade. The vascular bundles have xylem overlapping phloem. Each bundle consists of 8–14 xylem vessels, lignin-impregnated walls; parenchyma with cellulose walls; and phloem consists of small polygonal cells with cellulose walls, interspersed with many very thick-walled sclerenchyma fibres, lignin-impregnated. Surrounding the vascular bundle are three to four layers of sclerenchyma fibres with very thick walls, concentrated towards the phloem. In the midrib, there are one to two small vascular bundles located above, near the collenchyma. The spongy parenchyma includes irregular, polygonal cells, arranged haphazardly around the vascular bundles. In the concave areas on the leaves (no vascular bundles), appear one to two layers of large, rectangular colourless parenchyma cells lying in rows in the middle of the spongy parenchyma.

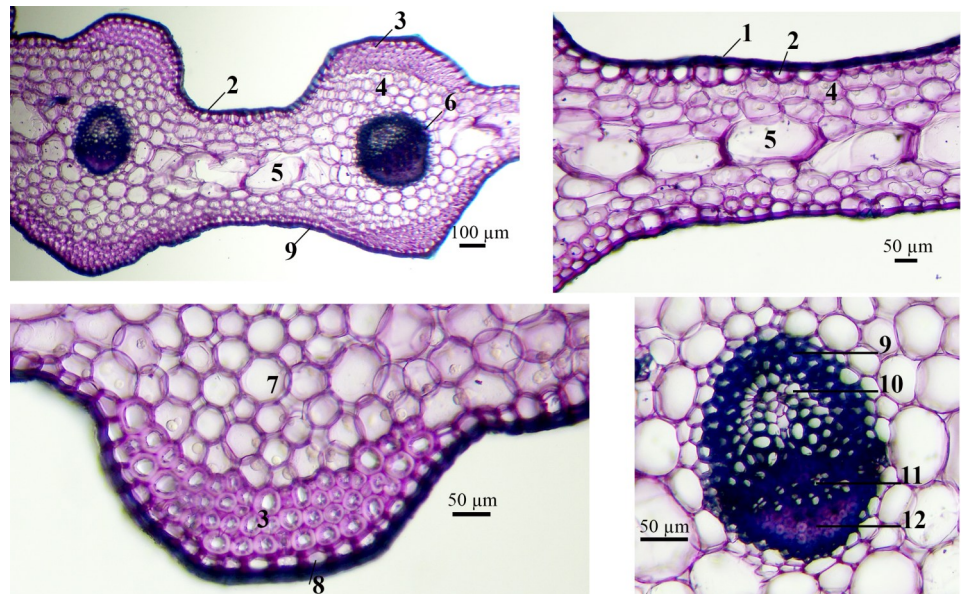


Figure 3. Cross-section of leaf blade. 1: cuticle, 2: upper epidermis, 3: collenchyma, 4: parenchyma, 5: colourless parenchyma, 6: vascular bundle, 7: spongy parenchyma, 8: lower epidermis, 9: sclerenchyma, 10: xylem, 11: phloem, 12: sclerenchyma fibres.

Leaf sheath (Figure 4)

The shape of the leaf sheath is often skewed, slightly concave on the upper surface and convex on the lower surface. The epidermis has one layer of rectangular, regular cells, cellulose walls, the outer surface is covered with a thick cutin layer. The collenchyma has three to five layers of round cells, irregular in size, arranged haphazardly. The spongy parenchyma includes polygonal, irregular cells, arranged haphazardly, surrounding the vascular bundles. The vascular bundles consist of phloem overlapping the xylem, arranged in rows in the spongy parenchyma area with the lower bundle being larger than the upper bundle. Each vascular bundle consists of 8–10 small, fairly regular xylem vessels, with wood-impregnated walls; soft tissue with cellulose walls; phloem comprises small polygonal cells with cellulose walls, interspersed with many very thick-walled sclerenchyma fibres, impregnated with lignin. Surrounding the vascular bundle are three to four layers of sclerenchyma fibres, very thick walls, concentrated towards the phloem.

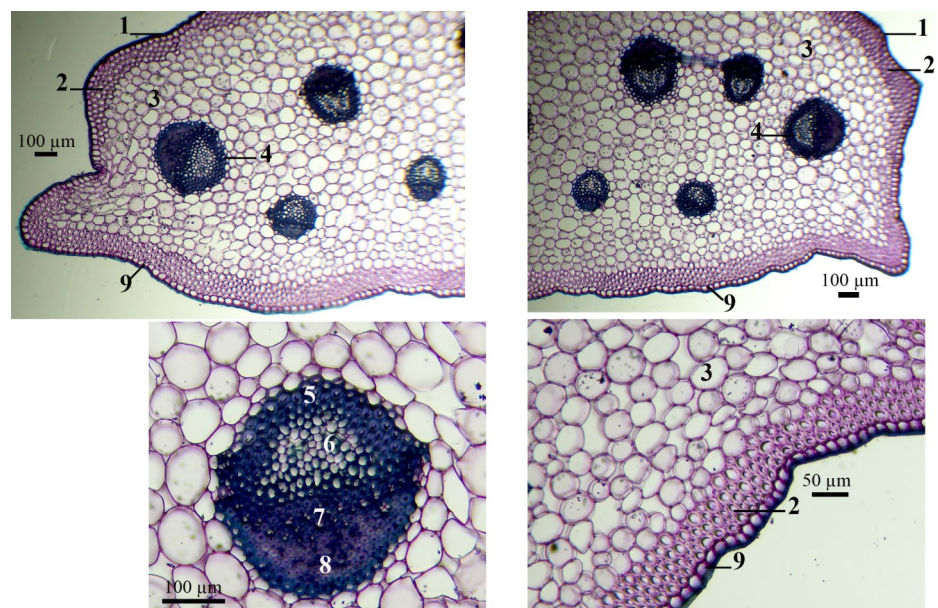


Figure 4. Cross-section of leaf sheath. 1: upper epidermis, 2: annular collenchyma, 3: spongy parenchyma, 4: vascular bundle, 5: sclerenchyma, 6: xylem, 7: phloem, 8: sclerenchyma fibres, 9: lower epidermis.

The anatomical traits of *Peliosanthes teta* were also provided by Chaikla et al. (2011). Accordingly, the transverse sections of leaf blades of *P. teta* and *P. cambodiana* share the following structural features: the leaf blade is convex and concave on both sides, thickened at the vascular bundles and concave between the bundles; the upper and lower epidermis consist of a single layer of polygonal cells; and both contained the large vascular bundles. However, the leaf cross-section *P. cambodiana* can be only distinguished from *P. teta* in having: there is a thick collenchyma layer above the lower epidermis; in the concave areas on the leaves, there are one to two layers of large, rectangular colourless parenchyma cells lying in rows in the middle of the spongy parenchyma (Chaikla et al. 2011). In addition, the transverse section of root of *P. cambodiana* differs from those of *P. teta* in having: cells containing the cubic calcium oxalate crystals; the piliferous layer with many short root hairs; endodermis with U-shaped (vs. no calcium oxalate crystals in cells; the piliferous layer with a few root hairs; endodermis with casparian strip in *P. teta*) (Chaikla et al. 2011).

AUTHORS CONTRIBUTION

N.N.P. and H.T.V. designed the research. N.N.P., V.H., T.T., H.T.L. collected samples during the field trips, T.T.L.T. performed the anatomical experiments. H.T.V. and N.N.P. analysed the data and wrote the manuscript.

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CONFLICT OF INTEREST

The authors do not have any conflict of interests to declare.

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