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Botanical characteristics, *mat*K sequence and preliminary chemical composition of Manuka - *Leptospermum scoparium*, Myrtaceae

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ABSTRACT

Background: Leptospermum scoparium is an introduced plant, used as an ornamental in Vietnam. Leptospermum scoparium has anti-inflammatory, antibacterial effects, treats cough, fever, and diarrhea. Objectives: The aim of this study is to investigate the botanical characteristics, matK sequence for identification of Manuka, and preliminary phytochemical screening. Materials and Methods: Fresh trees collected in Bao Loc - Lam Dong; the morphology was evaluated through detailed observation of fresh stem, leaf, and flower specimens. Anatomical studies involved preparing cross-sections with a razor, staining them with carmine and iodine green, and capturing microphotographs using a Samsung digital camera mounted on the microscope. The matK sequence was examined, and the chemical composition of the stem and leaf powder was analyzed using the modified Ciulei method. Results: L. scoparium was identified as Leptospermum scoparium J.R. Forst. & G.Forst., based on morphological characteristics and matK sequence with the following featured morphological characteristics: Simple leaf, alternate, 5 sepals free, 5 petals free, the subpart of the petals is present, numerous stamen arranged in the same circle, 5 carpels, inferior ovary *and data of anatomy: Sclereid in endodermis; inner phloem, secretory bags and calci oxalate crystals in the cross-section of the stems and leaves, parenchyma tissue in the cross-section of the leaves have a symmetrical structure; phytochemical constituents of the stems and leaves include: Essential oil, carotenoids, triterpenoids, tannins, reducing agents and organic acids; additionally, the leaves contain anthraquinones, flavonoids, and saponins. Conclusion: The study contributed to providing more data about of morphological characteristics, together with the anatomical characteristics of stems, leaves and the chemical composition of the stems, leaves of Manuka in Vietnam.*

Keywords: *Leptospermum scoparium, matK, morphology, anatomy, phytochemical constituents*

1. INTRODUCTION

Leptospermum scoparium JR Forst. & G. Forst (Myrtaceae), commonly known as Manuka, is a name often associated with the flora of New Zealand [1]. *L. scoparium* is an introduced plant in Vietnam. The ethanol extract from the leaves of *L.scoparium* was analyzed by GC-FID, revealing approximately 70 volatile compounds, of which 17 components were identified and quantified, including α-pinene, β-pinene, β-myrcene, p-cymene, 1,8-cineol, γ-terpinene, linalool, terpinen-4-ol, α-terpineol, β-caryophyllene, humulene, nerolidol, caryophyllene oxide, globulol, γ-eudesmol, cubenol, and α & β-eudesmol [1]. In the essential oil of *L.scoparium*, monoterpenes constitute ≤ 3 %, sesquiterpene hydrocarbons account for ≥ 60%, and cubebene/ copaene, elemene, gurjunene/ aromadendrene, farnesene/ caryophyllene, selinene, calamenene, oxidized sesquiterpenes, and triketones comprise ≤ 30 % [2]. The three major triketones in *L.scoparium* essential oil were flavesone, isoleptospermone, and leptospermone exhibit antibacterial activity [2]. Additionally, honey derived from *L.scoparium* flowers possesses antibacterial properties, specifically against *Escherichia coli* and *Staphylococcus aureus*, as tested via agar diffusion method. The minimum inhibitory concentration (MIC) against *E. coli* was 6.9 mM, while for *S. aureus* it was 4.3 mM

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[3]. Using HR-ESI-MS and MS/MS analysis combined with Compound Discoverer 3.3 software, the antibacterial compounds in leaf and branch extracts of *L.scoparium* against *S. aureus* were identified. The primary antibacterial component is grandiflorone, along with 20 β-triketones, flavonoids, and phloroglucinol derivatives, with the minimum effective dose (MED) of grandiflorone being 0.29 - 0.59 µg/cm^2 for *S. aureus* and 2.34 - 4.68 µg/cm^2 for *E. coli* [4]. Morphological characteristics serve as the basis for identifying the species *L.scoparium*, while microscopic features are used for pharmacognostic verification. In Vietnam, there is limited research on the botany, chemical composition, and medicinal applications of this species. With the aim of accurately identifying the scientific name of the *L.scoparium* species collected in Bao Loc, Lam Dong, and establishing a foundation for further research into its chemical composition and medicinal properties, the objective of this study is to investigate the botanical characteristics, *mat*K gene sequence, and preliminary chemical composition of the stem and leaves of the *L.scoparium*.

2. MATERIALS AND METHODS

2.1. Materials

The fresh sample of *Leptospermum scoparium*, including the stems, leaves, flowers, and fruit, was collected in Bao Loc, Lam Dong, in March 2024.

2.2. Methods

- Morphological study: Conducted following reference [5]. A hand lens, optical microscope, and stereomicroscope were used to observe and describe the morphological characteristics of the stems, leaves, inflorescences, and flowers. The scientific name of this species was determined based on the *mat*K gene sequence and references [6 - 8].
- *Mat*K sequence study because the *mat*K gene of chloroplasts is highly common: Following the method outlined by Jing Yu et al. (2011) [9]. DNA extraction: DNA samples were extracted using Thermo's DNA extraction protocol. After extraction, DNA concentration was checked by spectrophotometry at 260 nm. Amplification of the target gene segment and species identification: A portion of the DNA coding for the target gene was amplified using iTag with a primer annealing temperature of 55°C. The PCR products were checked for the presence of target DNA bands and then sent for sequencing at GeneLab. The DNA sequences obtained were analyzed and compared using the BLAST tool against the gene bank to identify the species. For samples that returned a similar species identification, sequence alignment was performed to determine the species with the highest similarity.
- Microscopic structure study: Conducted following reference [5]. Cross-sections of the stem, leaf blade, and petiole were made using a razor blade. For the stem: A cross-section was made at the internode of branches with a diameter of 5 - 6 mm. For the leaf blade: A cross-section was made at the basal third of the leaf blade, including the midrib and some of the main blade on either side. For the petiole: A cross-section was made at the basal third of the petiole, avoiding both the very base and the swollen region. The sections were bleached with Javel water and stained with alum carmine and iodine green. The cross-sections were observed in water under an optical microscope (model ECLIPSE E200LED MV R), and photographs were taken to describe the structure. Each part was observed from 5 - 10 cross-sections. Leaf powder (mature): The herbal sample was cut into small pieces, dried at 60 - 70°C, ground into a fine powder, sieved through a No. 32 sieve (mesh size 0.1 mm), and the powder components were observed under an optical microscope in water.
- Preliminary chemical composition analysis: The herbal sample was ground into coarse powder, and qualitative reactions were performed to preliminarily identify the presence of compound groups in the herbal sample from fractions with increasing polarity (diethyl ether, 96 % ethanol, water), using a modified Ciulei method based on the subject of Pharmacognosy-Traditional Pharmacy, Faculty of Pharmacy, University of Medicine and Pharmacy at Ho Chi Minh City [10].

3. RESULTS

3.1. Morphological characteristics

Shrub with a round cross-section, young stems are purplish-red and smooth, older stems are rough and brown. Leaves are simple, alternate, and without stipules. Leaves are narrowly strap-shaped, pointed at the tip, recurved, 7 - 14 x 2.5 mm, smooth, green with the upper surface darker than the lower surface, and the lower surface has dark green dots.

Leaf veins are acrodromous, with 3 prominent veins on the underside. Petiole is channel-shaped, purplish, about 1 mm long, and covered with numerous hairs. Flowers are solitary or arranged in clusters of 2 or 3, growing in the leaf axils. Flowers are actinomorphic, bisexual, with pentamerous symmetry. Petiole is short, about 2 - 3 mm. Bracts resemble normal leaves, with 2 deciduous bracteoles. Floral receptacle is cup-shaped, with a concave surface, green with white spots on the outside, green or purplish on the inside, approximately 1 x 3 mm. Sepals 5, equal, free, triangular form, 1.5 x 1.5 mm, purplish-pink, smooth, with white spots on the outer surface, and valvate aestivation. Petals 5, nearly equal, free, nearly round or obovate, purplish-pink or white with a hint of purple, 3 - 5.5 x 2.5 - 4 mm, smooth on both sides, quincuncial aestivation. Corona (accessory petals) has 20 petaloid appendages arranged in 5 groups, with 4 appendages per group. Stamens 12 - 15, arranged in clusters of 2 - 3. Filaments are thread-like, pinkish-white or purplish-pink, about 1 mm long. Anthers are oval form, yellowish-brown, 2-celled, opening longitudinally, introrse, and basifixed. Pollen grains are numerous, free, triangular, pale yellow, with 3 furrows, and measure 17.5 - 20 µm on each side. Gynoecium consists of 5 fused carpels, forming an inferior ovary with 5 locules, each containing numerous ovules, with axile placentation. Single ovary, inversely conical, green, about 4.5 mm tall, and smooth on the outside. Style is single, thread-like, white or purplish, about 2 mm long, attached at the apex of the ovary. Stigma is single, punctiform, and purplish. Fruit is a capsule, spherical, about 2 cm in diameter, turning brown when mature, with 5 longitudinal ridges. Seeds are numerous, strap-shaped, and brown (Figure 1).

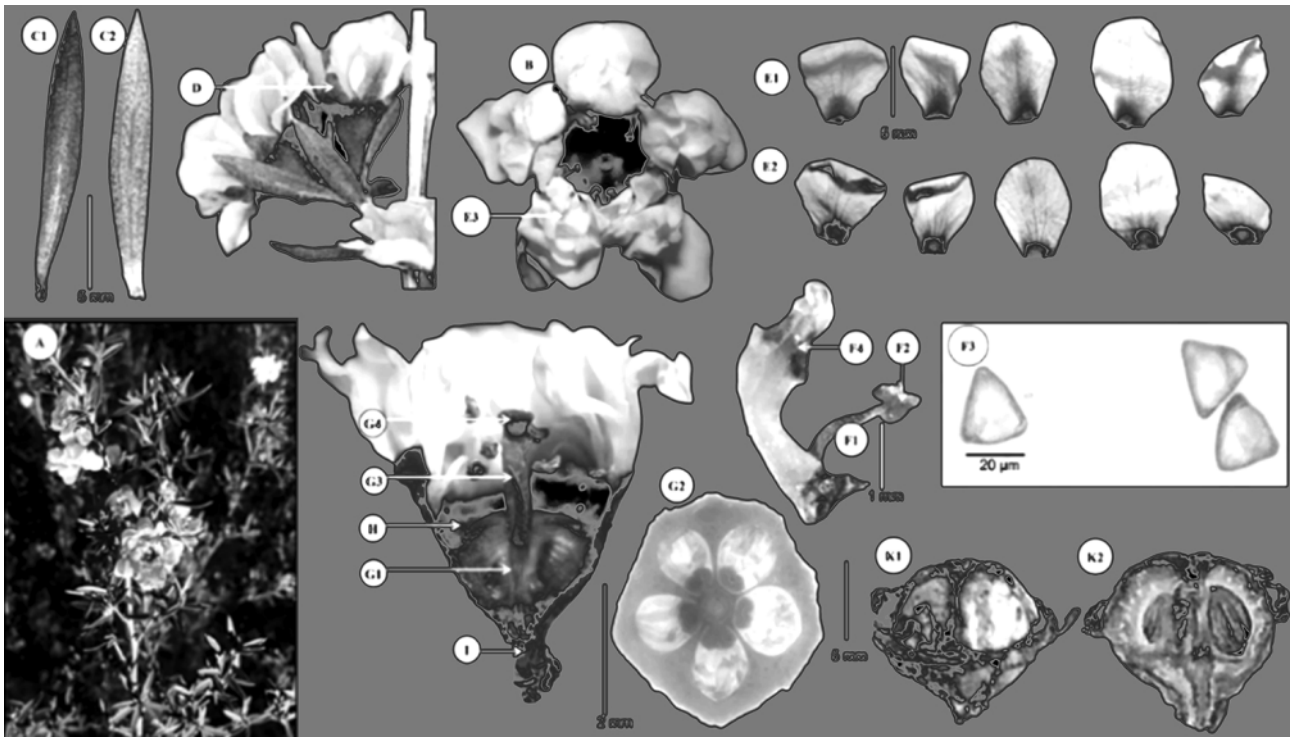

Figure 1. Morphological characteristics of *Leptospermum scoparium*

A. Stem with leaves and flowers, B. Flower, C. Leaf (1. Upper surface, 2. Lower surface), D. Sepals, E. Petals (1. Outer surface, 2. Inner surface, 3. Corona), F. Stamens (1. Filament, 2. Anther, 3. Pollen grains, 4. Sterile stamens), G. Gynoecium (1. Longitudinal section of the ovary, 2. Cross-section of the ovary, 3. Style,4. Stigma), H. Floral receptacle, I. Petiole, K. Fruit (1. Fruit, 2. Longitudinal section of the fruit)

3.2. Microbiological characteristics

The cross-section of stems: Cross-section of a round cross-section form. The epidermis consists of a single layer of polygonal-shaped cells, cellu-

lose walls, a flat and slightly thick cuticle layer, and scattered unicellular hairs. The collenchyma tissue is 1 - 2 layers of irregularly arranged polygonal cells, cellulose walls. The cortical parenchyma is a parenchyma with rounded cells, 5 - 7 layers of polygonal or oval-shaped cells, cellulose or lignified walls, arranged irregularly. The pericycle consists of sclerenchyma cells, polygonal in shape, with thick lignified walls, arranged in a nearly continuous ring. The cork contains 1 - 2 layers of rectangular cells, slightly undulating walls, arranged radially. The phloem consists of poly-gonal cells, undulating cellulose walls, arranged irregularly in clusters. The se-condary phloem consists of 2 - 4 layers of poly-gonal or rectangular cells, slightly undulating cellulose walls, arranged radially. The secondary xylem with a thickness 2.5 - 3 times that of the secondary phloem; the xylem vessels are poly-gonal and large in size, arranged irregularly; the parenchyma tissue of the secondary xylem consists of polygonal cells with thick or thin lignified walls, arranged radially. The medullary rays are narrow, consisting of 1 - 2 rows of elongated polygonal cells. Each vascular bundle in primary xylem contains 3 - 5 vessels, with polygonal xylem vessels; the parenchyma of primary xylem consists of irregularly arranged polygonal cells, either cellulose or lignified walls. The inner phloem is similar to that of the phloem and is separated from the xylem by several layers of parenchyma. The medullary parenchyma consists of paren-chyma tissue with nearly round polygonal cells, almost entirely lignified, arranged irregularly. The secretory cavities are nearly round, containing 6 - 8 boundary cells that are flattened, with lignified and slightly undulating walls, dispersed within cortical parenchyma. Calcium oxalate crystals in the form of needle-like structures are scattered throughout the medullary parenchyma (Figure 2).

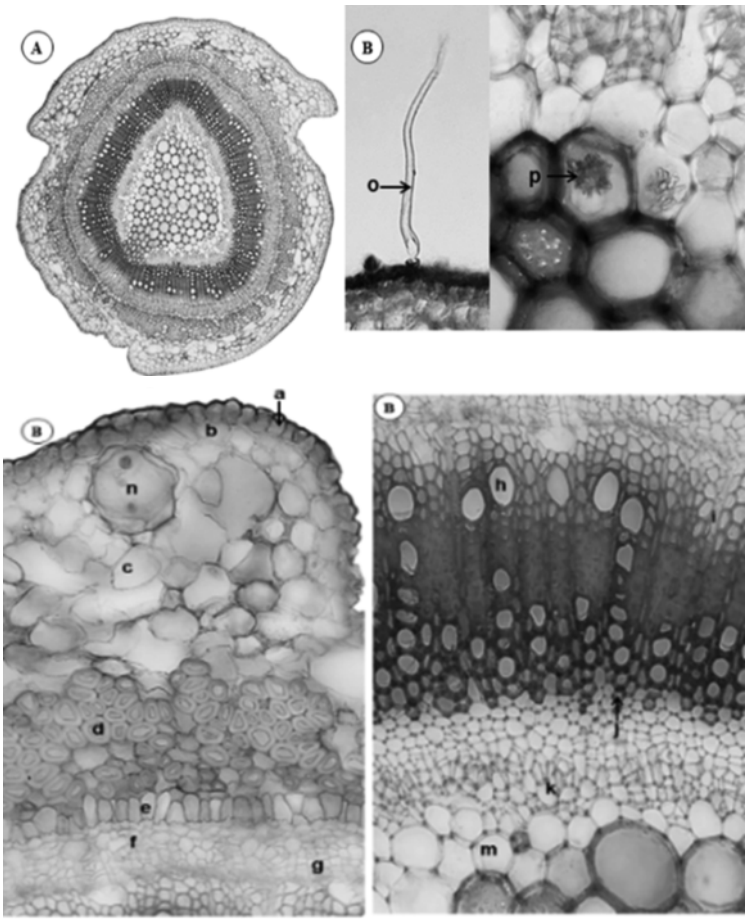

Figure 2. The cross-section of the stems of *Leptospermum scoparium*

A. The cross-section of stems, B. A part of the cross-section stems, a. Epidermis, b. Collenchyma tissue, c. Cortical parenchyma, d. Pericycle, e. Cork, f. Phloem, g. Secondary phloem, h. Secondary xylem, i. Medullary rays, j. Xylem, k. Inner phloem, m. Medullary parenchyma, n. Secretory cavities, o. Unicellular hair, p. Calcium oxalate

The cross-section of leaves: The upper surface is slightly concave, while the lower surface is slightly convex. *Midrib region:* The upper and lower epidermis consists of a single layer of polygonal cells, cellulose walls, featuring a flat and thick cuticle layer; stomata are present on both the upper and lower epidermis. The collenchyma tissue above the lower epidermis, consists of 1 - 2 layers of irregularly arranged polygonal cells, cellulose walls. The parenchyma tissue is composed of polygonal cells with cellulose walls, arranged irregularly. The vascular system is organized as a single large vascular bundle, with the xylem located above and the phloem below. The xylem consists of polygonal vessels arranged in rows, with each row containing 3 - 6 vessels, larger vessels typically positioned in the center of the row; the parenchyma of xylem consists of polygonal cells with lignified walls, arranged in 1 - 2 alternating rows with xylem vessels. The phloem consists of polygonal cells, slightly undulating walls, arranged irregularly. The sclerenchyma fibers contain 2 - 5 layers of polygonal cells, very thick lignified walls, arranged irregularly in clusters above xylem and below phloem. The calcium oxalate crystals in the form of cubes are scattered throughout parenchyma region. *Leaf blade region:* The upper and lower epidermis consists of a single layer of polygonal cells, cellulose walls, featuring a flat and thick cuticle layer; stomata are present on both the upper and lower epidermis. The mesophyll is heterogeneously structured and symmetrical. The upper and lower palisade parenchyma tissues are similar, typically containing 2 layers of elongated rectangular cells. The spongy parenchyma lies between the two layers of palisade tissue, comprising polygonal cells, cellulose walls arranged irregularly. The accessory vascular bundles 4, located on either side of the main vascular bundle, structurally similar to the main vascular bundle but smaller in size. The secretory cavities are nearly round, containing 5 - 7 boundary cells that are flattened, with cellulose (or lignified) walls that are slightly undulating, scattered within spongy mesophyll (Figure 3).

The cross-section of the petiole: The upper surface is slightly concave, while the lower surface is slightly convex. The epidermis consists of polygonal cells, cellulose walls, featuring a flat and thick cuticle layer, and is covered with numerous unicellular hairs. The collenchyma tissue contains 2 - 3 layers of irregularly arranged polygonal cells, cellulose walls. The parenchyma tissue consists of 3 - 4 layers of polygonal cells, cellulose walls, arranged irregularly. The vascular system typically comprises 5 vascular bundles arranged in an arc, with the xylem located above and the phloem below each bundle. The xylem consists of polygonal vessels arranged in multiple rows, with each row containing 3 - 6 vessels, larger vessels are usually positioned in the center of the row. The parenchyma of xylem consists of polygonal cells, lignified walls, arranged in 1 - 2 rows, interspersed with rows of vessels. The phloem is continuous, composed of polygonal cells, slightly undulating walls, and arranged irregularly. The sclerenchyma fibers consist of 2 - 3 layers of polygonal cells with very thick lignified walls, arranged irregularly in a continuous ring around vascular bundles of xylem. The secretory cavities are nearly round, containing 5 - 7 boundary cells that are flattened, with cellulose (or lignified) walls that are slightly undulating, scattered within the parenchyma tissue. Calcium oxalate crystals in the form of cubes are scattered throughout the parenchyma region (Figure 3).

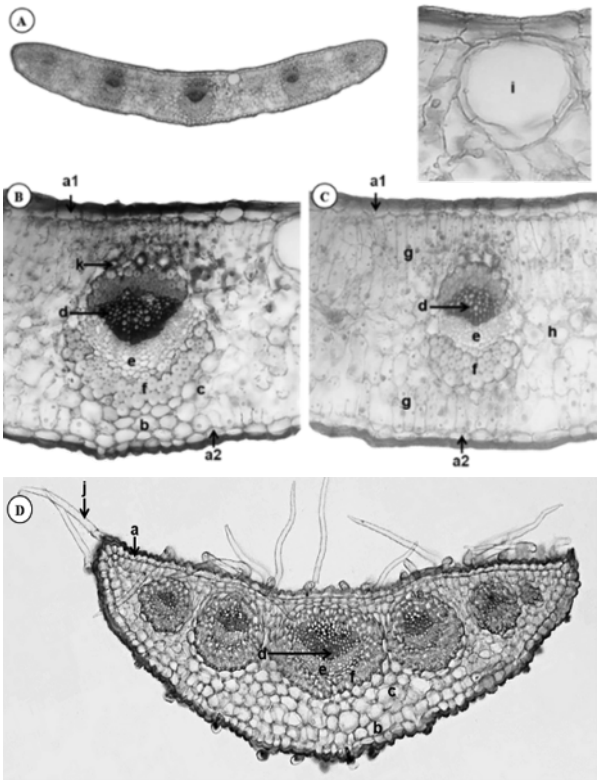

Figure 3. The cross-section of leaves and petioles of *Leptospermum scoparium*

A. The cross-section of leaves, B. Midrib region, C. Leaf blade region, D. The cross-section of petiole, a. Epidermis (1. Upper, 2. Lower), b. Collenchyma tissue, c. parenchyma with rounded cells, d. Xylem, e. Phloem, f. Sclerenchyma fibers, g. Palisade parenchyma, h. Spongy parenchyma, i. Secretory cavities, j. Unicellular hair, k. Calcium oxalate

Stem powder: Brown color, light fragrance. Composed of: The fragments of epidermal, the fragments of cork, the fragments of parenchyma tissue, the fragments of parenchyma with calcium oxalate crystals, the fragments of spiral vessels, the fragments of scalariform vessels, fibers, calcium oxalate crystals in the form needle-like structures, unicellular hairs (Figure 4).

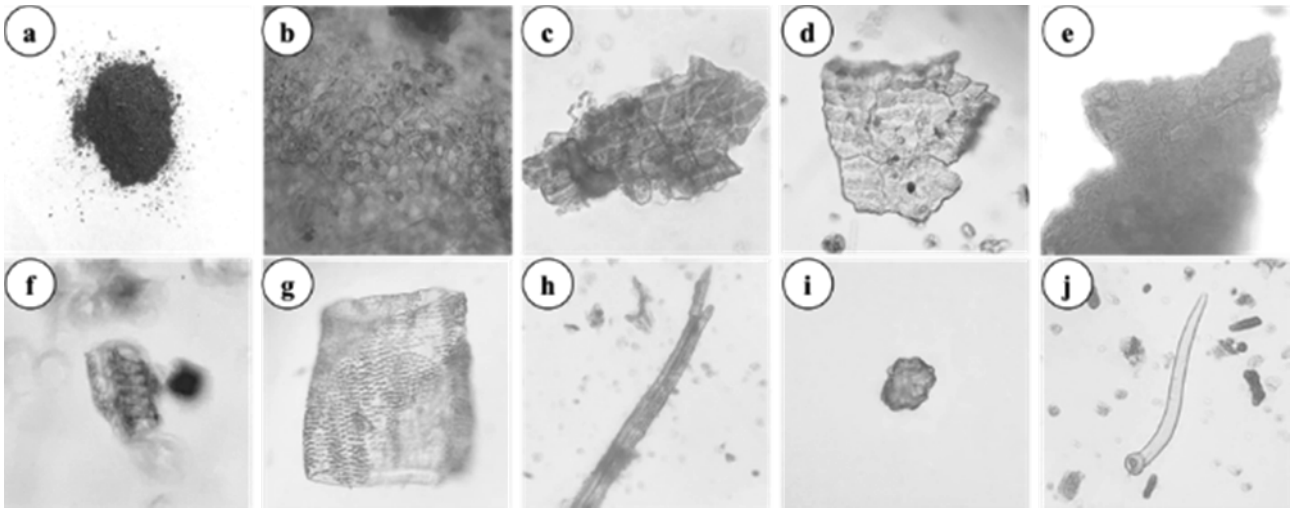

Figure 4. Stem powder and constituents of the stem powder of *Leptospermum scoparium*

a. Stem powder, b. Fragments of epidermal, c. Fragments of cork, d. Fragments of parenchyma tissue, e. Fragments of parenchyma with calcium oxalate crystals, f. Fragments of spiral vessels, g. Fragments of scalariform vessels, h. Fibers, I. Calcium oxalate crystals, j. Unicellular hairs

Leaf powder: Green color, light fragrance. Composed of: The fragments of the upper epidermis, the fragments of the lower epidermis with stomata, the fragments of palisade parenchyma tissue, the fragments of parenchyma tissue, the fragments of spiral vessels, fibers, calcium oxalate crystals in the form of cubes, and unicellular hairs (Figure 5).

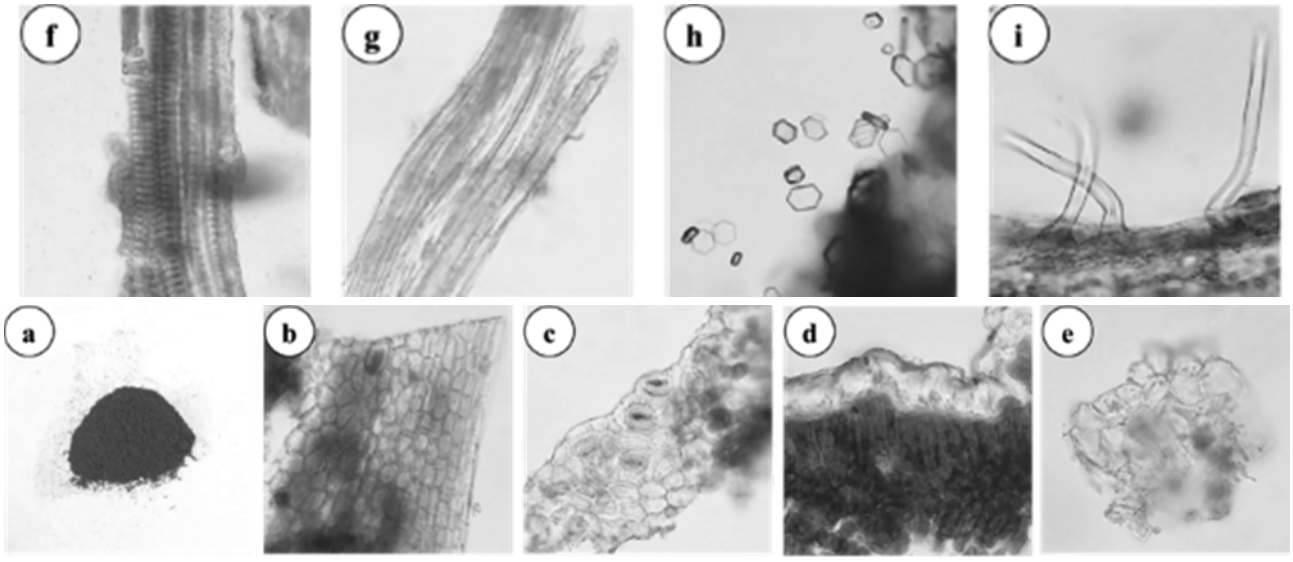

Figure 5. Leaf powder and constituents of leaf powder of *Leptospermum scoparium*

a. Leaf powder, b. Fragments of the upper epidermis, c. Fragments of the lower epidermis with stomata, d. Fragments of palisade parenchyma tissue, e. Fragments of parenchyma tissue, f. Fragments of spiral vessels, g. Fibers, h. Calcium oxalate crystals, i. Unicellular hairs

3.3. *Mat*K sequence

*Mat*K sequence (716 bp) of the *Leptospermum scoparium.*

ACTGGGTGAAAGATGTCTCTTCTTTGCATTTATTAC
GTTTCTTTCTCCACGAGTATTGGAATAGTCTTATTA
CTCCAAAGAAACATATTACCTTTTTTTTAAAAGGTA

ATCCAAGATTATTCTTGTTCCTATATAATTCTCATATA
TGTGAATATGAATACATCTTTCTTTTTCTCCGTAATC
AATCTTCTCATTTACGGTCAACGTCTTCTGGAATCT
TTTTTGAGCGAATCTATTTCTATGTAAAAATAGAAC
ATTTTGTCAAAGTCTTCTTTGATAATAATTTTCAGT
GCATCCTATGGTTCTTCAAAGATCCTTTCATGCATT
ATGTTAGATATCAAGGAAAATTTTTTATGGCTTCAA
AAGATACGCCTCTTCTGATGAATAAATGGAAATGTT
ACCTTGTTAATTTATGGCAATATAATTTTTCCGTGT
GGTTTCAACCAGGAAGGATTGATATAAACCAATTA
TGCAAGTATTCTCTTGACTTTTTGGGCTATCGTTCA
AGCGTGCGACTAAATTCTTCAGTGGTACGAAATCA
AATGCTAGAAAATTTATTTCTAATAAATAATGCTATG
AAGAAGTTTGAGACAATAGTTCCAATTATTCCTCT
GATTGGATCATTGTATAAATCGAATTTTTGTAATAC
ATTTGGACATCCCATTAGTAAACCGACCCGGACCG
ATTCATCCGATTCTGATATTATTGACCGTTTT

The results of the gene sequence comparison of the *Leptospermum scoparium* collected in Bao Loc, Lam Dong, using NCBI BLAST are presented in Table 1.

Remarks: From the results of the partial *mat*K gene sequence analysis, it can be concluded that the specimen collected in Bao Loc, Lam Dong, belongs to the genus *Leptospermum* (a group of related plants that share common characteristics) and shows 100% sequence similarity (a measure of how closely the DNA sequence matches) with the species *Leptospermum scoparium*.

Table 1. Results of sequence comparison of the *L. scoparium* with data from NCBI BLAST

Scientific Name	Max score	Total score	Query cover (%)	Per. Ident (%)	Acc. Len	Accession
Leptospermum scoparium	1323	1323	100	100.00	2548	OP903785.1
Leptospermum scoparium	1323	1323	100	100.00	845	KM065186.1
Leptospermum scoparium	1323	1323	100	100.00	834	KM065128.1
Leptospermum scoparium	1317	1317	100	99.86	2530	OP903786.1
Leptospermum petersonii	1317	1317	100	99.86	2533	OP903780.1

3.4. Preliminary chemical composition of the stems and leaves of *Leptospermum scoparium*

The dried stems and leaves of *L. scoparium* were coarsely ground and extracted with progressively polar solvents (diethyl ether, 96 % ethanol, water). Subsequently, rapid qualitative tests were conducted to identify compounds using characteristic chemical reactions. The preliminary results of the chemical composition of the stems and leaves of *L. scoparium* are detailed in Table 2.

Table 2. Preliminary qualitative results of the chemical composition present in the stems, leaves of *L. scoparium*

	Extract from the stems			Extract from the leaves			Conclusion	
	Et_2O	EtOH	H_2O	Et_2O	EtOH	H_2O	Stems	Leaves
Essential oil	+			+			Present	Present
Fats	-			-			Absent	Absent
Carotenoids	+			+			Present	Present
Triterpenoids	++	++	-	++	+	-	Present	Present
Alkaloides	-	-	-	-	-	-	Absent	Absent
Coumarins	-	-		-	-		Absent	Absent
Anthraquinones	-	-	-	+	-	-	Absent	Present
Cardiac glycosides		-	-		-	-	Absent	Absent
Flavonoides	-	-	-	+	-	-	Absent	Present

	Extract from the stems			Extract from the leaves			Conclusion	
	Et_2O	EtOH	H_2O	Et_2O	EtOH	H_2O	Stems	Leaves
Anthocyanosides		-	-		-	-	Absent	Absent
Proanthocyanidins		-	-		-	-	Absent	Absent
Tannins		+	-		-	+	Present	Present
Saponins		-	-		+	-	Absent	Present
Reducing compounds		-	+		+	+	Present	Present
Organic acids		+	+		+	+	Present	Present
Polyuronide compounds			-			-	Absent	Absent

Et_2O: diethyl ether, EtOH: 96 % Ethanol, (-) Absent; (+) Present; (++) Abundant

Remarks: The preliminary chemical composition of the stems and leaves of *L. scoparium* includes essential oil, carotenoids, triterpenoids, tannins, reducing compounds, and organic acids. Additionally, the leaves of *L. scoparium* also contain anthraquinones, flavonoids, and saponins.

4. DISCUSSION

After analyzing the *mat*K gene sequence of the Manuka species obtained, it was found that this species belongs to the genus *Leptospermum* and has a 100 % similarity ratio with *Leptospermum scoparium*. Subsequently, a morphological analysis was conducted using comparative morphology methods, and the results were compared with the literature [7], revealing similarities with the morphological characteristics of the genus *Leptospermum*. Comparisons with the literature [8, 9] indicated that the morphological features align with those of *Leptospermum scoparium*. The surveyed species collected in Bao Loc, Lam Dong, has been scientifically identified as *Leptospermum scoparium* J.R.Forst. & G.Forst. This study provides a detailed examination of the species' morphological characteristics, supplemented with color illustrations and additional observations on floral traits, pollen structure, and cross-sectional ovary features. For the first time, the anatomical structures of the stems, leaves, and petioles are described in detail, supported by illustrative images, representing a significant contribution to the microscopic study of this species. The findings on microanatomical characteristics and the components identified in the medicinal powder of the stems and leaves will serve as a basis for establishing quality standards for this medicinal plant and will facilitate further research on *L. scoparium* in Vietnam. Preliminary analyses of the chemical composition of the stems and leaves align with findings in the literature [1, 2, 4], indicating that the chemical profiles of these plant parts are generally similar. These initial results provide a valuable foundation for future chemical studies of *L. scoparium*.

5. CONCLUSION

The study contributed to providing more data about morphological characteristics: Simple leaf, alternate, 5 sepals free, 5 petals free, the subpart of the petals is present, numerous stamen arranged in the same circle, 5 carpels, an inferior ovary of *Leptospermum scoparium* in Vietnam. The anatomical characteristics of stems, leaves include: Sclereid in endodermis; inner phloem, secretory, bags, and calci oxalate crystals in the cross-section of the stems and leaves, parenchyma tissue in the cross-section of the leaves has a symmetrical structure. The study has also added information on the *mat*K gene sequence (716 bp) in the chloroplast of this species, contributing to species identification based on molecular markers. Phytochemical constituents of the stems

and leaves include: Essential oil, carotenoids, triterpenoids, tannins, reducing agents, and organic acids; additionally, the leaves contain anthraquinones, flavonoids, and saponins.

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Đặc điểm thực vật, trình tự gen *mat*K và sơ bộ thành phần hóa học của tùng tuyết mai - *Leptospermum scoparium*, họ sim (Myrtaceae)

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TÓM TẮT

Đặt vấn đề: Tùng tuyết mai là loài cây nhập nội, dùng làm cảnh ở Việt Nam. Tùng tuyết mai có tác dụng kháng viêm, kháng khuẩn, trị ho, cảm sốt và tiêu chảy. Mục tiêu nghiên cứu: Khảo sát đặc điểm thực vật, trình tự matK để góp phần định danh đúng loài tùng tuyết mai và sơ bộ thành phần hóa học. Đối tượng và phương pháp nghiên cứu: Cây tươi được thu thập tại Bảo Lộc - Lâm Đồng, đánh giá hình thái bằng cách quan sát và đo các đặc điểm của mẫu thân, lá và hoa tươi của chúng; đối với các nghiên cứu giải phẫu, các vi phẫu thu được bằng dao lam, các mẫu được nhuộm với carmin và vert'iod, các hình vi học được chụp bằng máy ảnh Samsung qua thị kính của kính hiển vi, kèm phân tích trình tự matK và khảo sát sơ bộ thành phần hóa học bột thân, lá bằng phương pháp Ciulei có cải tiến. Kết quả: Loài tùng tuyết mai được định danh dựa trên hình thái và trình tự gen matK xác định tên khoa học là Leptospermum scoparium J.R.Forst. & G.Forst. có đặc điểm hình thái đặc trưng: Lá đơn, mọc cách, 5 lá đài rời, 5 cánh hoa rời, có tràng phụ, nhiều nhị rời xếp một vòng, 5 lá noãn, bầu dưới; kèm dữ liệu giải phẫu: Trụ bì hóa mô cứng; libe trong, túi tiết ly bào và tinh thể calci oxalat hiện diện ở vi phẫu thân và lá, thịt lá cấu tạo dị thể đối xứng; sơ bộ thành phần hóa học trong thân và lá tùng tuyết mai có tinh dầu, carotenoid, triterpenoid, tannin, các chất khử và các

acid hữu cơ; ngoài ra trong lá còn có thêm anthraquinon, flavonoid và saponin. Kết luận: Nghiên cứu góp phần cung cấp thêm dữ liệu về trình tự matK, đặc điểm hình thái, giải phẫu thân, lá và thành phần hóa học có trong thân, lá của loài Tùng tuyết mai ở Việt Nam.

Từ khóa: *Leptospermum scoparium, trình tự matK, hình thái, giải phẫu, thành phần hóa học*

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