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RESEARCH ARTICLE

Phytochemical profiling of bioactive compounds in *Telosma cordata* (Tonkin jasmine) flower extract using GC-MS technique

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Abstract

This study presents a comprehensive account of *Telosma cordata* and related species, focusing on taxonomy, distribution and distinguishing morphological traits. To elucidate the phytochemical landscape of the species, floral samples were subjected to Gas Chromatography-Mass Spectrometry (GC-MS) analysis. The resulting chromatographic profiles revealed a diverse spectrum of primary and secondary metabolites, including volatile oils, phenolic compounds and bioactive flavonoids. The study identifies several major phytoconstituents with potential medicinal and nutritional relevance. The richness of antioxidant and antimicrobial metabolites in the methanolic extract suggests potential applications in developing natural therapeutic agents against oxidative stress and microbial infections. On the other hand, the hexane extract, dominated by heptadecanamine, indicates strong antimicrobial activity with possible use in pharmaceutical and industrial applications. Together, these findings emphasise the pharmacological potential of *T. cordata* flowers and justify further studies, including bioassays and formulation development.

Keywords: bioactive components; GC-MS; polar/non polar solvents; *Telosma cordata*

Introduction

Floriculture, the cultivation of flowering and ornamental plants, has become a dynamic sector in the global horticultural industry. It has a significant role in improving biodiversity, boosting environmental beauty and promoting economic prosperity through the global flower trade. Flowers have long been a vital component of human existence, representing beauty, emotions and customs. The floriculture industry in India is expanding rapidly, driven by strong demand both within the country and abroad. In the coming years, India's flower export sector is anticipated to reach its maximum potential, contributing significantly to global growth (1). India ranks 18th, contributing 0.6 % to the global floriculture trade (2). Tamil Nadu stands as the leading state for loose flower production in India, playing a pivotal role in both the national and regional floriculture industry. As of 2024, Tamil Nadu produced a record 631,367 MT of loose flowers, representing sustained growth from previous years and cementing its contribution as approximately 25 % of India's total loose flower output. Tamil Nadu's dominance in the loose flower segment is supported by its diverse agro-climatic zones, fertile soils and abundant labour, making year-round cultivation possible (3). Against this dynamic backdrop, the exploration and utilisation of novel and underexplored species have taken on fresh importance, both for their ornamental value and their untapped potential in health and industry. *Telosma cordata,* commonly known as the Chinese violet, cowslip creeper or Tonkin jasmine, belongs to the *Apocynaceae* family and exemplifies such promise; morphological structures are shown in (Fig. 1) (4, 5). Locally called Kodi sampangi or Patcha sampangi in Tamil, native to India, Burma and Southeast Asia, this perennial climber is celebrated for its cascading clusters of fragrant yellow flowers, glossy heart-shaped leaves and versatile use in food, ornamentation and traditional remedies. Despite its popularity in certain regions for decorative and culinary purposes (6). Common species include *T. procumbens, T. pallida, T. puberula and T. thailandica* (morphological comparison given in Table 1). It has a prominent role in traditional medicine, where its essential oils, which are derived from the flowers and leaves, are used to relieve pain, promote wound healing, treat scabies, manage ulcers, relieve headaches and relax nerves (4). Additionally, *T. cordata* has been shown to have antioxidant, antidiabetic and antibacterial qualities (7, 8, 9). Research has also indicated that it

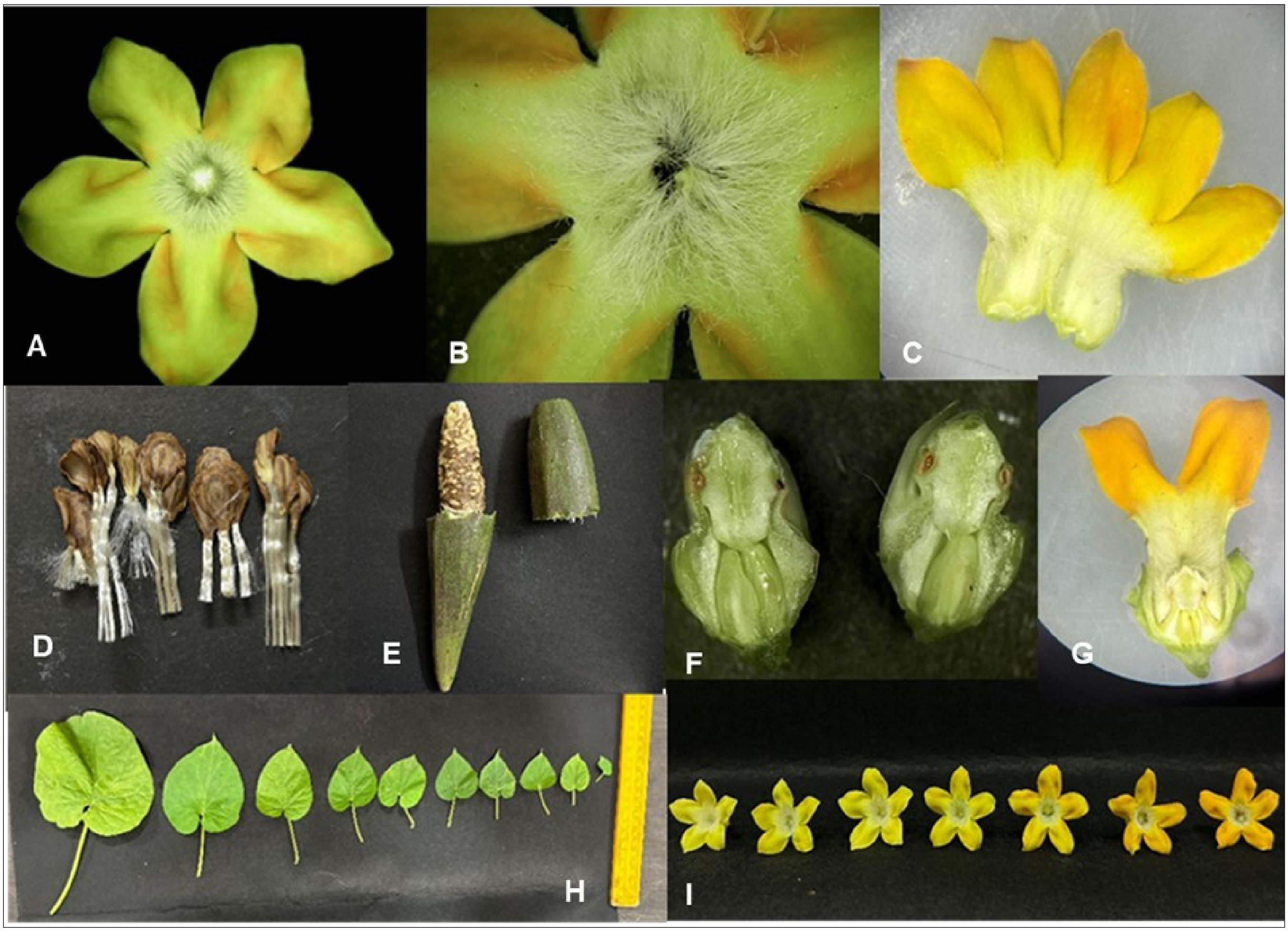


Fig. 1. A. Flower image under microscope; B. Top view of hairy; C. opened corolla; D. seed; E. pod; F. vertical section showing superior ovary; G. Cross section of the flower; H. size of the leaves; I. Colour shades of the flower.

Table 1. Morphological comparison of *Telosma cordata* with allied taxa

Characters	*T. cordata*	*T. puberula*	*T. procumbens*	*T. pallida*
Stem	Woody climber with milky sap, sparsely lenticellate	Liana, smooth stem, young twig puberulent	Slender woody climber, lenticellate	Slender twinning subshrub, densely pubescent
Petiole	Opposite, 1.5-5 cm, pubescent when young, but becomes glabrous with age	1–2.5 cm and pubescent	1.5–3.5 cm and pubescent	slender, 2.5-5 cm and pubescent
Leaves	opposite, ovate and have a deeply cordate (heart-shaped) base with a narrow sinus, acuminate	ovate-oblong to elongated elliptic and also pubescent, particularly on the nerves, 6 –13×3–8 cm, smooth/veined	ovate to oblong or oblong-elliptic, measuring 6–13 cm in length and 4–6 cm in width, apex acuminate, lateral veins 4 –6 pairs, pubescent	Ovate-oblong, 7–16×4–7cm, pubescent especially on nerves
Peduncle	Compound umbellate, 0.5-1.5 cm	Umbrella to round compound flower, 0.5-1.5 cm	Spherical, 1 to 3 cm	Lateral flowers in umbellate cymes, 0.7 to 1.5 cm
Pedicels	1 cm, umbel-like cymes	5-12 mm long, umbel, likely puberulent	1.5-2.5 cm, umbel-like, axillary inflorescence	~1 cm, pubescent
Petals	5-petaled, pale yellow or greenish-yellow, star-shaped, Oblong, ciliate	5 petals, oblong, yellowish-green, star-shaped and twisted	5 petals, yellow-green corolla, Lanceolate, twisted, edges ciliate	Corolla 1.5 cm, salver-shaped, pale cream, Oblong, glabrous
Crown	Yellowish green	bright green or greenish yellow	Greenish or greenish yellow	Pale cream
Odour	Strong at night, pleasant fragrance	strong fragrance	Odour less	fragrance
Petal lobes	Longer than the corolla tube	Oblong, not exceeding the corolla	Longer than the corolla tube, upright, twice as long as as corolla tube	Equal to or shorter than the corolla tube
Corona lobes	slightly fleshy, Shorter than anther appendages	longer than the anther appendages,	Equal to anther appendages	Equal or longer than anther appendages
Pollinia	oblong-lanceolate in shape and yellow in colour	Upright, next to anther, ovatus-oblong lobes	oblong-lanceolate in shape and are yellow in colour	oblong-lanceolate and yellow, with maroon caudicles and they are erect,
Flowering season	May to October	May to October	April to August	May to January

may be used to treat conjunctivitis, prevent cancer and lessen the risk of cardiovascular disease (10). Additionally, this plant's potential as a supplement with sedative and neuroprotective properties is suggested by the fact that the indigenous people of Vietnam have used it as a herbal tea to enhance the quality of their sleep.

While not as commercially prominent as jasmine or marigold, *T. cordata* offers potential for niche markets both as a loose flower for decorative and ceremonial uses and as a value-added product through its unique aroma and phytochemical properties. Recent advancements in analytical techniques like GC-MS allow for precise profiling of the plant's bioactive compounds. This combined technique has revolutionised the field, with gas chromatography (GC) segregating chemical mixtures and mass spectrometry (MS) proficiently identifying their components (11). Initial studies on *T. cordata*'s flowers and leaves have revealed a complex array of metabolites, including volatile essential oils, phenolic antioxidants and a range of flavonoids, many with reported health-promoting properties. The capacity to recognize and measure these phytochemicals has been greatly improved by developments in analytical methods. Even in trace amounts, GC-MS is a potent technique for identifying bioactive substances, including acids, ethers and alcohols. In this study, we used GC-MS analysis to identify different bioactive chemicals in the flowers. This method made it easier to understand the phytochemical profiles that support these plants' conventional medical applications. *T.cordata* remains relatively underexploited within the broader international floriculture trade. Documentation of morphological traits such as floral architecture, leaf morphology and growth habit enables distinction between *T. cordata* and its closely related species. Accordingly, *T.cordata* will be further investigated to characterise its phytochemicals and substantiate its traditional uses.

In this context, the present article integrates field-based documentation and advanced phytochemical analysis to offer a comprehensive perspective on *Telosma cordata.* Through the integration of forefront analytical research with traditional botanical study, this project seeks to improve our basic knowledge. Sometimes, undervalued crops are floriculture treasures, thereby enhancing the sustainability and diversity of the global floriculture industry.

Materials and Methods

The present study was carried out at the Department of Floriculture and Landscape Architecture, Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, during 2024-2025. A total of 120 healthy and mature specimens of *Telosma cordata* were collected from three different locations, such as Dindigul, Theni and Villupuram, each location with a count of 40 plants. The fully developed flowers were harvested in the morning hours to preserve the integrity of phytochemical constituents. The samples were given for phytochemical profiling to identify the primary and secondary compounds present in the flowers. To differentiate the compounds, polar (Methanol) and non-polar (Hexane) solvents are used.

Botany of *Telosma cordata*

The plant is native to India, Myanmar, Indochina and South China. It is widely cultivated in Southeast Asia, especially in Thailand, Vietnam and Malaysia. Cytologically, it exhibits a chromosome number of 2n = 22, relevant for breeding and phylogenetic studies. It was introduced and cultivated in Java in the seventeenth century. It grows well in full sun and rich, well-drained sandy-loam soil; pH 6.1-7.5 is ideal. It can withstand drought and poor soil, but it is vulnerable to cold and flooding. *Telosma cordata* (Burm. f.) Merr., commonly known as Chinese violet, cowslip creeper, Pakalana vine or Tonkin jasmine, is a vigorous perennial woody climber belonging to the family Apocynaceae. It is characterized by twining, woody, cylindrical stems with glabrous green young shoots that become brown and woody with age, exuding a milky latex when cut. The leaves are opposite, simple, exstipulate, broadly cordate to ovate with an acuminate apex, entire margins and a deeply cordate base, measuring 6 cm-12 cm long and 5 cm-10 cm wide, glabrous on both surfaces, with 1 cm-3.5 cm long petioles. The plant bears highly fragrant, bright yellow to greenish-yellow, star-shaped flowers arranged in compound axillary or terminal umbellate cymes of 5-25 flowers, each with a short corolla tube, spreading to slightly reflexed lobes and an elaborate corona with five erect subulate lobes. Flowering occurs mainly from March to August.

Methodology of phytochemical extraction

The flowers are collected from the field (Plot No: 10) in the Department of Floriculture and Landscaping. For the preparation of *Telosma cordata* flower extracts, fresh, fully opened flowers were collected in the early morning during June, cleaned with distilled water. The plant specimen was authenticated by BSI, Coimbatore (No.: BSI/SRC/5/23/2025-26/Tech./651). The fresh flowers were then wrapped in a Whatman No. 42. Soxhlet extraction was carried out separately using two solvents of differing polarity, analytical grade methanol (polar) and hexane (non-polar), with approximately 300mL of the respective solvent placed in the round-bottom flask (1:10 ratio). The sample was loaded into a thimble and the Soxhlet apparatus was assembled with a condenser attached. Extraction was performed by gentle heating on a mantle to maintain continuous reflux for 6 hours (Hexane solvent) and 8 hours (Methane solvent), until the siphon tube returned a colourless solvent, confirming exhaustive extraction. The extracts were then cooled and concentrated under reduced pressure using a rotary evaporator at temperatures below 50 °C to avoid thermal degradation. The resulting extracts were dried further, if necessary, weighed to determine yield and stored in amber glass vials at 4 °C until further phytochemical analysis, such as GC–MS profiling. All steps were conducted using HPLC-grade solvents and standard laboratory safety procedures to ensure reproducibility and reliability of results.

Gas chromatography and mass spectroscopy (GC-MS) and data analysis

HPLC-grade methanol was used to dissolve the solvent-free floral samples (100 mg/ml). The samples were analysed using a Shimadzu GC-MS-2030-TQ8040 NX system. The instrument was equipped with a nonpolar Rxi-5Sil MS column (30 m length x 0.25 mm internal diameter, 0.25 µm film thickness). Helium served as the carrier gas at a constant flow rate of 0.3 mL/min. 1 µL aliquot of each sample was injected at an inlet temperature of 240 °C. The oven temperature was initially held out by matching the obtained mass spectra with those in the NIST (National Institute of Standards and Technology) library, using the similarity index and Kováts retention indices (RI) for confirmation. GC-MS was used to quantify common chemicals found in the flower sample. The peak area % obtained from the chromatograms was used to calculate each compound's concentration. By comparing the sample's mass with a spectrum database, the chromatogram was verified. The peak area % obtained from the chromatograms was used to calculate each compound's concentration.

Results and Discussion

The GC-MS analysis of the methanolic and hexane extracts of *Telosma cordata* flowers revealed a diverse profile of bioactive compounds with significant biological and pharmacological relevance. When *T. cordata* is compared with related species, such as Nyctanthes and Vernonia, it emerges as uniquely rich, especially when methanol is used for extraction, yielding not only an array of volatile aromatics but also a diverse set of phenolic compounds and bioactive acids (12). The methanolic extract was rich in compounds with antioxidant, antimicrobial and anti-inflammatory properties. The most abundant compound detected was Succinylacetone (19.23 %), known for its exceptional thermal stability and moderate antibacterial activity (Table 2) (13-44). Other major constituents included Mevalonic lactone (11.6 %), which plays a role in antioxidant and anti-inflammatory pathways and Pyridoxamine (9.05 %), a form of vitamin B6 with strong antioxidant potential and therapeutic applications against kidney-related disorders. Fatty acids such as palmitic acid (4.98 %), decanoic acid (4.75 %), elaidic acid (3.29 %) and linoleic acid (3.11 %) were also present, contributing to the antimicrobial, antioxidant and nutraceutical properties of the oil (Fig. 2). Interestingly, the extract also contained hydroxyoctanoic acid (2.86 %), which is reported to exhibit antioxidant, anti-inflammatory and anticancer activities. Several minor compounds like cinnamic acid (1.42 %), uracil (0.82 %) and 5-hydroxymethylfurfural (0.82 %) further enhanced the bioactive profile with multifunctional properties, including antimicrobial and anti-proliferative effects.

The hexane extract exhibited a different chemical composition dominated by Heptadacanamine (72.64 %), a long-chain amine with strong antimicrobial potential. Compared to the methanolic extract, the hexane extract contained fewer but more concentrated compounds (Table 3) (45-65). Other notable constituents included Methyl cis isosenoate (5.83 %), associated with inflammatory metabolite regulation and Palmitic acid (3.03 %), a fatty acid with wide applications in cosmetics and skincare (Fig. 3). Lipid derivatives such as methyl oleate (2.66 %), octadecenal (2.43 %) and linoleic acid (0.96 %) contributed to emulsifying, insecticidal and nutraceutical properties. Additionally, the presence of lignoceric acid (0.89 %) and juniperic acid (0.72 %) highlighted the extract's anti-inflammatory and antimicrobial potential. Although present in smaller amounts, compounds like methyl elaidate (0.36 %) and tridecanedial (0.2 %) showed antioxidant, anticancer and anti-inflammatory activities, further strengthening the bioactive significance of the extract.

These findings suggest that the methanolic extract of *T. cordata* flowers is a rich source of multifunctional metabolites, with a predominance of compounds related to antioxidant defence and antimicrobial activity, which could justify its traditional medicinal applications. The coexistence of volatile aroma compounds in both extracts highlights their dual ornamental and sensory appeal. The contrasting profiles suggest that a combined solvent approach maximizes the recovery of both aroma-active lipophiles and nutritionally relevant hydrophiles, offering a more complete understanding of the plant's phytochemical richness.

Conclusion

The GC-MS profiling of *Telosma cordata* flowers revealed a rich and diverse phytochemical composition, with the polarity of the solvent playing a significant role in the extraction of various metabolite classes. The methanolic extract was predominantly composed of polar bioactive compounds such as succinylacetone, mevalonic lactone and pyridoxamine, which are known for their antioxidant, anti-inflammatory and antimicrobial properties. This underscores the potential of *T. cordata* as a functional food ingredient and therapeutic agent. Conversely, the hexane extract featured a high concentration of heptadecanamine and long-chain fatty acid derivatives, imparting strong antimicrobial, emulsifying and industrially relevant characteristics. Future research aimed at compound isolation, bioactivity-guided fractionation and validation of structure activity relationships will be essential in

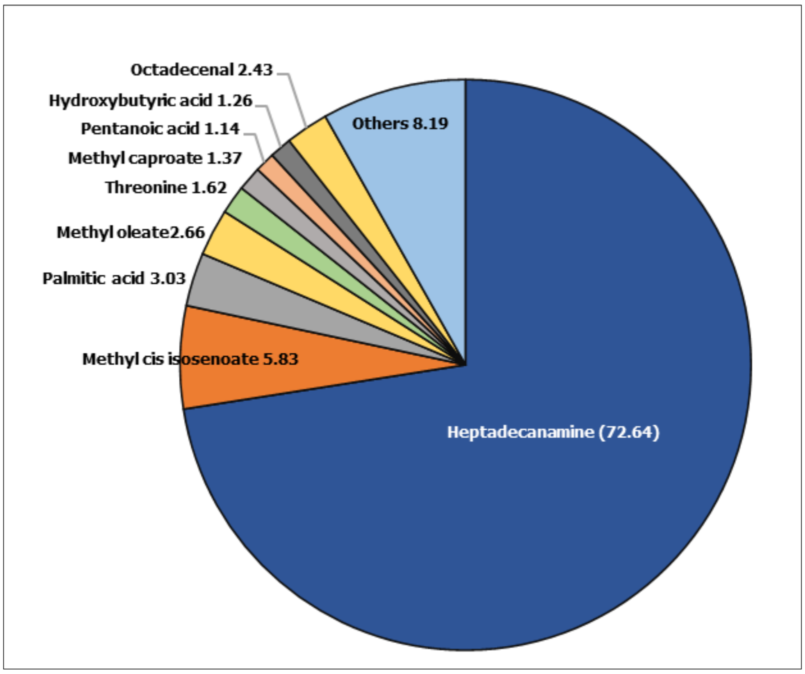
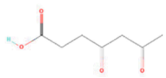
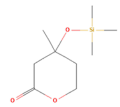
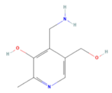
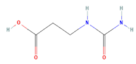
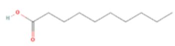
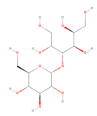
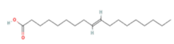
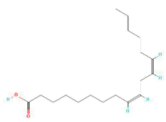
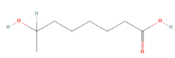
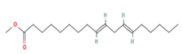
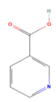
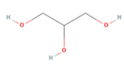


Fig. 2. Methanoic extracted *Telosma cordata* composition based on GC-MS analysis.

Table 2. Bioactive compounds detected in the methanolic extract of *Telosma coradta* flower

S. No	Chemical compound name	Area / Height (%)	2D Structure	Molecular formula and Molecular weight	Function	Reference
1	Succinylacetone	19.23		$C_7H_{10}O_4$ 158.15 g/mol	Exceptional thermal stability and moderate antibacterial activity	(13)
2	Mevalonic lactone	11.6		$C_9H_{18}O_3Si$ 202.32 g/mol	Antioxidant and anti-inflammatory activities	(14)
3	Pyridoxamine	9.05		$C_8H_{12}N_2O_2$ 168.19 g/mol	A form of vitamin B_6, which treats diabetic nephropathy (kidney damage) and kidney stones, Antioxidant activity	(15)
4	Ureidopropionic acid	7.82		$C_4H_8N_2O_3$ 132.12 g/mol	Antimicrobial activity	(16)
5	Palmitic acid	4.98		$C_{16}H_{32}O_2$/ 256.42 g/ mol	Antibacterial and antioxidant properties	(17)
6	Decanoic acid	4.75		$C_{10}H_{20}O_2$ 172.26 g/mol	Antibacterial, anti-inflammatory,	(18)
7	Maltitol	4.69		$C_{12}H_{24}O_{11}$ 344.31 g/mol	Antimicrobial, sugar substitute	(19)
8	Methyl cis-13,16-Docosadienoate	4.62		$C_{23}H_{42}O_2$ 350.6 g/mol	Used as a biochemical reagent in life science research and for analytical purposes	(20)
9	Hexadecyn	3.37		$C_{16}H_{30}O$ 238.41 g/mol	Intermediates in chemical synthesis and as precursors for pheromone synthesis	(21)
10	Elaidic acid	3.29		$C_{18}H_{34}O_2$ 282.5 g/mol	Antibacterial activity	(22)
11	Linoleic acid	3.11		$C_{18}H_{32}O_2$ 280.4 g/mol	Antithrombotic activity, antifungal activity and nutraceutical	(23)
12	Hydroxyoctanoic acid	2.86		$C_8H_{16}O_3$ 160.21 g/mol	Antioxidant, antimicrobial, anti-inflammatory and anticancer properties.	(24)
13	Methyl linolelaidate	2.64		$C_{19}H_{34}O_2$ 294.5 g/mol	Antioxidant activity and an antiglycation agent	(25)
14	Nicotinic acid	2.47		$C_6H_5NO_2$ 123.11 g/mol	Antibacterial, antioxidant, anti-inflammatory, anticarcinogenic and antitubercular activities	(26)
15	Glycerol	1.9		$C_3H_8O_3$ 92.09 g/mol	Antiviral effects	(27)

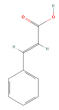
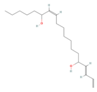
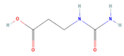
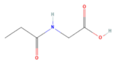
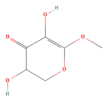
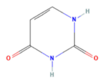
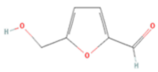
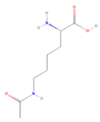
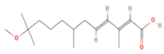
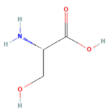
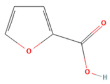
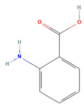
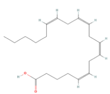
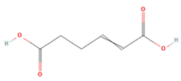
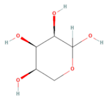
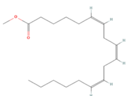
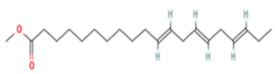
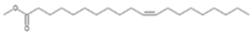
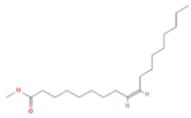
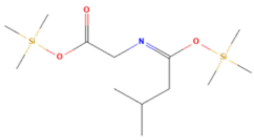
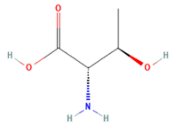
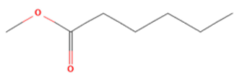
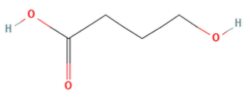
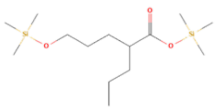
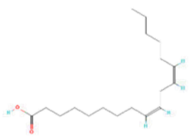
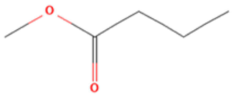
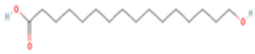
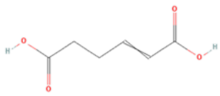
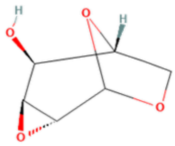
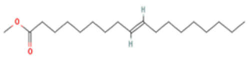
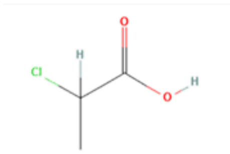
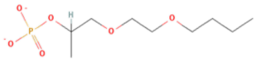
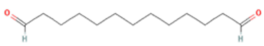
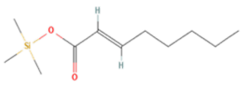
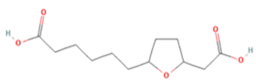
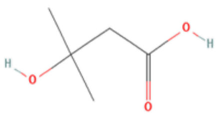
16	Cinnamic acid	1.42		$C_9H_8O_2$ 148.16 g/mol	Antimicrobial, antioxidant and anti-inflammatory properties	(28)
17	Nonadecatriene-5,14-diol	1.18		$C_{19}H_{34}O_2$ 294.5 g/mol	Antiviral, antibacterial activity and Pharmacokinetic properties.	(29), (15)
18	Ureidopropionic acid	1.13		$C_4H_8N_2O_3$ 132.12 g/mol	Antimicrobial activity	(30)
19	Propionylglycine	1.08		$C_5H_9NO_3$ 131.13 g/mol	Antimicrobial activity	(31)
20	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6- methoxy	0.86		$C_6H_8O_5$ 160.12 g/mol	Antioxidant property	(32)
21	Uracil	0.82		$C_4H_4N_2O_2$ 112.09 g/mol	Antibacterial, antifungal, antimicrobial, antitubercular, antioxidant, antiprotozoal properties	(33)
22	5-Hydroxymethylfurfural	0.82		$C_6H_6O_3$ 126.11 g/mol	Antioxidant, anti-inflammatory and anti-proliferative effects	(34)
23	Acetyllysine	0.81		$C_8H_{16}N_2O_3$ 188.22 g/mol	Antioxidant and anti-inflammatory properties	(35)
24	Methoprene acid	0.79		$C_{16}H_{28}O_3$ 268.39 g/mol	Synthetic insect growth regulator (IGR)	(36)
25	Serine	0.78		$C_3H_7NO_3$ 105.09 g/mol	Antioxidant activity, antimicrobial	(37)
26	Furoic acid	0.68		$C_5H_4O_3$ 112.08 g/mol	Fungicide, flavouring agent in the food industry, antimicrobial activity, anti-inflammatory and antibacterial properties	(38)
27	Anthranilic acid	0.62		$C_7H_7NO_2$ 137.14 g/mol	Secondary antioxidant	(39)
28	Arachidonic acid	0.61		$C_{20}H_{32}O_2$ 304.5 g/mol	Anti-bacterial and antioxidative properties	(40)
29	Hexenedioic acid	0.58		$C_6H_8O_4$ 144.12 g/mol	Antibacterial activity	(41)
30	Ribose	0.52		$C_5H_{10}O_5$ 150.13 g/mol	Antimicrobial activity	(42)
31	Methyl gamma-linolenate	0.50		$C_{19}H_{32}O_2$ 292.5 g/mol	An apoptosis inducer, an antineoplastic agent and has antibacterial activity.	(43)
32	Methyl eicosa-8,11,14-trienoate	0.42		$C_{21}H_{36}O_2$ 320.5 g/mol	Modulating inflammatory pathways or as components of dietary interventions, anti-inflammatory properties.	(44)

Table 3. Bioactive compounds detected in the hexane extract of *Telosma coradta* flower

S. No.	Chemical compound name	Area / Height (%)	2D structure	Molecular formula and molecular weight	Function	Reference
1	Heptadacanamine	72.64		$C_{17}H_{37}N$ 255.5 g/mol	Antimicrobial	(45)
2	Methyl cis isosenoate	5.83		$C_{21}H_{40}O_2$ 324.5 g/mol	Stimulates the production of inflammatory metabolites	(46)
3	Palmitic acid	3.03		$C_{16}H_{32}O_2$ 256.42 g/mol	It is a key ingredient in cosmetics, skincare and haircare products for its moisturising, emulsifying and cleansing properties	(16)
4	Methyl oleate	2.66		$C_{19}H_{36}O_2$ 296.5 g/mol	Emulsifiers Plasticizers	(47)
5	Octadecenal	2.43		$C_{18}H_{34}O$ 266.5 g/mol	Insecticidal effects, antimicrobial activity	(48)
6	Isovalerylglycine	1.8		$C_{13}H_{29}NO_3Si_2$ 303.54 g/mol	Used as a Biomarker affecting leucine metabolism	(49)
7	Threonine	1.62		$C_4H_9NO_3$ 119.12 g/mol	An amino acid involved in lipid metabolism, protein synthesis and ESC proliferation	(50)
8	Methyl caproate	1.37		$C_7H_{14}O_2$ 130.18 g/mol	Flavouring agent, fragrance ingredient, Plasticizer, Lubricant	(51)
9	Hydroxybutyric acid	1.26		$C_4H_8O_3$ 104.10 g/mol	Muscle growth enhancer, Central nervous system depressant and in medical uses	(52)
10	Pentanoic acid	1.14		$C_{14}H_{32}O_3Si_2$ 304.57 g/mol	Production of esters for fragrances, flavourings and as a building block in chemical synthesis	(53)
11	Linoleic acid	0.96		$C_{18}H_{32}O_2$ 280.4 g/mol	Antithrombotic activity, antifungal activity and Nutraceutical	(54)
12	Lignoceric acid	0.89		$C_{24}H_{48}O_2$ 368.6 g/mol	Anti-inflammatory, Nutraceuticals, Cosmetics, Natural additives (food products) and Pharmaceuticals	(55)

13	Methyl butanoate	0.81		$C_5H_{10}O_2$ 102.13 g/mol	Used as an aromatherapy and as a flavouring agent	(56)
14	Juniperic acid	0.72		$C_{16}H_{32}O_3$ 272.42 g/mol	Antibacterial, antifungal and Anti-inflammatory properties	(57)
15	Hexenedioic acid	0.45		$C_6H_8O_4$ 144.12 g/mol	Antibacterial activity	(58)
16	Anhydro-d-galactosan	0.36		$C_6H_8O_4$ 144.12 g/mol	Anticariogenic activity	(59)
17	Methyl elaidate	0.36		$C_{19}H_{36}O_2$ 296.5 g/mol	Antioxidant, Anticancer	(60)
18	Chloropropionic acid	0.29		$C_3H_5ClO_2$ 108.52 g/mol	Primarily used as a valuable intermediate in the production of crop protection agents, Pharmaceuticals and Dyes.	(61)
19	Propanol, 1-(2-butoxyethoxy)	0.26		$C_9H_{19}O_6P_2$ 254.22 g/mol	Used as a Solvent, plasticiser, Coupling agent, coalescing agent and dispersing agent in industrial applications	(62)
20	Tridecanedial	0.2		$C_{13}H_{24}O_2$ 212.33 g/mol	Antimicrobial, Anti-inflammatory applications in the cosmetic and perfumery industries	(63)
21	Octenoic acid	0.18		$C_{11}H_{22}O_2Si$ 214.38 g/mol	Flavouring agent, cosmetics and as a potential insecticide. It's also been studied for its anti-cancer and anti-inflammatory properties.	(64)
22	Epoxydodecanedioic acid	0.11		$C_{12}H_{20}O_5$ 244.28 g/mol	Used as a component in epoxy resins and as a curative agent in powder coatings	(65)
23	Hydroxyisovaleric acid	0.1		$C_5H_{10}O_3$ 118.13 g/mol	To assess biotin deficiency, monitor metabolic disturbances and evaluate gut microbiota balance	(9)

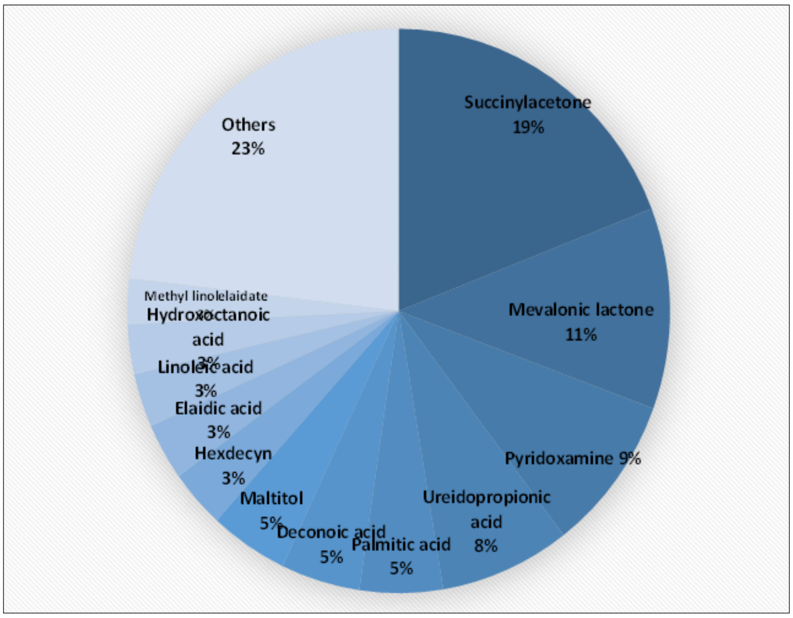


Fig. 3. Hexanoic extracted *Telosma cordata* composition based on GC-MS analysis.

unlocking the full pharmacological and commercial potential of this floral species. From the present study, it may be concluded that it is a rich source of novel and biologically active metabolites, which may be of great interest for the pharmaceutical industry and medicinal research. However, isolation of individual phytochemical constituents and subjecting these to other biological activities may lead to new research insights.

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Authors' contributions

RS carried out the experiment, took observation and analysed the data. KL guided the research by formulating the concept, helped secure funds and approved the final manuscript. RC contributed by reviewing the manuscript. AR contributed procure research grants. DK contributed by edit and summarise the manuscript. NMB helped to outline and modify the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

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