

Morphological and microscopic characteristics of *Stahlianthus thorelii* Gagnep. in VietNam

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Abstract

The morphological characters of the species of genus *Stahlianthus* have been investigated and described. The scientific name was identified. This is *Stahlianthus thorelii* Gagnep.. characterized by inflorescence surrounded by a campanulate bracts with bilobed apex. The microscopic characters of mentioned species have been also investigated and described.

INTRODUCTION

Genus *Stahlianthus* is a small genus in family Zingiberaceae, distributed in Cambodia, China, India, Laos, Myanmar, Sikkim, Thailand and Vietnam (Wu and Larsen, 2000). In folk medicine, many species of the genus *Stahlianthus* such as *S. thorelii* Gagnep. and *S. involuocratus* (King ex Baker) Craib ex Loes. have long been used in traditional medicine to treat diseases related to inflammation, ulcers, pneumonia, diarrhea and cancer (Pingsusaen *et al.* 2015, Vo, V. C. 1997). *S. thorelii* Gagnep. was described first by Gagnepain in 1907 (Bulletin de la Société Botanique de France 1907). However, the studies about morphological and microscopic characteristics of the species have not adequate to establish the identity and the degree of purity of such materials. Meanwhile, the first step towards the establishment of identity and purity of drugs can be accomplished by organoleptic, macroscopic and microscopic evaluation and is indispensable before performing other tests. Therefore, the present study is an attempt to establish macroscopic and microscopic characteristics of *S. thorelii* Gagnep. collected from Gia Lai province, Vietnam (was planted in Ba Vi - Hanoi) in order to standardize the materials for analysis and other studies.

MATERIALS AND METHODS:

Materials: *Stahlianthus thorelii* was collected from the dipterocarp forest along National Route 14 in Dak Lak, Gia Lai and Chu Prong, Gia Lai and was planted in Ba Vi Hanoi. Collection time: May 11, 2019. Botanical identification was performed by Department of Pharmacognosy, Hanoi University of Pharmacy and the voucher specimen (HNU No. NHTuan 031.) was deposited at Herbarium of HNU, Vietnam.

Methods: Comparative morphological method was applied to identify the species (Tap N 2006, Thin NN, 2007); collected samples were analyzed in morphological characteristics the compared with those of taxonomic key and description in the documents (Wu *et al.* 2000).

Microscopy: Transverse sections of the rhizome and leaf were taken by free hand, mounted in water and observed under the microscope. The dried cured rhizome was powdered and the powder was suspended in water and subjected to microscopic evaluation.

RESULTS:

Classification

Scientific name: *Stahlianthus thorelii* Gagnep.; Bull. Soc. Bot. France 54: 114 1907.

Synonym: No.

Vietnamese common name: Tam that nam. Family: Zingiberaceae

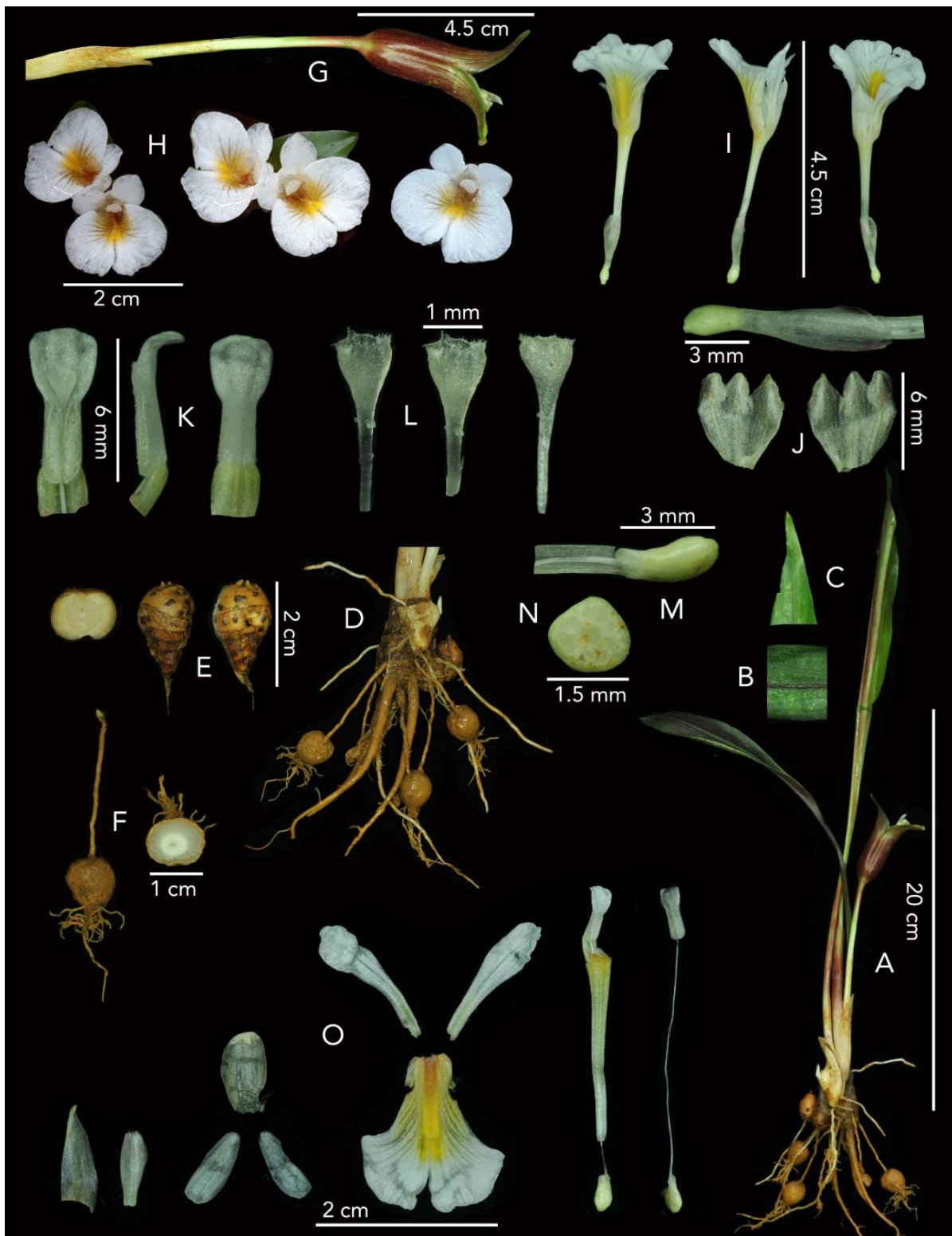


Figure 1. *Stahlianthus thorelii*. A. Habitat; B. Midrib; C. Leaf apex; D. Rhizomes, tubers and roots at maturity; E. Rhizome; F. Root tuber; G. Inflorescence; H. Flowers (front view) ; I. Flower with calyx tube and ovary; J. Calyx; K. Stamen (filament, anther and anther crest); L. Stigma; M. Ovary; N. Cross section of ovary; O. Flower dissection: Bract, calyx, dorsal and lateral corolla lobes, labellum and lateral staminodes, floral tube with ovary and stamen attached, ovary with style and epigynous glands attached (from left). Photos and design by *Nguyen Hoang Tuan*.

Small rhizomatous herb to 8-10 cm tall. *Rhizomes* ovate, short, stout, light brown externally, creamy white to pale yellow internally; *scales* triangular, brown, glabrous; *roots* fibrous some expanded into globose tubers at apex, externally light brown, internally translucent white with white center, buried deeply in ground. *Pseudostems* 4-5 cm tall, composed of sheathing bracts and leaf sheaths; *leaf sheaths* red, greenish-red or greenish white with red stripes, ligules very short, bilobed, obtuse to round, **ciliate**; *petiole* 3-5 cm long, greenish-red, canaliculate, glabrous; *lamina* narrowly obovate-oblong or narrowly oblanceolate, adaxially purple along midrib and green towards the margins, abaxially green or purplish-green; midrib canaliculate, turning narrower towards the apex, purple; base narrowly cuneate, apex attenuate to acuminate, ciliate/puberulent. *Inflorescence* arise from a rhizome, 8-12 cm long, with peduncle obscured within pseudostem; peduncle 4-8 cm long, greenish at base, greenish-red at apex; *bract* campanulate, 3.0-4.5 cm long, apex bilobed, lobe apex obtuse to acute, reflexed, purple at base, green at the margins and apex, with densely purple stripes from the base to the apex, glabrous; *capitulum* with 4-5 flowers without pedicel; *bracteoles* linear, 0.8-1.0 x 0.3-0.4 cm, ovate, apex obtuse to acute, membranous, semi-translucent white, glabrous. Flowers 4.0-5.0 cm long, exerted from bracts; *calyx* 6-8 mm long, apex trilobed, with unilateral incision, 0.8-1 mm, lobe apex obtuse to rounded, membranous, semi-translucent white or with green tinge, glabrous; *floral tube* 2.5-3.0 cm long, narrowly funnel-shaped, externally white at base, turning yellow towards the apex, glabrous, with dorsally placed loose groove holding the style; *dorsal corolla lobe* 11-12 x 4.5-5.5 mm, obovate-oblong, slightly concave, semi-translucent white to creamy white, glabrous, apex mucronate, mucro ca 1 mm; *lateral corolla lobes* 6.5-7.5 x 2.5-3.0 mm, obovate-oblong, apex obtuse to rounded, semi-translucent white, glabrous; *labellum* 2.0-2.5 x 1.3-1.5 cm spatulate-obovate/flabellate-obovate with an incision 3-4 mm, base claw 0.6 cm by 0.5 cm, lobe apex rounded and crenate, light yellow at base, turning white towards apex and margins with an orange blotch at base and an yellow band running through the centre, creating canaliculate along the centre part, pilose; *lateral staminodes* 2.0-2.5 x 0.3-

0.4 cm, narrowly obovate, slightly crenate, white with yellow tinge at base, puberulous. *Stamen* 7-8 mm long; *filament* 1.7-2.0 mm long, 1.5-1.7 mm wide, narrower at the point of connection to connective, creamy white to pale yellow, glabrous; *anther* 6-7 mm long, white, connective tissue white, densely puberulent (glandular hair), anther crest 2.5-3.0 mm long, obovate, falcate, apex rounded, white, glabrous; *anther thecae* 3.0-4.0 mm long, oblong, dehiscing along entire length, pollen white. *Style* white, glabrous; *stigma* ca 1 mm wide, cupuliform, margin ciliate, whitish to creamy white. *Ovary* 2-3 x 1.5 mm, trilocular, creamy white, glabrous. *Fruits* not seen.

Phenology: Flowering occurs from April to May.

Ecology: Growing wildly near streams, ravine and damp palces.

Distribution: Viet Nam (Lao Cai, Ha Noi (Ba Vi), Kon Tum (Sa Thay), Gia Lai. China, Thailand, Lao PDR.

Microscopic characters of rhizome: Transverse section of rhizome is circular in outline. The section shows a zone of narrow cells separating outer cortical region and an inner stelar region. Epidermal cells are rectangular-oval cover with cuticle. Followed to these are 4-6 layers of cork cells which are rectangular and tangentially elongated. Wide cortex consists of thin walled, polygonal to circular parenchyma with intercellular spaces. These cells are filled with oval-ellipsoidal starch grains. A number of small vascular bundles are present scattered in outer cortical region. Each vascular bundle is enclosed within a prominent fibrous sheath. There is a single layered endodermis composed of thin walled rectangular cells separating cortical region and stelar region, and pericycle followed by vascular bundles without bundle sheath, arranged in a ring. In stellar region, inner vascular bundles are also scattered and composed of groups of xylem elements and a patch of phloem. Xylem consists of parenchyma, vessels, tracheids and fibers. Phloem is observed around the xylem and consists of sieve elements, companion cells. There are more inner vascular bundles in stellar region than cortical region. These parenchymatous cells similar to cortex. Numerous cells contain yellow brown oleoresin scattered throughout the rhizome.

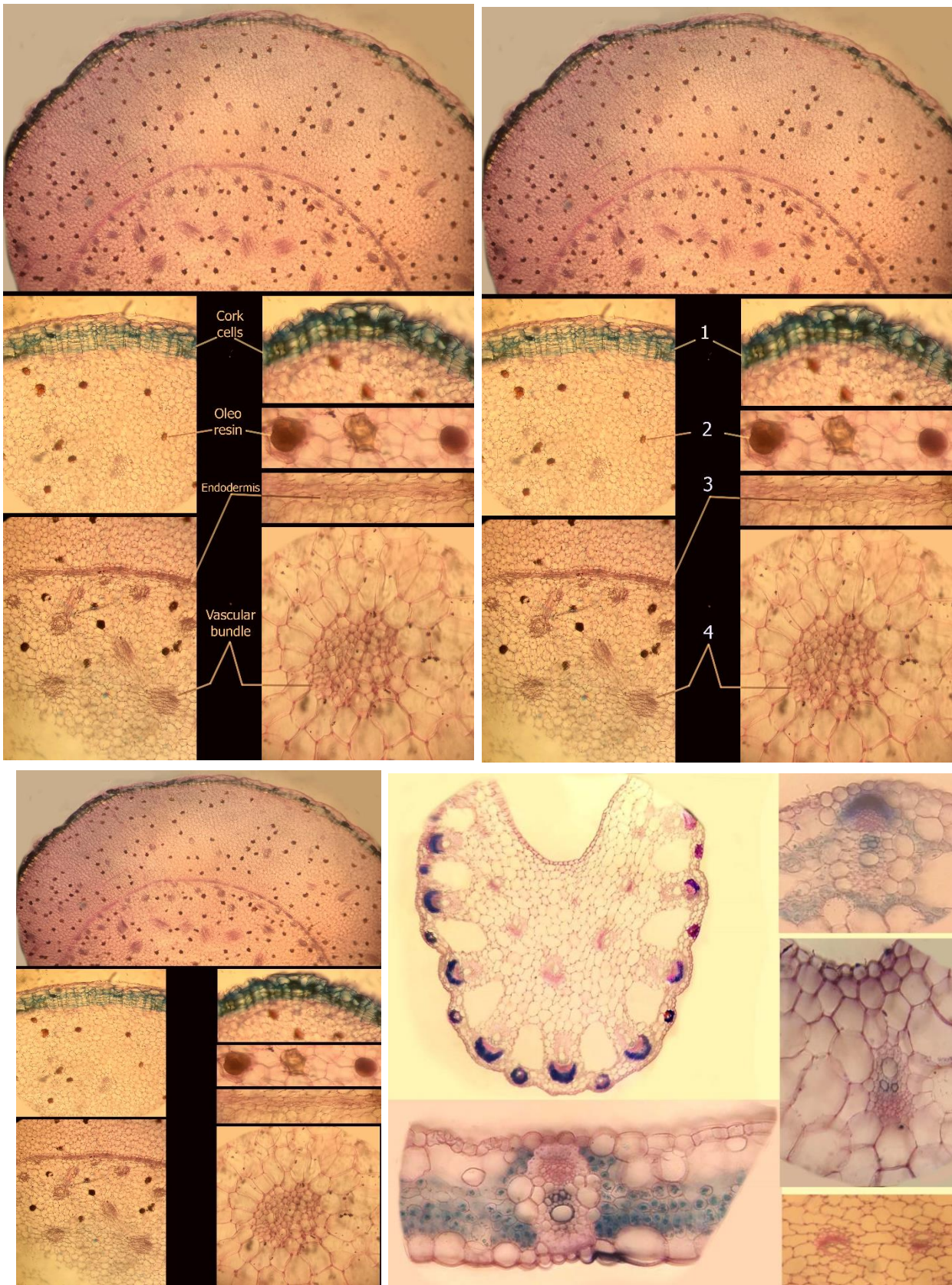


Figure 2. Transverse section of rhizome
1 Cork cells; 2. Oleo resin; 3. Endodermis; 4. Vascular bundles.

Microscopic characters of leaf: Transverse sections of leaf passing through midrib and lamina are shown in Fig. 3.

The midrib: Both upper and lower epidermis are single layered and covered with thin cuticle. Epidermal cells are polygonal to circle in outline, parenchymatous and small. Ground tissue is made up of parenchyma cells which are thin walled and polygonal. There are a main arc of large vascular bundles arranged near to the abaxial epidermis.

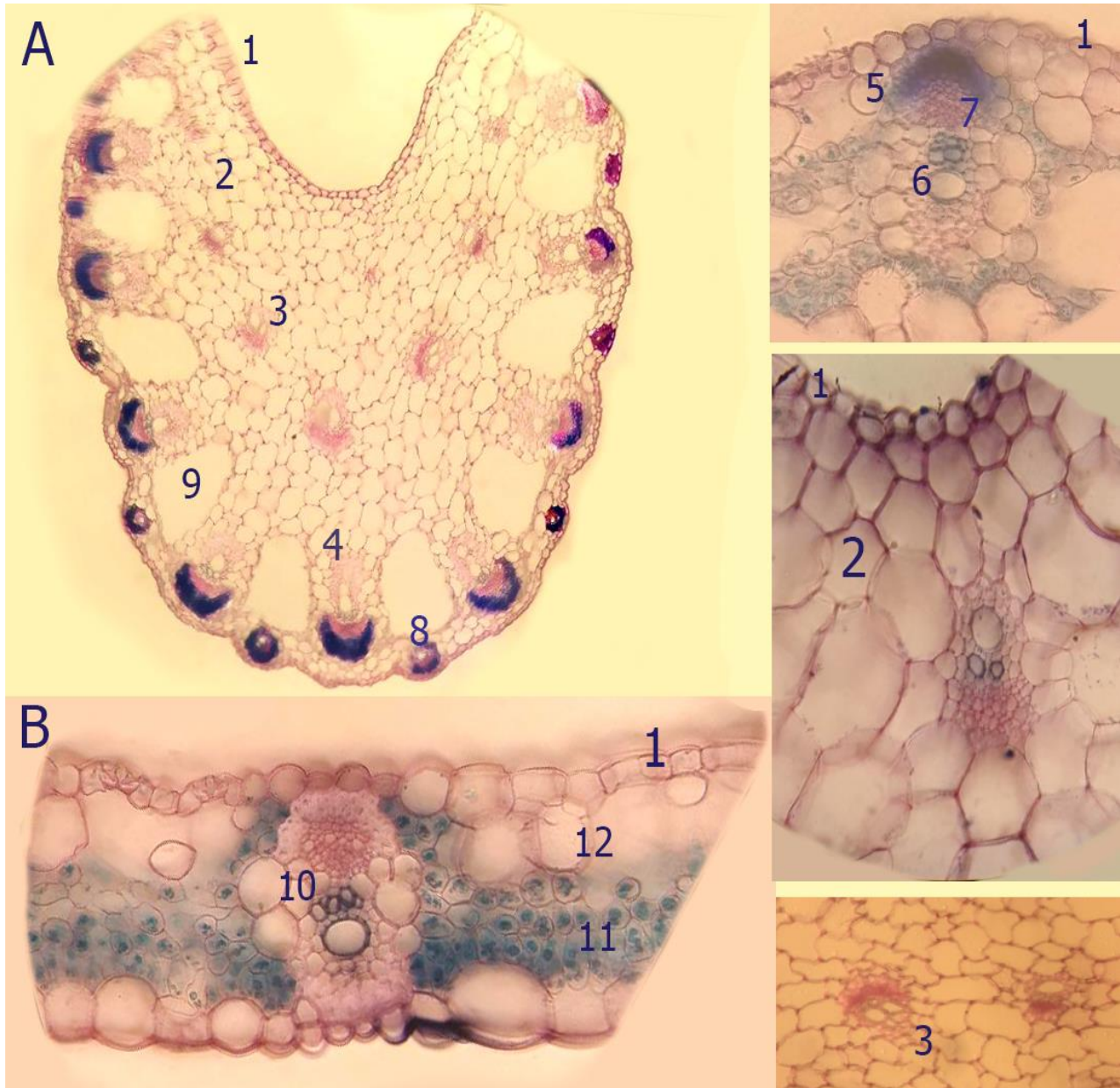


Figure 3. Microscopic characters of leaf

A. Transverse section of midrib:

1. Epidermis, 2. Parenchymatous cells, 3. Vascular bundle, 4. Vascular bundle, 5. Sclerenchymatous cells, 6. Xylem, 7. Phloem; 8. Xylem- Phloem;

B. Transverse section of lamina: 9. Air chamber; 10. Vascular bundle; 11. Palisade mesophyll; 12. Spongy mesophyll.

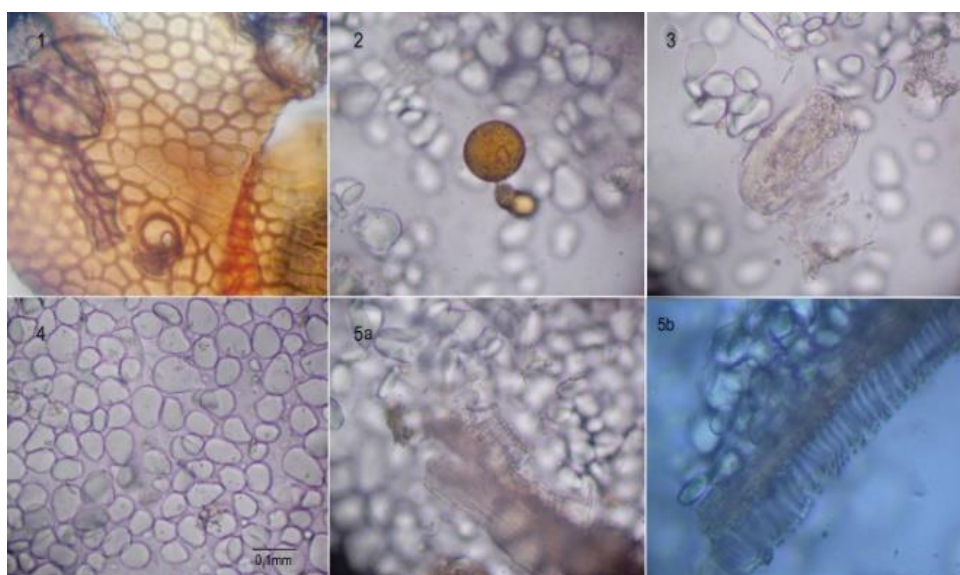


Figure 4: Powder microscopy

1. Fragment of cork cells; 2. Oleo resin; 3. Parenchymatous cell with oleo resin; 4. Starch grains; 5 (a,b). Spiral vessels

Powder microscopy:

The powder is light brown in color. Under microscope the powder shows fragment of cork cells. These cells are polygonal and thickened walls. Starch grains mostly oval and obvoid are abundantly found. The average diameters of the starch grains are found to be about 0,25-0,5 mm. The fragment of tracheids with spiral vessels are also observed. Some cells filled with yellow oleo resin are oblong and thin walls.

CONCLUSION:

In this paper, research on morphological and microscopical characteristics of Tam that nam collected at collected from Gia Lai and was planted in Ba Vi (Hanoi). The scientific name was identified such as *Stahlianthus thorelii* Gagnep Ames belonging to Zingiberaceae family. The results provide morphological and microscopical characteristics for identification and standardization of *Stahlianthus thorelii* Gagnep

REFERENCES:

- Chi VV, 2012**, *Dictionary of Medicinal Plants in Vietnam*, Medicine Publishing House, Hanoi. Vol.2, 769-770
- Pingsusaen, P., Kunanusorn, P., Khonsung, P., Chiranthanut, N., Panthong, A., & Rujjanawate, C., 2015**. Investigation of anti-inflammatory, antinociceptive and antipyretic activities of *Stahlianthus involucratus* rhizome ethanol extract. *Journal of ethnopharmacology*, 162:199-206.
- Tap N, 2006**, *Methods for medicine plant resources survey*. In Nguyen Thuong Dong (editors), Study on herbal medicine, Graduate curriculum, Science and Technics Publishing House, Hanoi 33-60
- Thin NN, 2007**, *Methods for studying botany*, National University Publishing House, Hanoi, 23-27
- World Health Organization Quality control methods for medicinal plant material, *WHO Library*. 1998; 110–115.
- Wu, T.-L. and K. Larsen. 2000**. Zingiberaceae. In: Wu, Z.-Y. and P. H. Raven (eds.), *Flora of China* 24: 333-346. Sci. Press, Beijing, China.

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