

GC-MS DETERMINATION OF BIOACTIVE COMPONENTS OF *MELASTOMA MALABATHRICUM* L.K. BALAMURUGAN¹, A. NISHANTHINI¹, S.LALITHARANI² AND V.R. MOHAN^{1*}¹Ethnopharmacology Unit, Research Department of Botany, V. O. Chidambaram College, Tuticorin, 628 008, Tamil Nadu, India,²Department of Botany, Mount Carmel College, Bangalore 560027, India. Email: vrmohanvoc@gmail.com

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ABSTRACT

In this study, the bioactive components of *Melastoma malabathricum* leaf have been evaluated using GC-MS. The chemical compositions of the ethanol extract of *Melastoma malabathricum* were investigated using Perkin-Elmer Gas Chromatography-Mass Spectrometry, while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. GC-MS analysis of ethanol extract of *Melastoma malabathricum* revealed the existence of (+)-3,4-Dehydroproline amide(69.44%), Mefloquine(17.36%) and 2-(3,5-Diphenyl-pyrazol-1-yl)benzothiazole(3.47%).

Keywords: *Melastoma malabathricum*, Mefloquine, Phytocomponents.

INTRODUCTION

Melastoma malabathricum belongs to the Melastomataceae family. It is also called the Singapore Rhododendron or Senduduk. It is a erect shrub or small tree 1.5 to 5m tall. It was traditionally used to treat diarrhoea, dysentery, leucorrhoea, hemorrhoids, wounds, infection during confinement, toothache, flatulence, sore legs, and thrush and also it is used by the Jah hut people in Malaysia to cure diarrhoea⁽¹⁾. Taking into consideration of the medicinal importance of this plant, the ethanol extract of leaf of *Melastoma malabathricum* were analyzed for the GC-MS. This work will help to identify the compounds of therapeutic value. GC-MS is the best technique to identify the bioactive constituents of long chain hydrocarbons, alcohols, acids, ester, alkaloids, steroids, amino and nitro compound etc.

MATERIALS AND METHODS

Collection of plant sample

Leaves of *Melastoma malabathricum* was collected from Daudeli, Joide Taluk, Hubli District, North Karnataka. With the help of local flora, voucher specimens were identified and preserved in the Ethnopharmacology Unit, Research Department of Botany, V. O. Chidambaram College, Tuticorin, Tamil Nadu for further references.

Plant sample extraction

The plants were shaded dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to stoppered flask, and treated with ethanol until the powder is fully immersed. The flask was shaken every hour for the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was filtered. The extract was collected and evaporated to dryness by using a vacuum distillation unit. The final residue thus obtained was then subjected to GC-MS analysis.

GC-MS Analysis

GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite-I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Dimethyl poly siloxane). For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2µl 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 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5seconds and fragments from 45

to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass.

Identification of compounds

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight and structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

The compounds present in the ethanol extract of leaf of *Melastoma malabathricum* were identified by GC-MS analysis (Fig.1). The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration % in the ethanol extract leaf of *Melastoma malabathricum* are presented in Table 1. The prevailing compounds in ethanol extract of leaf were (+) -3,4-Dehydroproline amide (69.44%), Mefloquine (17.36%) and 2-(3,5-Diphenyl-pyrazol-1-yl)-benzothiazole (3.47%). Figure 2,3,4 and 5 shows mass spectrum and structure of 10'-Bromo-9,9'-biphenanthryl-10-ol, Dehydro nylidrin acet, (+)-3,4-Dehydroproline amide and Mefloquine respectively. Table 2 listed the major phytocomponents and its biological activities obtained through the GC-MS study of *Melastoma malabathricum*. The biological activities listed are based on Dr. Dukes Phytochemical and Ethnobotanical Databases by Dr. Jim Duke of the Agricultural Research Service, USDA.

In the present study 10 compounds were identified by Gas Chromatography -Mass Spectrometry (GC-MS) analysis. The presence of various bioactive compounds justifies the use of this plant for various ailments by traditional practitioners. However, isolation of individual phytochemical constituents and subjecting it to biological activity will definitely give fruitful results. It could be concluded that *Melastoma malabathricum* contains various bioactive compounds, so it is recommended as a plant of phytopharmaceutical importance. However, further studies are needed to undertake its bioactivity and toxicity profile.

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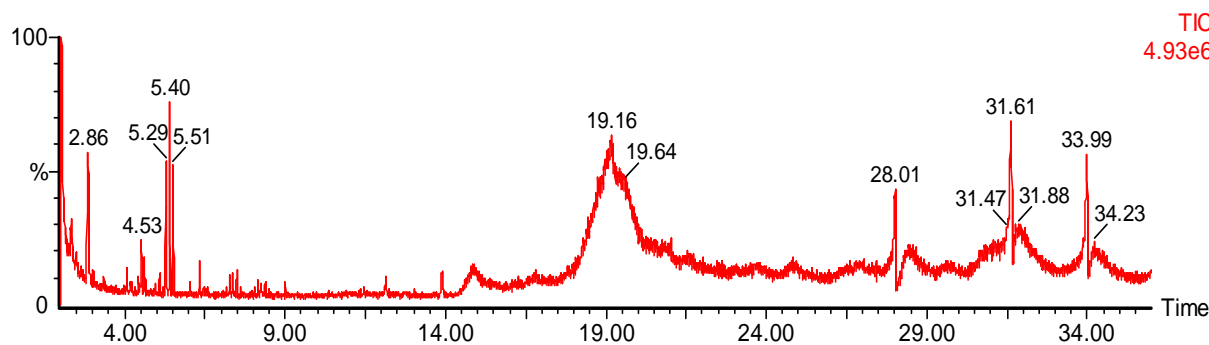
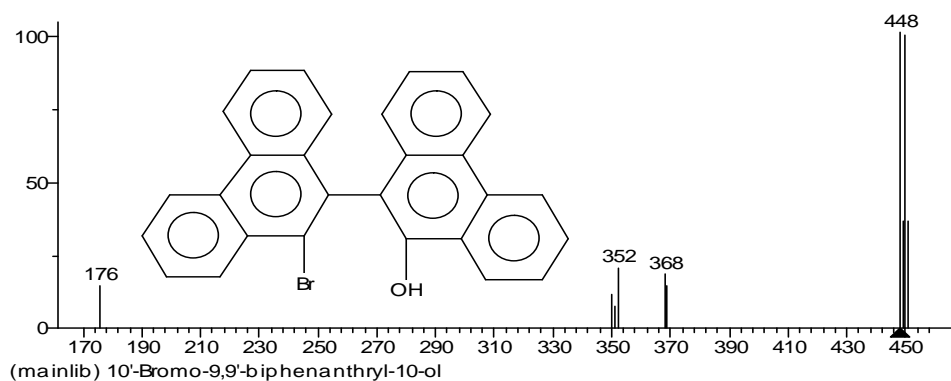
Table 1: Components detected in the ethanol extract of *Melastoma malabathricum* leaf

No.	RT	Name of the compound	Molecular formula	MW	Peak Area %
1.	8.33	10'-Bromo-9,9'-biphenanthryl-10-ol	C28H17BrO	448	1.74
2.	11.64	Benzenamine, 4-nitro-N- triphenylphosphoranylidene)- [Phosphine imide, N-(p-nitrophenyl)-P,P,P-triphenyl-]	C24H19N2O2P	398	1.22
3.	13.83	Pyridine, 3,5-dichloro-2,4,6-trifluoro- [3,5-Dichloro-2,4,6-trifluoropyridine]	C5Cl2F3N	201	1.74
4.	15.11	[1,2,5]-Oxadiazolo[3,4-f]cinnoline, 4,5-dihydro-9-methyl-, 3-oxide	C9H8N4O2	204	0.87
5.	17.74	2,6,10,14-Tetramethylpentadecan-2-ol	C19H40O	284	1.22
6.	19.71	2-(3,5-Diphenyl-pyrazol-1-yl)-benzothiazole	C22H15N3S	353	3.47
7.	22.88	Dehydro nylidrin acet.	C21H25NO2	323	1.74
8.	23.59	4a,8a-Ethenonaphthalene, 1,2,3,4-tetrahydro-	C12H14	158	1.22
9.	24.66	(+)-3,4-Dehydroproline amide	C5H8N2O	112	69.44
10.	32.32	Mefloquine	C17H16F6N2O	378	17.36

Table 2: Activity of Phyto-components identified in the ethanol extract of leaf of *Melastoma malabathricum*

No.	Name of the compound	Molecular formula	Compound nature	**Activity
1.	10'-Bromo-9,9'-biphenanthryl-10-ol	C28H17BrO	Bromo compound	Antimicrobial
2.	Benzenamine, 4-nitro-N- triphenylphosphoranylidene)-	C24H19N2O2P	Amino compound	Antimicrobial
3.	Pyridine, 3,5-dichloro-2,4,6-trifluoro- [3,5-Dichloro-2,4,6-trifluoropyridine]	C5Cl2F3N	Fluro compound	Antimicrobial
4.	[1,2,5]-Oxadiazolo[3,4-f]cinnoline, 4,5-dihydro-9-methyl-, 3-oxide	C9H8N4O2	Nitrogen compound	Antimicrobial
5.	2,6,10,14-Tetramethylpentadecan-2-ol	C19H40O	Alcoholic compound	Antimicrobial
6.	2-(3,5-Diphenyl-pyrazol-1-yl)-benzothiazole	C22H15N3S		anti-microbial, analgesic, anti-inflammatory, anti-cancer, anti-tubercular anti-depressant anthelmintic diuretic
7.	Dehydro nylidrin acet.	C21H25NO2	Nitrogen compound	Vasodilator
8.	(+)-3,4-Dehydroproline amide	C5H8N2O	Alkaloid	Antimicrobial anti-inflammatory
9.	Mefloquine	C17H16F6N2O	Nitrogen compound	Anti malarial drug

**Dr Duke's Phytochemical and ethanobotanical data base

**Fig. 1: GC-MS Chromatogram of the ethanol extract of leaf of *Melastoma malabathricum*****Fig. 2: Mass Spectrum of 10'-Bromo-9,9'-biphenanthryl-10-ol**

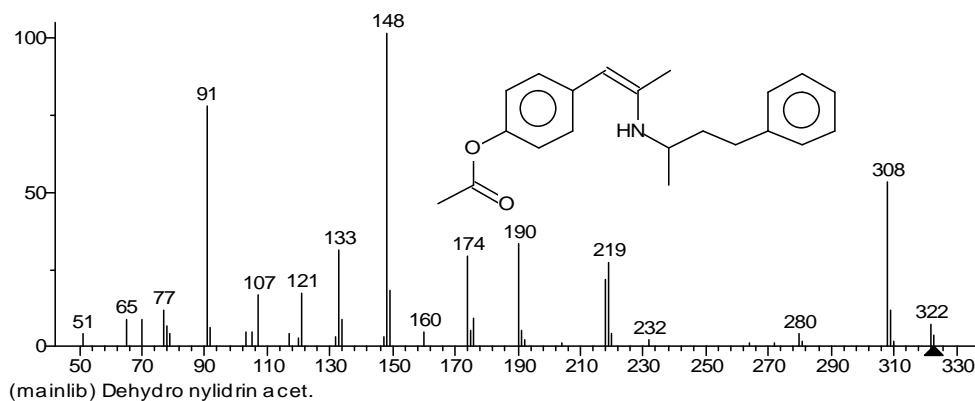


Fig. 3: Mass Spectrum of Dehydro nyldrin acet.

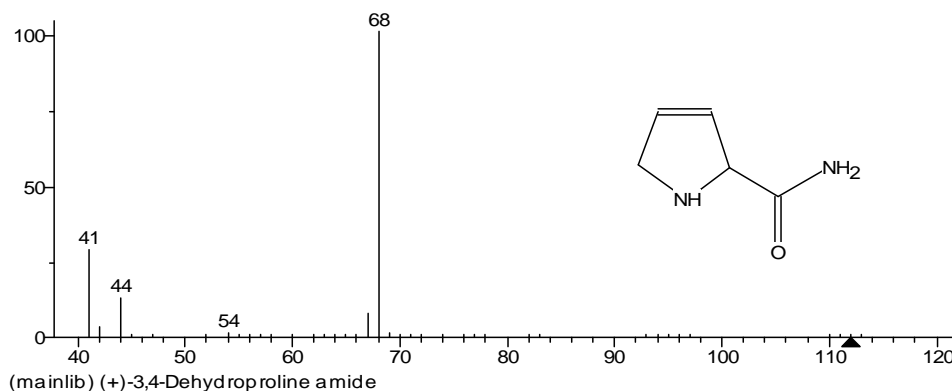


Fig. 4: Mass Spectrum of (+)-3,4-Dehydroproline amide

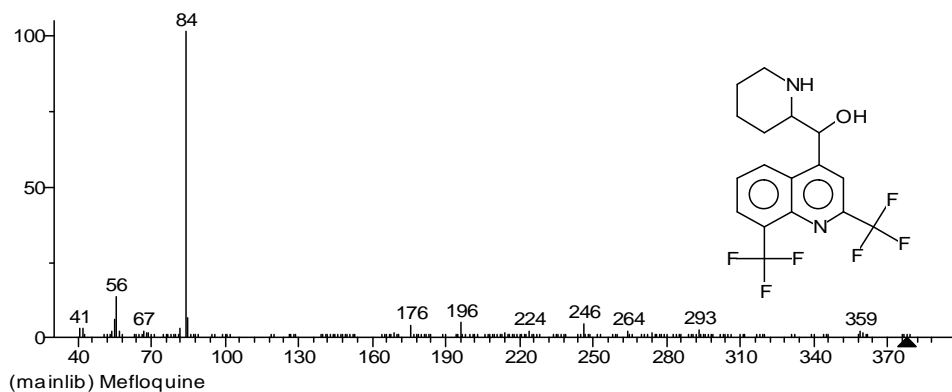


Fig. 5: Mass Spectrum of Mefloquine

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