

## GC-MS ANALYSIS OF BIOACTIVE COMPONENTS IN *GAULTHERIA FRAGRATISSIMA* WALL.

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### ABSTRACT

Medicinal plant species are being used as folk medicine by various tribal and local communities in Tamilnadu as well as all over India since ancient days. The present study of phytochemical analysis of aerial parts of *Gaultheria fragrantissima* Wall. was extracted with methanol and analysed using GC-MS. Nearly fifteen bioactive chemical compounds were identified in crude extracts. Predominantly, m-Ethylbenzonitrile, 1-Mehtoxy-1-buten-3-yne, 4-Fluorobenzyl alcohol, 5-Methylcyclopent-1-ene-1-carboxyl, Methyl Salicylate, 2-Hexenal, 2ethyl- and Cyclohexane, 1, 3-dimethyl-2-methyl compounds were present. This analysis revealed that the existence of m-Ethylbenzonitrile and 1-Mehtoxy-1-buten-3-yne as major constituents. These different active phytochemicals have been found to possess a wide range of biological applications.

**Keywords:** Medicinal plant, GC-MS, *Gaultheria fragrantissima*, Phytochemicals

### INTRODUCTION

Medicinal plants used for traditional medicine contain a wide range of substances that can be used to treat chronic as well as infectious diseases. Clinical microbiologists have great interest in screening of medicinal plants for new therapeutics (Periyasamy *et al.*, 2010). The therapeutic efficacy of many indigenous plants for various diseases has been described by traditional herbal medicinal practitioners. Even the World Health Organization (WHO) supports the use of medicinal plants, provided it is proven to be efficacious, safe, less toxic, available and reliable natural resource (Lalitha Easwari *et al.*, 2013). The secondary metabolites are alkaloids, phenolics, flavonoids, essential oils and other organic constituents. These secondary metabolites are usually produced in different parts of the plants like roots, leaves, fruits and seeds and then translocated to other parts of plant for storage. Knowledge about these medicinally active constituents makes their application as medicine as mentioned in the various pharmacopeias.

The genus *Gaultheria* comprises about 200 species which are native to wide geographical areas ranging from Andes, North America, Australia and nearby islands to South-East Asia. In India, it is found mainly in the eastern Himalayas, it is found throughout the North-Eastern region including the Indo-Nepal and Indo-Bhutan territories at an altitude between 1,800 and 2,500 m whereas in Western Ghats, it is found in Nilgiri, Palani Hills of Tamilnadu up to an altitude of 1,500 m with low frequency with low frequency and density (Bantawa *et al.*, 2011). The plant has been used as an antiseptic, carminative, flavouring agent (confectionaries, herbal tea, toothpaste, etc.) and condiment and also in rheumatic and arthritis treatments. The oil has a powerful antiseptic property and is a constituent for several insecticidal and insect repellent preparations (Ranyaphi *et al.*, 2012). Hence during the present investigations phytochemical screening of *Gaultheria fragrantissima* is carried on with a view to analyse the presence of chemical constituents that secondary metabolites, with a view to recommend their application in pharmaceutical industry.

### Materials and methods

#### Plant materials

The plant samples were collected from Coimbatore District, Tamilnadu. The botanical identify of the plant was confirmed by Dr. S. Padmavathy, Professor, PG & Research Department of Botany, Nirmala College for Women, Coimbatore, Tamilnadu.

#### Plant sample preparation

50gm powdered plant material was soaked in 200 ml of methanol overnight and then centrifuged through Whatman no.1 filter paper along with 2gm sodium sulfate to remove the sediments and traces of water in the filtrate. Before filtering the filter paper along with sodium sulphate is wetted with methanol. The filtrate is then concentrated by bubbling nitrogen gas into the solution and reduces the volume to 1ml. The extract contains both polar and non-polar phytocomponents.

#### GC-MS analysis

GC-MS analysis was carried out on a GC clarus 500 Perkin Elmer system comprising a AOC-201 auto sampler and gas chromatograph interfaced to a mass spectrophotometer instrument employing the following conditions: Column Elite-1 fused silica capillary column (30mm×0.25mm I.D ×1 μ M df, composed of 100% Dimethyl poly siloxane ), operating in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 0.5 μ l was employed (split ratio of 10:1) injector temperature 250 °C; ion-source temperature 280 °C. The oven temperature was programmed from 110 °C (isothermal for 2 min), with an increase of 10 °C/min, to 200 °C, then 5 °C/min to 280 °C, ending with a 9 min isothermal at 280 °C. Mass spectra were taken at 70 eV; a scan interval of 0.5 seconds and fragments from 45 to 450 Da. Total GC running time is 46min.

#### Results and Discussion

Medicinal plants are being used as valuable sources of food and medicine for the prevention of illness and maintenance of human health. In India, many indigenous plants are widely consumed as food or home remedies especially in the treatment or management of common diseases. The composition and identification of the main components present in the *Gaultheria fragrantissima* are shown in (Table 1). Fifteen compounds were identified in *G. fragrantissima* by GC-MS analysis. The active principles with their retention time (RT), percentage area and Reference No. are presented in (Table 1 and Fig 1). It was found that the main constituents of leaves m-Ethylbenzonitrile (22.57%), 1-Mehtoxy-1-buten-3-yne (21.49%), 4-Fluorobenzyl alcohol (9.83%), 5-Methylcyclopent-1-ene-1-carboxyl (8.23%), Methyl Salicylate (7.17%), 2-Hexenal 2ethyl- (6.43%), Cyclohexane, 1,3-dimethyl-2-methyl (6.05%), 2,4-Decadienal (4.80%), N-(n-Propyl)acetamide (3.41%).

File : C:\HPCHEM\1\DATA\A0830A.D  
 Operator :  
 Acquired : 30 Aug 2013 10:39 am using AcqMethod STU-1  
 Instrument : GC/MS \* P  
 Sample Name : gau  
 Misc Info :  
 Vial Number : 1

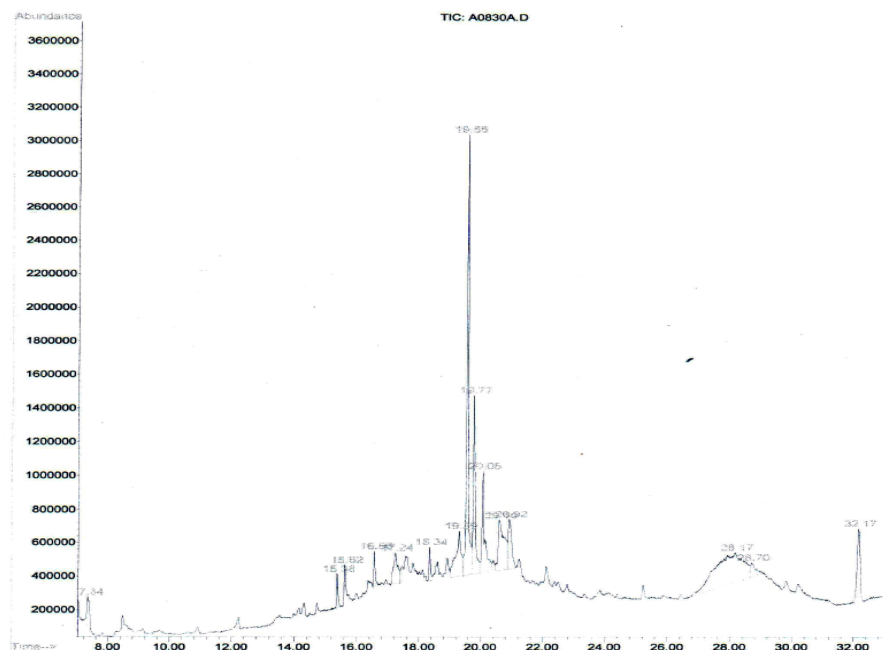


Figure 1: GC-MS studies of *Gaultheria fragrantissima* Wall.

Gaultherin is a monotropitin a conjugated compound made up of methyl salicylate and disaccharides of glucose and xylose, called primevorose. Methyl salicylate is the natural precursor of pharmaceutical aspirin. In the US, there are more than 40 products that contain methyl acetate as an active ingredient to treat various kinds of external pains. The oil has high demand in pharmaceutical

and perfumery industries (Ranyaphi *et al.*, 2012). In the present study fifteen chemical constituents have been identified from methanol extract of aerial parts of *Gaultheria fragrantissima* by GC-MS analysis. The existence of various bioactive chemical compounds proves the use of this plant various ailment by traditional medical practitioners.

Table 1: GC-MS studies of *Gaultheria fragrantissima* Wall.

Pk#	RT	Area%	Library/ID	Ref#	CAS#	Qual
1	7.34	1.98	C:\DATABASE\NIST98.L Isopropyl Alcohol Isopropyl Alcohol Propylene Glycol	11521 110736 11460	000067-63-0 000067-63-0 000057-55-6	72 64 64
2	15.37	1.20	C:\DATABASE\NIST98.L Urea, trimethyl- Tetraacetyl-d-xylonic nitrile 2-Formylhistamine	10653 10677 10720	000632-14-4 1000130-04-4 1000132-95-8	47 45 40
3	15.61	2.25	C:\DATABASE\NIST98.L 4H-Pyran-4-one, 2,3-dihydro-3,5-di 4H-Pyran-4-one, 2,3-dihydro-3,5-di 2-Tetrazene, 1,1-diethyl-4,4-dimet	109420 4836 11216	028564-83-2 028564-83-2 014866-81-0	87 62 43
4	16.56	1.48	C:\DATABASE\NIST98.L 2-Furancarboxaldehyde, 5-(hydroxym 2-Furancarboxaldehyde, 5-(hydroxym 4-Mercaptophenol	118306 118397 57293	000067-47-0 000067-47-0 000637-89-8	60 53 35
5	17.24	3.41	C:\DATABASE\NIST98.L 4H-Pyran-4-one, 2,3-dihydro-3,5-di 4H-Pyran-4-one, 2,3-dihydro-3,5-di N-(n-Propyl)acetamide	4836 109420 10694	028564-83-2 028564-83-2 005331-48-6	64 59 27
6	18.34	1.27	C:\DATABASE\NIST98.L N-Methoxy-1-ribofuranosyl-4-carbox Tetraacetyl-d-xylonic nitrile N-(Glycyl)alanine	10880 10677 10524	1000129-57-7 1000130-04-4 1000225-93-3	53 45 40
7	19.29	6.43	C:\DATABASE\NIST98.L 2-Hexenal, 2-ethyl- Thiophene-3-boronic acid 2-Hexenal, 2-ethyl-	111722 57918 111278	000645-62-5 006165-69-1 000645-62-5	25 22 20
8	19.55	21.49	C:\DATABASE\NIST98.L 2-Furancarboxaldehyde, 5-(hydroxym Thiocyanic acid, 2-propynyl ester 1-Methoxy-1-buten-3-yne	118397 1364 1343	000067-47-0 024309-48-6 002798-73-4	90 50 47
9	19.76	9.83	C:\DATABASE\NIST98.L 2-Furancarboxaldehyde, 5-(hydroxym 2-Furancarboxaldehyde, 5-(hydroxym 4-Fluorobenzyl alcohol	118397 118306 42355	000067-47-0 000067-47-0 000459-56-3	91 55 50
10	20.06	7.17	C:\DATABASE\NIST98.L Methyl Salicylate Methyl Salicylate Methyl Salicylate	120912 120910 120911	000119-36-8 000119-36-8 000119-36-8	96 96 95
11	20.60	8.23	C:\DATABASE\NIST98.L 2-Furancarboxaldehyde, 5-(hydroxym 2-Furancarboxaldehyde, 5-(hydroxym 5-Methylcyclopent-1-ene-1-carboxyl	118397 118306 32139	000067-47-0 000067-47-0 053623-50-0	46 46 38

12	4.80	C:\DATABASE\NIST98.L			
		2,4-Decadienal	116043	002363-88-4	38
		2,4-Decadienal, (E,E)-	116039	025152-84-5	38
		2,4-Decadienal, (E,E)-	31387	025152-84-5	35
28.16	22.57	C:\DATABASE\NIST98.L			
		4-Cyclopropylmethylbenzonitrile	52135	1000110-39-3	35
		6-Methyl benzobicyclo[2.2.1] hepte	52134	140224-88-0	32
		m-Ethylbenzonitrile	52140	1000118-64-1	30
28.70	1.85	C:\DATABASE\NIST98.L			
		6-Methyl benzobicyclo[2.2.1] hepte	52134	140224-88-0	38
		4-Cyclopropylmethylbenzonitrile	52135	1000110-39-3	35
		Heptadecanoic acid, 3-oxo-, methyl	52116	054934-65-5	27
32.17	6.05	C:\DATABASE\NIST98.L			
		Bicyclo[3.1.1]heptane, 2,6,6-trime	2052	004795-86-2	87
		Bicyclo[3.1.1]heptane, 2,6,6-trime	13368	006876-13-7	86
		Cyclohexane, 1,3-dimethyl-2-methyl	113932	019781-47-6	43

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## REFERENCES

1. Ranyaphi, RA., Mao, AA. And Borthakur, SK., 2012. In-vitro palnt regeneration of wintergreen (*Gaultheria fragrantissima* Wall.): Assessment of multiple nutrient formulations and cytokinin types. Indian Journal of Biotechnology, 11: 197-204.
2. Bantawa, P., Das, A., Ghosh, PD. and Mondal, TK., 2011. Detection of natural genetic diversity of *Gaultheria fragrantissima* landraces by RAPDs: An endangered woody oil bearing palnt of Indo-China Himalayas. Indian Journal of Biotechnology, 10: 294-300.
3. Lalitha Eswari, M., Vijaya Bharathi, R. and Jayshree, N., 2013. Preliminary Phytochemical Screening and Heavy Metal Analysis of Leaf Extracts of *Ziziphus oenopia* (L) Mill. Gard. International Journal of Pharmaceutical Sciences and Drug Research, 5(1): 38-40
4. Periyasamy A, Rajkumar, Mahalingam K., 2010. Phytochemical screening and antimicrobial activity from five Indian medicinal plants against human pathogens. Middle-East Journal of Scientific Research, 5(6): 477-482