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Phytochemical Composition of Therapeutic Potential of *Clematis Zeylanica* and *Corallocarpus Epigaeus* : A Comparative Study

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Abstract
Medicinal plants contain a wide variety of bioactive compounds that exhibit numerous biological activities. Identifying and screening these compounds is essential for promoting and safeguarding human health. *Clematis zeylanica* L. (Poir.) belonging to the family Ranunculaceae, and *Corallocarpus epigaeus* (Rottler) Hooker.f belonging to the family Cucurbitaceae were an important medicinal plant used in many ayurvedic formulations. The main aim of the current investigation was to study the phytochemical and compare phytochemical compounds in the leaves of *C. zeylanica* and tuber of *C. epigaeus* etanolic extracts by using gas chromatography and mass spectrometer (GC-MS). The GC-MS study revealed the presence of 17 bioactive compounds in *C. zeylanica* and 13 bioactive compounds in *C. epigaeus*. Among this phytochemicals 3-penten-2-one-4-methyl, Thiozole,4,5-dihydro-2-methyl, (+) propoxyphene, and Cyclopentasiloxane, decamethhyle- present in both the plants. Differences in compound composition between the two extracts highlight their distinct pharmacological potentials. Hence, the plant is suggested as pharmaceutically important. Further, isolation of individual bioactive compounds may be necessary to find a novel drug.

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1. INTRODUCTION

In most of the developing countries traditional medicine and medicinal plants are used for the maintenance of good health, which has been widely ascertained (UNISCO, 1996). An increasing cartel on the use of medicinal plants in the industrialized communities has been traced to the extraction and development of several drugs from traditionally used herbal remedies (UNISCO,1998). A large class of phytochemicals used in traditional medicine has been shown to have a variety of biological effects, including antibacterial, antidiabetic, antifertility, antifungal, antihypercholesteremic, antiinflammatory, antitumor, cardiovascular, central nervous system depressant, cytotoxic, diuretic, and others that are used to treat various human diseases (Mondel *et al*., 2020).

C. zeylanica is a group of climbing shrub belonging to the family Ranunculaceae native to the Indian subcontinent, China and Indochina. Common on hedges and thickets in tropical forests and scrub formations, on hillslopes, and along streams to an elevation of about 1000 m in the Himalayas from eastern Nepal to Sikkim, Bhutan, and north- western India, in northern Myanmar, Bangladesh, West Bengal, Bihar, and in Peninsular India from Madhya Pradesh, Odisha and Maharashtra to Tamil Nadu and Kerala, as well as in Sri Lanka. In the Western Ghats, it is relatively prevalent in moist deciduous forests and forest plantations (Parrotta, 2024).In Tamil Nadu it is found growing in moist forests and along stream banks and it is commonly known as Vatamolli, Vathamkolli, Vadakkodivalli, Vatakkoti etc., Flowers are produced between October and April.

The whole plant is considered anthelmintic, depurative, anodyne, Anti- inflammatory. This Whole plant is used in Ayurveda. Inhalation of the crushed roots and stem cures headache; chewing fresh stems ameliorates toothache; consumption of plant poultice mixed with the tender endosperm of *Borassus flabellifer* relieves chest pain. Young leaves paste applied on skin diseases and ulcers, and on forehead for cold and headache; useful in healing wounds and ulcers (Vargeese *et al.,* 2017). It is also used externally to relieve itch, rheumatic pain, and skin diseases including eczema. The roots and stems have a strong penetrating smell, and are used by traditional healer for (head pain) cephalagia (Manasa *et al.,* 2013). The leaf decoction mixed with *Ficus religiosa*, *Zingiber officinale, Cinnamomum verum, Piper nigrum* when taken twice a day after meals for 15 days cures rheumatism, stroke, and blood pressure. During the treatment period the patient should avoid consuming chicken, meat, cool drinks and consume food prepared from parboiled rice, finger millet, pearl millet with sesame oil (Arul Sheeba *et al.,* 2023)

Corallocarpus epigaeus belongs to the family Cucurbitaceae. It is commonly called as Red fruit Creeper. In Tamil it is known as Aagasa karuda kizhangu. It is distributed in Africa, Persian Gulf region and India. In India it is widely distributed in Tamil Nadu, Andra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Uttar Pradesh, Maharashtra, Punjab, West Bengal and Peninsular India. Produce flowers and fruits from the month of June to October. *C. epigaeus* is used in Ayurveda and Siddha medicine; roots as a laxative, as a paste for snakebite, and for women who have stomach pains; powdered roots are used for rheumatism, diarrhea, syphilis, and mild doses of diabetes. For snake bites, scorpion stings, and swellings, tuberous root paste is applied; for snakebite, the tuber is sliced, dried, and powdered, then consumed or ingested with water, fresh tuber smashed, and the juice administered (Quattrocchi, 2016; Venkata Suresh, 2017) tubers are used as a treatment for acute dysentery, venereal diseases, skinconditions, and snakebites in traditional medicine (Aiswarya *et al*., 2022).It is also believed to cleanse the wounds, obesity, tumor, cough, bronchitis, rheumatism and diabetes. Powder of the *Corallocarpus epigaeus* tubers mixed with leaves of *Aristolochia indica,* bark of *Azadirachta indica* and given internally to treat snake bite and also used to reduce tumor (Arul Sheeba *et al.,* 2023). Hence, the present study aimed to evaluate and compare the chemical constituents of the ethanolic extracts of *Clematis zeylanica* L. (Poir.) leaves and *Corallocarpus epigaeus* (Rottler) Hook.f. tubers."

2. MATERIALS AND METHODS

2.1 Collection and Identification of Plant Material

Fresh plant material was collected from the Sanamavu Reserve Forest in Krishnagiri district, Tamil Nadu, India. The plant was identified and confirmed by the Botanical Survey of India (BSI), Coimbatore – vide.

1. *Clematis zeylanica* L. (Poir.)
   - BSI/SRC/5/23/2023/Tech/749.
2. *Corallocarpus epigaeus* (Rottler) Hooke. f.
   - BSI/SRC/5/23/2023/Tech/747.

The plant parts, including *Clematis zeylanica* leaves and *Corallocarpus epigaeus* tubers, were separated and washed with tap water to remove dirt. They were then shade-dried and ground into a fine powder for further study.

Figure 1: Parts of plant *Clematis zeylanica* L. (Poir.) and *Corallocarpus epigaeus* (Rottler) Hooke. f.

2.2 Gas Chromatography and Mass Spectrometry (GCMS)

GC-MS is a powerful analytical technique that combines gas chromatography and Mass Spectrometry to separate and identify chemicals in a sample based on mass-to- charge (m/z) ratio. In GC the complex mixture of chemicals are separated based on their differential volatility. MS helps to detect the fragments created when electrical charge breaks down the separated chemical compounds. It is a modern technique, which describe the detection and quantification of active ingredients in plant materials and are useful in the proper standardization of herbal drug formulations. In recent years, GC-MS have become widespread for distinguishing functional groups and recognizing various bioactive substances such as alkaloids, terpenoids, flavonoids, glycosides etc., present in plants.

2.3 Ethanol Leaf Extraction

The field collected *C. zeylanica* leaf and *C. epigaeus* tuber were washed in clean running tap water and then in distilled water; shadow dried at room temperature, then powdered and stored in the closed airtight and moisture free vessel. 10 mg of the powder was added to 50 ml of ethanol. The shaken mixture was kept for 72 hours with frequent shaking at room temperature in an agitator. Afterwards, the extract was filtered from march through Whatman No. 41 filter paper. This extraction procedure was repeated thrice and the final extract thus obtained was preserved in a vial in the refrigerator for further GC-MS analysis.

GC-MS examination of the ethanolic leaf extracts of *C. zeylanica*, and the tuber extract of *C. epigaeus* were performed utilizing the instrument Agilent 7890 B Gas Chromatography system equipped with a 7000C Mass Spectrometer Triple Quad (Agilent Technologies Inc. Sant Clara, CA, USA) under computer control at 70eV. Using a micro syringe, about 1µL of the ethanol extract was injected into the GC-MS, and 40 minutes of scanning were spent on the analysis. The compounds eluted from the column as they were separated and went into a detector, which was able to provide an electronic signal each time a chemical was found. A computer was used to process the signal, which increased in size the higher the concentration in the sample. Interval of time between the injection time (Initial time) and the elution time is known as Retention Time (RT).

The signals produced when the compounds eluted from the gas column into the detector were represented by the respective peaks in the chromatogram. The Y-axis assessed the signal intensity to quantify the component in the injected sample, while the X-axis displayed the retention time (RT). Following this steps individual chemicals were exposed to an ionized electron stream which cause the fragments. The fragments thus extracted are in fact, the charged ions with specific mass. The resultant graph (mass spectrum graph) represents the fingerprints of the molecules which are used to calibrate the m/z (mass / charge) ratio.

The temperature of the oven, the flow rate of the gas utilized, and the electron gun were first

programmed before the extract was analyzed using Gas Chromatography and Mass Spectroscopy. The oven's temperature was kept constant at 250°C. Helium was used as the carrier gas and its flow rate was adjusted 1ml/minute. The electron gun of the mass detector emitted electrons with an energy of about 70eV. Based on a comparison of their retention times with the NIST libraries, the components were identified.

Following the analyses, the components were identified using those available in the libraries (NIST) linked to the GC-MS device, and the outcomes were tabulated and phytochemicals were compared.

3. RESULT AND DISCUSSIONS

The GC-MS study revealed the presence of 17 bioactive compounds in *C. zeylanica* and 13 bioactive compounds in *C. epigaeus*. Among this phytochemicals 3-penten-2-one-4-methyl, Thiozole,4,5-dihydro-2-methyl, (+) propoxyphene, and Cyclopentasiloxane, decamethhyle- present in both the plants.

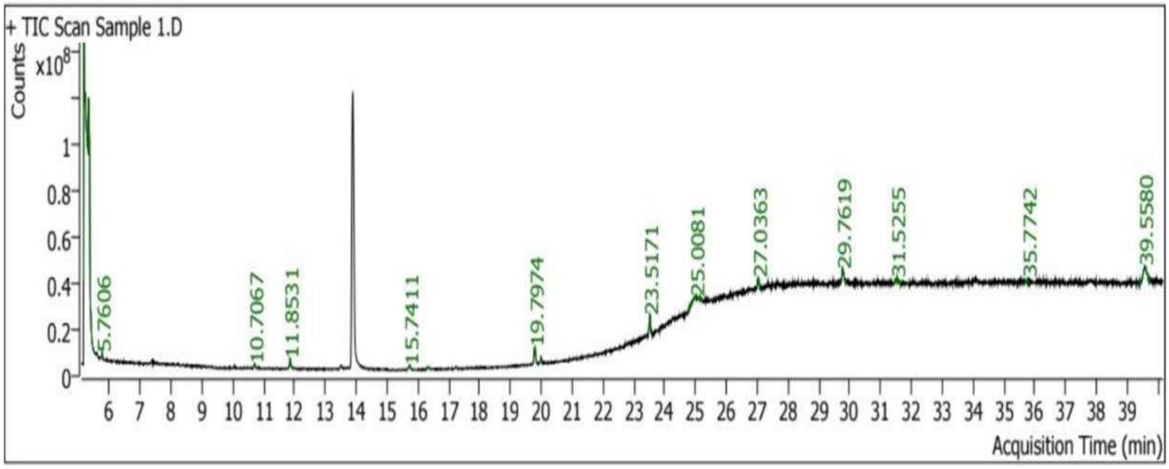

Figure 2: GC-MS chromatogram for tuber ethanolic extract of *Clematis zeylanica* leaves

Table 1: List of compounds identified in ethanolic leaves extract of *Clematis zeylanica* by GC-MS analysis

S. No	Component RT	Compound Name	Match Factor	Formula	Area%
1	5.16735	Thiazole,4,5-dihydro-2-methyl-	67.78005156	CH_7NS	41.88502
2	5.327683	(+)-Propoxyphene	57.31537934	$C_{22}H_{29}NO_2$	15.7773
3	5.760567	3,4-Dimethoxycinnamic Acid	51.43294907	$C_{11}H_{12}O_4$	0.161893
4	10.70673	Coumarin,6-benzyloxy-3,4-dihydro-4,4 dimethyl-	64.36898547	$C_{18}H_{18}O_3$	0.278731
5	11.85308	3-Penten-2-one,4-methyl-	67.31137514	$C_6H_{10}O$	0.663956
6	13.88927	2-Pentanone,4-hydroxy-4-methyl-	82.9054609	$C_6H_{12}O_2$	25.88223

7	15.74107	Cyclotetrasiloxane, octamethyl-	75.94246976	$C_8H_{24}O_4Si_4$	0.466753
8	16.31825	Avocadeneacetate	50.05273868	$C_{19}H_{36}O_4$	0.217167
9	19.7974	Cyclopentasiloxane, decamethyl-	90.89621575	$C_{10}H_{30}O_5Si_5$	1.184199
10	19.9898	8,11,14-Eicosatrienoic acid, methyl ester, (Z,Z,Z)-	56.02097118	$C_{21}H_{36}O_2$	0.298102
11	23.51705	4,6'-Dimethoxy-2'(trimethylsilyl)oxychal cone	76.16258539	$C_{20}H_{24}O_4Si$	0.997732
12	25.0081	Hexasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11 -dodecamethyl-	52.27290936	$C_{12}H_{38}O_5Si_6$	3.972405
13	27.03627	5-Chloro-1H-indazole-3-carboxylic acid, 2TMS derivative	53.42008955	$_{21}ClN_2O\ _2Si_2$	0.773598
14	29.76187	2,4-Di-tert-butylphenol	58.35077323	$C_{14}H_{22}O$	1.257605
15	31.52548	2,5-Dihydroxybenzoic acid,3TMS derivative	58.40106401	$C_{16}H_{30}O4Si_3$	0.888281
16	35.77422	1h-Pyrrole-3,4-diacetic acid,2-acetoxymethyl-5-methoxycarbonyl-,dimethyl ester	51.47203687	$C_{15}H_{19}NO_8$	0.423851
17	39.55798	Octadecanal,2-bromo-	60.60711169	$C_{18}H_{35}BrO$	3.657991

3.1 Seventeen different phytochemicals were recorded in the ethanolic extracts of the leaves and listed as follows:

1. **Thiazole,4,5-dihydro-2-methyl-** The thiazole containing compounds have been known for their therapeutic properties such as, anticancer, antioxidant, anticonvulsant, anti-inflammatory, antitubercular, antibacterial, antifungal, antimalarial and cardiovascular activities (https:/pubmed.ncbi.nlm.nih.gov). They were reported to be useful as antineoplastic, anti-inflammatory, antibiotic, anti- microbial, diuretic agents and in antithyroid treatments (Linda *et al.*, 2021). The presence of this compound here, in this taxon, makes it a potential candidate to treat the above cited diseases and conditions. The list of diseases and conditions tabulated in the table of folkloric uses (Table-3) validates the present findings which open the new gates to pursue this phytochemical through purification and modification via drug designing.

2. **2-Pentanone,4-hydroxy-4-methyl** (Diacetone alcohol (+syn.) is an aliphatic oil which is naturally found in plants. It is toxic and used as solvent and a component in many synthetic substances. It causes fall in blood pressure (Walton *et al.*, 1928). Search did not show any medicinal properties.

3. **(+) Propoxyphene** is a pain reliever that belongs to the class of opioids. It is basically amild narcotic pain alleviator and suppresses cough, however in overdose it becomes an addictive and for this reason it is banned in certain countries (Allison Gandey 2011). The presence of this compound validates the use of this plant as a medicinal source. There are six silicate compounds, differing in their degree of silication and being aliphatic or aromatic in their nature.

3.2 Aliphatic Compounds:

4. Hexasiloxane,1,1,3,3,5,5,7,7,,9,9,11,11-dodecamethylis a straight chainorga- nosilicone compound reported already in *Swertia chirata* leaf extracts and was found to show hydrogen bonding with 5AVI

receptor in the *in-silico* studies (Jerine *et al.,* 2021). This used in breast implants, and in cosmetics. Polysilicones are used as backbone molecules.

5. Cyclopentasiloxane, decamethylis a cyclic siloxane with maxi-mum methylation which is used in cosmetics as deodorant, sunblock, anti-perspirant emollient and in skin care (Donald Mackay *et al.,* 2015).

6. Cyclotetrasiloxane, octamethyl is also like the above but has only 4 Silicon and eight methyl groups and has the same uses in cosmetics (Moretto *et al.,* 2005). The presence of the above four chemicals of aliphatic nature suggests that *C. zeylanica* could be used in cosmetics and the silica compounds, accounting for the ability of the plant against abiotic and biotic stresses.

3.4 Aromatic Compounds:

7. **4,6-dimethoxy-2(trimethylsilyl)oxychalcone** as a protected form may not have direct biological activity. The chalcones are secondary metabolites and have been reported to have many therapeutic properties such as anti-inflammatory, antioxidant, antimalarial, antidiabetic, antiviral and anticancer (Hana Lee *et al.,* 2020). The search for this compound did not yield any bioactivity, hence this compound may be isolated for chalcone that may be used as a pivotal molecule to derive derivatives with potential therapeutic effects.

8. **2,5-dihydrobenzoic acid, 3TMS** derivative is basically Genetic acid with the 3TMSgroups.Genisticacidisreportedtohaveanti-inflammatory, antirheumatic, antiarthritic and analgesic properties along with inhibition of LDL oxidation. It also acts as an anticarcinogenic and inhibitor of fibroblast growth inhibitor (Science Direct: Value-Added. 2019)

9. **5-Chloro-1H-indazole-3-carboxylic acid, 2TMS** derivative is a methyl silyl derivative of the parent compound. The1H-indazole is a pharma-cophore used as a motif in designing drugs such as Niraparib with ovarian, fallopian epithelial anticancer activity (DRUGBANK online: Heo YA, Duggan ST 2018). It is interesting that this parent compound is not common in nature and this highlights the importance of *C. zeylanica* as a potential taxon in finding an additional cure against the ovarian related cancer among women.

The latter three aromatic compounds show more therapeutic characteristics compared to the aliphatic silicate compounds.

10. **3-4Dimethoxy cinnamic acidic** involved in bone metabolism through stimulating osteoblasts and preventing high rate of bone resorption and adipogenesis (Eiko Sakai *et al.,* 2022). The presence of this compound in *C. zeylonica* suggests that it could be useful in treating bone fracture and bone formation deficiency.

11. **Avocadene acetate** reported from Avocado is present in this taxon too. Avocadene acetate is reported to have many therapeutic properties including anticancer activity. It is also a modulator of mitochondrial metabolism triggering cell death in leukemia cells selectively. It reduces obesity induced by diet habit (Nawaz Ahmad *et al.,* 2025). Though it is present in small concentration in *C. zeylanica,* this plant can be used in handling anticancer and antiobesity problems.

12. **3-Penton-2-one,4-methyl** is present in all the five selected samples and found in human saliva and faeces influencing the quality of the microbiota. It occurs as alpha, and beta-unsaturated ketone and their derivatives are pharmacologically important with anticancer, anti-inflammatory, antipyretic and analgesic activities. This compound has potential antibacterial, antifungal and antiulcer activities also (Velu Arjunan *et al.,* 2012).

13. **Coumarin,6, benzyloxy-3.4-dihydro-4,4-dimethyl.** Coumarin naturally occurs in plants with more therapeutic potential. It is used as a flavoring agent but in restricted dosages. The Coumarin backbone is may be used as a pharma- cophore which different groups may be added to design active drugs with antibiotic, anticancer, anti-inflammatory and many other properties (Virginia *et al.,* 2023).

14. **8,11,14-Eicosatrienoic acid, methyl ester,(Z,Z,Z)** is a paracrine class of hormone acting locally acting as signaling molecules and are involved in numerous physiological and pathological processes (Wolfe 1982). It's an important source of this eicosanoid to treat local hormonal problems.

15. **1-H-Pyrrole -3,4-diacetic acid,2-acetoxymethyl-5 methoxy carbonyl-dimethyl**

ester. Being a pyrrole containing compound, this becomes animpor-tantcandidate, since there are many drugs already in use developed through drug designing. It is used to treat cancer, inflammation, viral, bacterial and fungal diseases (Jeelan Basha *et al.,* 2022). This compound may be isolated and studied for its analogues‟ therapeutic potentials.

16. **Octadecanal,2-bromo-** isabrominatedstearylaldehydeandthestearylalcoholisa pheromone used by many insects (Kelsey *et al.,* 2020).The brominated stearyl alcohol is used in traditional medicine to treat asthma, epilepsy, rheumatoid arthritis, filariasis, microbial infections etc. (Esther Ugo Alum *et al.,* 2023). Hence *C. zeylanica* is a valid medicinal plant that could be further investigated to find out its full potential.

17. **2,4-Di-tert-butylphenol** is useful in production of many antioxidants like tris (2,4-Di-tert-butylphenyl) phosphate and is fragrances, agrochemicals and catalysts. It has been reported from *Lacto coccus sp.* and was shown to have fungicidal activity against the fungi *Aspergillus niger, Fusarium oxysporum* and *Pennicillium chrysogenum.* It was reported to have biocontrol effect against these fungi when used on the wheat grains. It also showed cytotoxicity against HeLa and MCF-7 cancer cell lines especially against the former line (Kontham *et al.,* 2015).

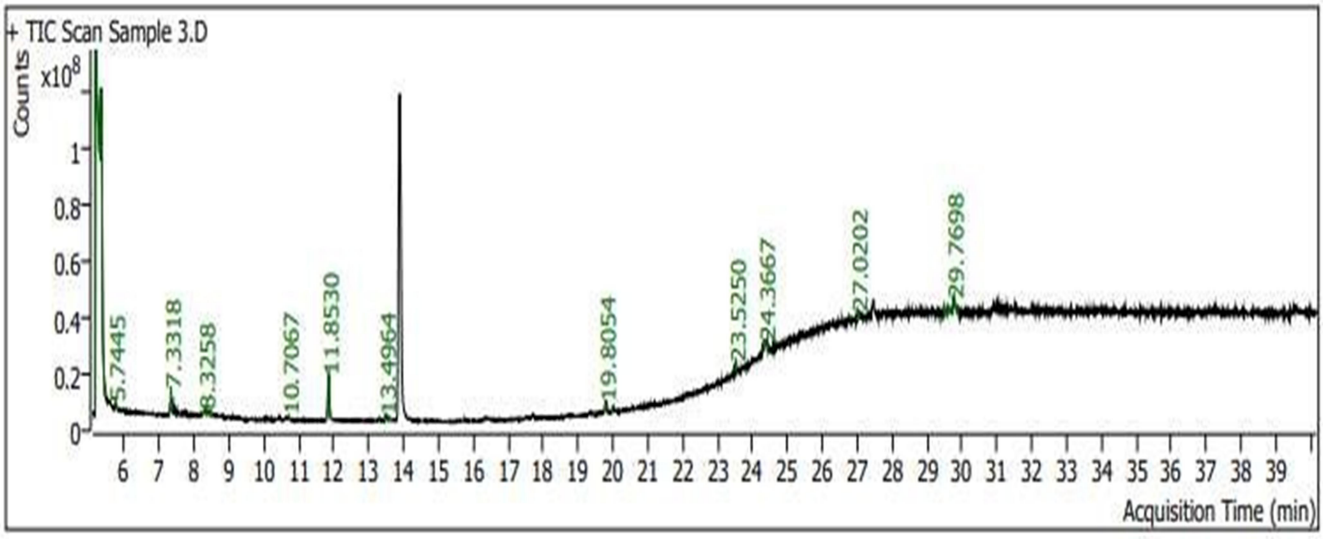

Figure 3: GC-MS Chromatogram of ethanolic tuber extract of *C.epigynaus*

Table 2: List of compounds identified in ethanolic tuber extract of *C. epigaeus* by GC-MS analysis

S. No	Component RT	Compound Name	Match Factor	Formula	Area%
1	5.175316667	Thiazole,4,5-dihydro-2-methyl-	67.92387	C_4H_7NS	43.9799
2	5.327633333	(+)-Propoxyphene	54.33622	$C_{22}H_{29}NO_2$	16.63651
3	5.744483333	N-formyl-3,4,5-trimethoxymethamphetamine	52.24737	$C_{14}H_{21}NO_4$	0.277435
4	7.33175	Acetic acid	65.21837	$C_2H_4O_2$	0.897491
5	8.325783333	.beta.-Hydroxyethyltheophyllinetert-butyldimethylsilylether	63.58984	$C_{15}H_{26}N_4O_3Si$	0.821375
6	10.70668333	Propenoicacid,3-(4-benzyloxyphenyl)-,ethylester	59.4689	$C_{18}H_{18}O_3$	0.149829

7	11.85303333	3-Penten-2-one,4-methyl-	79.22938	$C_6H_{10}O$	2.522676
8	19.80536667	Cyclopentasiloxane,decamethyl-	82.75401	$C_{10}H_{30}O_5Si_5$	0.61422
9	19.99776667	Octadecane,1,1'-[1,3-propanediylbis(oxy)]bis-	51.52576	$C_{39}H_{80}O_2$	0.067986
10	23.525	4,6'-Dimethoxy-2'-(tert.-butyldimethylsilyl)oxychalcone	68.07433	$C_{23}H_{30}O_4Si$	0.378959
11	24.36673333	9-Octadecenoicacid,(2-phenyl-1,3-dioxolan-4-yl)methylester,cis-	55.94473	$C_{28}H_{44}O_4$	1.338278
12	27.02018333	[(6-Ethoxy-1,3-benzothiazol-2-yl)sulfanyl]aceticacid,TMS derivative	50.76068	$C_{14}H_{19}NO_3S_2Si$	0.343115
13	29.76983333	Phenol,2,5-bis(1,1-dimethylethyl)-	58.43652	$C_{14}H_{22}O$	2.678166

3.5 Thirteen different phytochemicals were recorded in the ethanolic extracts of the tuber and listed as follows:

The ethanolic extracts of tubers of *C. epigaeus* showed four compounds which were found to be present in *C. zeylanica* leaves viz.

1. Thiazole,4,5-dihydro-2-methyl.
2. (+) Propoxyphene.
3. Cyclopentasiloxane,decamethyl.
4. 3-Penton-2-one,4-methyl. Which suggests that both these two taxa may be useful in curing the relevant diseases and conditions and if one is unavailable the other would help.
5. **Beta-hydroxyethyltheophylline-tert-butyldimethylsilylether-** The search did not yield any direct medicinal use of this. However the theophylline as such has been proved as a multipurpose medicine, although it was known as abronchiodilator used to treat asthma. Being a smooth muscle relaxant, and also improves heart function, central nervous activities and acts as a diuretic. Theophylline is found naturally in many plants like *Thea chinensis, Coffea species, Theobroma cacao, Ilex paraguariensis, Pauliniacupana* and *Cola acuminata*. It is used to treat chronicobstructive pulmonary disease (COPD) (Brames, 2013). However, its therapeutic range is very narrow and very easily it could become toxic even within the permitted concentration which varies with age groups and life style (Alexander Kong *et al*., 2021). Coming to its presence in *C. epigaeus*, it is highly protected by the hydroxy (Phenolic) tert-butyldimethylsilyl ether that makes the tuber safe to consume after deprotecting. The use must be done with care since an overdose or even the admitted dose may cause serious problems. These reports validate that tuber extraction of *C. epigaeus* may be used with caution as bronchodilator.
6. **4,6-Dimethoxy-2-(tert-butyldimethylsilyl) oxychalconewhose** nearest molecular member has been already discussed under *C. zeylanica*. The backbone chalcone is a provenstructure helpful in many physiological and pharmacological activities. It is a precursor molecule of flavonoids and isoflavonoids acts as a pivotal structure for many synthetic drugs to treat ulcer, diabetes, viral infections, cancer cell proliferations, neuroticproblems, and also exhibit carcinoprotective, cardioprotective, hapatorprotective and nephroprotective properties (Rishav *et al.,* 2024).
7. **N-Formyl-3,4,5-trimethyloxymethamphetine** was found to be present only in this plant which is a psychedelic drug interacting through the central nervous system (Hey 1047). Its parent compound Amphetamine may be purified, designed with substitutes to form new drugs.

Search in the library did not show any of its direct biological and therapeutic role. Probably it is anew hallucinogenic compound which may be pursued to know its potentials. Being hallucinogenic the extracts may be used with care.

8. **Propeonic acid, 3-(4-benzyloxyphenyl)-ethyl ester**. The Benzyloxyphenyl- pharmacore (fluorinated) is known to slow down the Sodium channel inactivation which is useful in treating epilepsy, lessening the side effects like dizziness, drowsiness and nausea caused by the first line antiepileptic drugs (Amber *et al.,* 2012). Benzyloxyphenyl and phenethylphenyl-

imidazole derivatives already have been reported to have ante-drug qualities which minimize the side effects of the drugs (Kentaro *et al.,* 2022).

The presence of the benzyloxy containing compound in *C. epigaeus* opens up a new gate to treat epilepsy after purification and activation of the benzyloxy pharmacophore with other elements like Cl, F etc. or alkyl or aryl radicals.

9. **Octadecane,1,1- [1,3-propanedyilbis (oxy)] bis.** The Octadecane backbone is a metabolite in bacteria and higher plants acting as lipid mediators in humans for many activities such as immune regulation, inflammation, cell proliferation, and nociception. (Aram *et al*., 2017). Moreover, it acts as a source for many long chain fatty acids (20C-22C) which are involved in the synthesis of omega-3fattyacids, DHA which are beneficial to cerebral activities (Guenette *et al.,*2011).

The presence of this compound in *C. epigaeus* is noteworthy because it can be a source for many long chain fatty acids with much therapeutic potential, as an oxylipin it may have its own direct medicinal use which may be pursued.

10. **9-Octadecenoic acid (2-phenyl-1,3-dioxalon-4yl) methyl ester-cis-.**

The long chain Dioxolane has been reported to inhibit leukotriene-B4 production in tumour cells (Alan Aitken & Lawrence 1996). This was reported in Vitis vinifera (Mohamad *et al.,* 2017) and its medicinal potential may be studied further. The other part of the molecule 9- octadecenoic acid has many therapeutic potentials and its antioxidantand anticancer activities are noteworthy (Ali Reza *et al.,*2021). The presence of this compound makes *C. epigaeus* special, because the composite molecule may be therapeutically useful as such or its alkyl and aryl parts may be used separately after purification and cleavage.

11. **[(6-Ethoxy-1,3-benzothiazol 2-yl) sulphonyl] acetic acid, MS derivative**. The parent compound Benzothiazole is already known to have many bio- and pharmacological properties such as antimicrobial, antiinflammatory, antitumor, antirheumatic and fungicidal and its derivatives were reported to have anticancer activity against many types of cancers (Ali Irfan *et al.,* 2019).

Based on the above reports, it is suggested that *C. epigaeus* could be used as source of drugs for the above diseases. In this plant it exists as a highly protected molecule which after deprotection may be designed to produce novel drugs with many other potentials.

12. **Phenol, 2,5-bis(1,1-dimethylethyl)** is already reported to be an anti- bacterial, antifungal, antioxidant, antiinflammatory and anticancer agent by Larbie *et al.,* (2020) in their study of ethanolic extract of *Cinnamomum zeylanicum*.

It is present in considerable quantity in *C. epigaeus* and the potential may be utilized and development of new drugs using this compound may be pursued.

13. **Acetic acid** is a common metabolite and is the source of acetyl group involved in many metabolic reactions, especially as Acetyl CoA, in transmission of neuronic signals etc. (Bose *et al.,* 2019). Acetic acid is used as an additive in drug industry. It is used to treat external otitis being an antifungal and antibacterial agent. It brings down blood pressure, blood sugar and inflammation (Rachael, 2022).

Table 3: Shows list of the five chosen samples and their folkloric medicinal uses as per the literature collected

S. No	Sample	Diseases
1	*Clematis zeylanica* (or) *Narawelia zeylanica*	Anti-arthritic, Anti-bacterial,Anti-fungal, Anti-helminthiasis, Anti-helmintic, Anti-malarias, Anti-ulcer, Cold, Colic inflammation, Dermatopathy, Headache, Itches, Leprosy, Migraine, Psoriasis, Rheumatalgia, Rhinitis, Skin allergy, Toothache Wounds.

2	*Corallocarpus epigaeus*	Anthelmintics, Anti-cancerous, Anti-diabetic, Anti-fungal, Antioxidant, Cardiovascular disease, Chronic Mucos enteritis, Diarrhoea, Hypertension. Rheumatism, Snakebite, Syphilitic.

Table 4: Shows the list of diseases and the relevant therapeutic chosen plants.

S. No	Diseases	*C. zeylanica*	*C. epigaeus*
1	Anti-bacterial	+	+
2	Anti-cancerous	+	+
3	Anticonvulsant	+	-
4	Anti-fungal	+	+
5	Antihypertensive	-	+
6	Anti-inflammatory	+	+
7	Anti-malarial	+	-
8	Antimicrobial	+	+
9	Anti-neurodegrative	-	-
10	Anti-oxidant	+	+
11	Anti-thyroid	+	-
12	Anti-tubercular	+	-
13	Asthma	+	-
14	Cardiovascular activity	+	-
15	Cold	+	-
16	Diuretics	+	-
17	Epilepsy	+	-
18	Flariasis	+	-
19	Increase HDL	-	+
20	Pain reliever	+	-
21	Reduce LDL	-	+
22	Rheumatoid arthritis	+	-

Table 5: List of Phytochemicals presence in the selected sample plants by GC-MS

S. No	PHYTOCHEMICALS	*C. zeylanica*	*C. epigaeus*
1	3-Penten-2-one, 4-methyl-	+	+
2	Thiazole, 4,5-dihydro-2-methyl-	+	+
3	(+)-Propoxyphene	+	+
4	Cyclotetrasiloxane, decamethyl-	+	+
5	2,4-Di-tert-butylphenol	+	-
6	Acetic acid	-	+
7	Octadecanal, 2-bromo-	+	-
8	3,4-Dimethoxycinnamic acid	+	-
9	Coumarin, 6-benzyloxy-3,4-dihydro-4,4-dimethyl-	+	-
10	2-Pentanone, 4-hydroxy-4-methyl-	+	-
11	Cyclotetrasiloxane, octamethyl-	+	-

12	Avocadene acetate	+	-
13	8,11,14-Eicosatrienoic acid, methyl ester, (Z,Z,Z)-	+	-
14	4,6'-Dimethoxy-2'(trimethylsilyl)oxychalcone	+	-
15	Hexasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11-dodecamethyl-	+	-
16	5-Chloro-1H-indazole-3-carboxylic acid, 2TMS derivative	+	-
17	2,5-Dihydroxybenzoic acid, 3TMS derivative	+	-
18	1h-Pyrrole-3,4-diacetic acid, 2-acetoxymethyl-5-methoxycarbonyl-, dimethyl ester	+	-
19	N-formyl-3,4,5-trimethoxymethamphetamine	-	+
20	Beta. -Hydroxyethyltheophylline tert-butyldimethylsilyl ether	-	+
21	Propenoic acid, 3-(4-benzyloxyphenyl)-, ethyl ester	-	+
22	Octadecane, 1,1'-[1,3-propanediylbis(oxy)] bis-	-	+
23	4,6'-Dimethoxy-2'-(tert. -butyldimethylsilyl) oxychalcone	-	+
24	9-Octadecenoic acid, (2-phenyl-1,3-dioxolan-4-yl) methyl ester, cis-	-	+
25	[(6-Ethoxy-1,3-benzothiazol-2-yl) sulfanyl]acetic acid, TMS derivative	-	+
26	Phenol, 2,5-bis(1,1-dimethylethyl)-	-	+

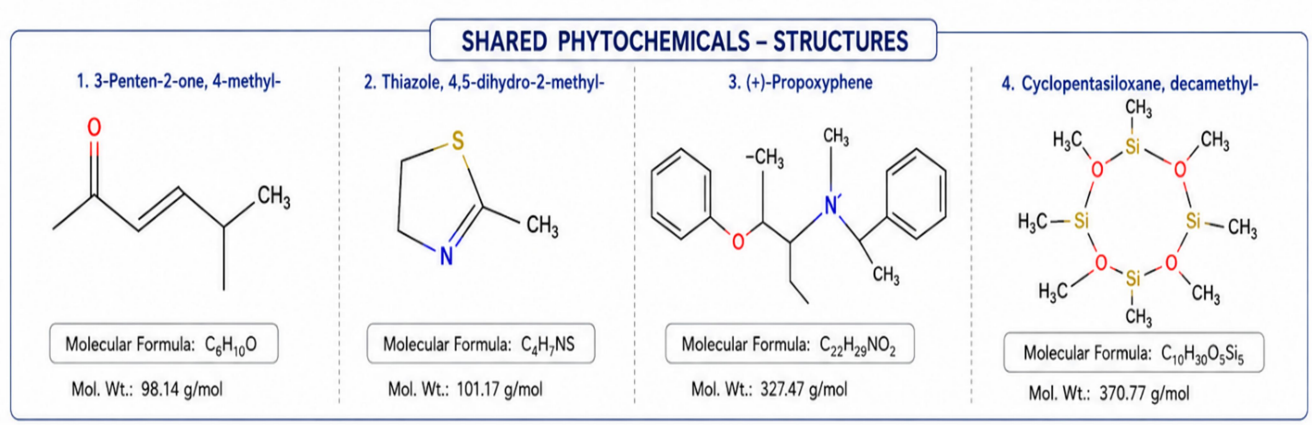

Figure 4: Shared Phytochemicals presence in the selected plants by GC-MS.

Table 6: shows the diseases/conditions controlled by the individual Phytochemicals recorded in the GCMS.

S. No	Diseases	Compounds
1	Anti-bacterial	3-Penten-2-one, 4-methyl- Thiazole, 4,5-dihydro-2-methyl- Phenol, 2,5-bis(1,1-dimethylethyl)- 1h-Pyrrole-3,4-diacetic acid, 2-acetoxymethyl-5-methoxycarbonyl-, dimethyl ester
2	Anti-biotic	Thiazole, 4,5-dihydro-2-methyl- Coumarin, 6-benzyloxy-3,4-dihydro-4,4-dimethyl-
3	Anti-cancerous	Thiazole, 4,5-dihydro-2-methyl- Coumarin, 6-benzyloxy-3,4-dihydro-4,4-dimethyl- 1h-Pyrrole-3,4-diacetic acid, 2-acetoxymethyl-5- Phenol, 2,5-bis(1,1-dimethylethyl)- 3-Penten-2-one, 4-methyl-

		Acetic acid, Avocadene acetate
4	Anti-diabetics	4,6'-Dimethoxy-2'(trimethylsilyl)oxychalcone
5	Anti- flariasis	Octadecanal, 2-bromo-
6	Anti-fungal	3-Penten-2-one, 4-methyl- Thiazole, 4,5-dihydro-2-methyl- Phenol, 2,5-bis(1,1-dimethylethyl)- 1h-Pyrrole-3,4-diacetic acid, 2-acetoxymethyl-5-methoxycarbonyl-, dimethyl ester
7	Anti-inflammatory	Thiazole, 4,5-dihydro-2-methyl- 3-Penten-2-one, 4-methyl- Coumarin, 6-benzyloxy-3,4-dihydro-4,4-dimethyl- 1h-Pyrrole-3,4-diacetic acid, 2-acetoxymethyl-5- Phenol, 2,5-bis(1,1-dimethylethyl)- [(6-Ethoxy-1,3-benzothiazol-2-yl)sulfanyl]acetic acid, TMS derivative 4,6'-Dimethoxy-2'(trimethylsilyl)oxychalcone Octadecane, 1,1'-[1,3-propanediylbis(oxy)]bis-
8	Anti-helmintic	[(6-Ethoxy-1,3-benzothiazol-2-yl)sulfanyl]acetic acid, TMS derivative
9	Anti-hypertensive	9-Octadecenoic acid, methyl ester.
10	Anti-malaria	4,6'-Dimethoxy-2'(trimethylsilyl)oxychalcone Thiazole, 4,5-dihydro-2-methyl-
11	Anti-obesity	Avicadence acetate
12	Anti-oxidant	Thiazole, 4,5-dihydro-2-methyl- 4,6'-Dimethoxy-2'(trimethylsilyl)oxychalcone Phenol, 2,5-bis(1,1-dimethylethyl)- 9-Octadecenoic acid, methyl ester
13	Anti-pyretic	3-Penten-2-one, 4-methyl-
14	Anti-rheumatic	[(6-Ethoxy-1,3-benzothiazol-2-yl)sulfanyl]acetic acid, TMS derivative Octadecanal, 2-bromo-
15	Anti-thyroid	Thiazole, 4,5-dihydro-2-methyl-
16	Anti-tumor	[(6-Ethoxy-1,3-benzothiazol-2-yl)sulfanyl]acetic acid, TMS derivative Octadecanal, 2-bromo-
17	Anti-tubercular	Thiazole, 4,5-dihydro-2-methyl- Acetic acid.
18	Anti-ulcer	3-Penten-2-one, 4-methyl- 4,6'-Dimethoxy-2'(trimethylsilyl) oxychalcone
19	Asthma	Octadecanal, 2-bromo- .beta.-Hydroxyethyltheophylline tert-butyldimethylsilyl ether
20	Bone fracture	3,4-dimethyoxy cinnamic acid
21	Cardio vascular activity/ Cardio protection	Thiazole, 4,5-dihydro-2-methyl- 4,6'-Dimethoxy-2'(trimethylsilyl) oxychalcone beta.-Hydroxyethyltheophylline tert-butyldimethylsilyl ether
22	Cold	(+) propoxyphene
23	Cosmetics for body care	Hexasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11-dodecamethyl-
24	Diuretic	Thiazole, 4,5-dihydro-2-methyl- .beta.-Hydroxyethyltheophylline tert-butyldimethylsilyl ether
25	Epilepsy	Octadecanal, 2-bromo

		Propenoic acid, 3-(4-benzyloxyphenyl)-, ethyl ester
26	Hormone problems	8,11,14-Eicosatrienoic acid, methyl ester, (Z,Z,Z)-
27	Neuro degradative disease & Psychedelic drug	N-formyl-3,4,5-trimethoxymethamphetamine
28	Pain reliever & Analgesic	(+) propoxyphene 3-Penten-2-one, 4-methyl-
29	Wheezing	.beta.-Hydroxyethyltheophylline tert-butyldimethylsilyl ether

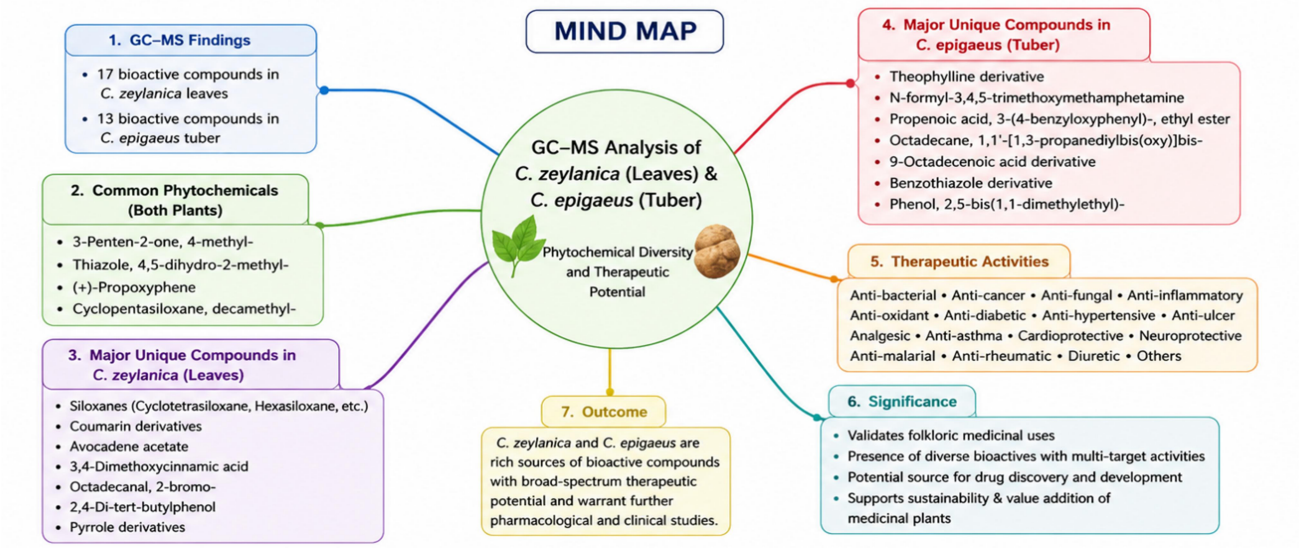

Figure 5: Over all view of the GC-MS analysis of *C. zeylanica* (leaves) and *C. epigaeus* (tuber)

4. CONCLUSION

The GC–MS analysis of ethanolic leaf extract of *Clematis zeylanica* revealed 17 diverse phytochemicals, with Thiazole,4,5-dihydro-2-methyl- and Coumarin,6- benzyloxy-3,4-dihydro-4,4-dimethyl-as major constituents. Many identified compounds possess significant pharmacological activities such as antimicrobial, anti-inflammatory, antioxidant, and anticancer properties. The presence of bioactive molecules common to *C. epigaeus* suggests a shared therapeutic potential between the two plants. The results validate the traditional medicinal uses of *C. zeylanica* highlight its potential for future drug development and phytochemical research.

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