

GC-MS ANALYSIS OF VARIOUS EXTRACTS OF CLERODENDRUM PHLOMIDIS LEAF

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ABSTRACT

Objective: The investigation was carried out to determine the possible chemical components present in various extracts of *clerodendrum phlomidis* leaf using GC-MS

Methods: The chemical compositions of various extracts of *clerodendrum phlomidis* leaf were investigated using Gas Chromatography- Mass Spectroscopy.

Results: The GC-MS analysis provided different peaks determining the presence seven different compounds namely: (1) Isopropyl Linoneate, (2) Hexadecanoic Acid, 2- Hydroxyl-1-[Hydroxymethyl]Ethyl Ester, (3) 9-Octadecenoic Acid[Z]-,2-Hydroxy-1-[Hydroxymethyl]Ethyl Ester.(4)1,11-Tridecadiene,(5)Hexadecane,(6)Benzene,1-methyl-4-nitroso,

(7) 1[2Acetoxyethyl]3,6diazahomoadamantan-9-one oxime.

Conclusion: The presence of various chemical compounds confirms the application of *Clerodendrum phlomidis* possess medicinal value and further plan of study includes isolation and purification of chemical compounds.

Keywords: *Clerodendrum phlomidis*, GC-MS analysis.

INTRODUCTION

Medicinal plants are expensive gift from human to nature. The approval of traditional medicine as an alternative form of health care and the improvement of microbial resistance to the existing antibiotics has lead researchers to scrutinize the antimicrobial compounds[1]. Herbal medicines are safer than synthetic medicines because the phytochemicals in the plant extract target the biochemical pathway. Medicinal plants have been used all over the world for the treatment and prevention of various ailments, particularly in developing countries where infectious disease are endemic and modern health facilities and services are inadequate[2]. The tribal communities of many countries are still using medicinal plants to cure sickness[19] plant based natural constituents can be derived from any part of the plant like bark, leaves, roots, flowers, seeds, fruits, etc[3]. Plants are the traditional sources for many chemicals used as a pharmaceutical biochemicals, fragrances, food colours and flavours[4]. Medicinal plants are at great interest to the researcher in the field of biotechnology, as most of the drug industries depend in part on plants for the production of pharmaceutical compounds.

Clerodendrum phlomidis (family: *lamiaceae*) is a common shrub of arid plains, low hills and tropical deserts. They are distributed throughout the drier parts of India (Andhra Pradesh, Uttar Pradesh, Diu Island, Delhi, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Bihar, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal), Pakistan, Sri Lanka, south-east Asia[5,6,7,8]. The leaves of the plant is used as a bitter tonic, diabetes[10], malaria, lung disease, dyspepsia, asthma, rheumatism[11,12], inflammatory diseases, febrifuge, fever, swelling, eye disorders, digestive disorders, drowsiness[13] head ache, body ache, mental disturbances and bronchitis. *Clerodendrum phlomidis* finds a lot of applications in Indian traditional veterinary practices⁹. The tribals Santals feed *C. phlomidis* to their cattle for diarrhea and worms or when the stomach swells [14]. Extracts of leaves are applied on body of domestic animals to kill lice. Leaves are good fodders especially for goats[15]. Leaf paste is applied to infested hooves to give a relief for the animals and reportedly cures foot and mouth diseases and secondary infections. Fresh leaf extracts are pasted on animals with skin problems[16] and used for hypothermia or shivering in cattle. In Chittoor, Ananthapur districts of Andhra Pradesh and

Southern India *C. phlomidis* is used for alleviating diseases of livestock by the local traditional herbal practitioners. Leaves are given orally twice daily to cure convulsive seizures and trypanosomiasis infection until cured[17]. Hence the present investigation was carried out to determine the phytochemical compounds using GC-MS analysis.

MATERIALS AND METHODS

Collection of plant material

The plant of *Clerodendrum phlomidis* (leaves) was collected from vatharayanthethu, cuddalore district, India. The whole plant leaves were dried under shade, segregated, pulverized by a mechanical grinder and passed through a 40 mesh sieve.

Preparation of Extracts

The above powdered materials were successively extracted with Petroleum ether(40-60°C), Ethyl acetate (40-60°C), and Methanol (70-80°C), by hot continuous percolation method in Soxhlet apparatus[8] for 24 hrs. The extract was concentrated by using a rotary evaporator and subjected to freeze drying in a lyophilizer till dry powder was obtained. The final residue thus obtained was then subjected to GC-MS analysis.

Gas Chromatography-Mass spectrometry (GC-MS) analysis

The petroleum ether, ethyl acetate and ethanolic extracts from *Clerodendrum phlomidis* were used for GC-MS analysis. 2 µl of the ethanol, ethyl acetate and petroleum ether extracts of leaves of *Clerodendrum phlomidis* was employed for GC-MS analysis (12). These petroleum ether and ethanol extracts were dissolved in HPLC grade methanol and subjected to GC and MS JEOL GC mate equipped with secondary electron multiplier. JEOL GCMATE II GC-MS (Agilent Technologies 6890N Network GC system for gas chromatography). The column (HP5) was fused silica 50 m x 0.25 mm I.D. Analysis conditions were 20 min. at 100°C, 3 min at 235°C for column temperature, 240°C for injector temperature, helium was the carrier gas and split ratio was 5:4. The sample (1 µl) was evaporated in a split less injector at 300°C. Run time was 22 min(13). The compounds were identified by gas chromatography coupled with mass spectrometry. The molecular weight and structure of the compounds of test materials were ascertained by interpretation on mass spectrum of GC-MS using the database of National Institute Standard and Technology (NIST)

Identification of Compounds

Interpretation of mass spectrum of GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the known 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 was ascertained[19].

RESULTS AND DISCUSSION

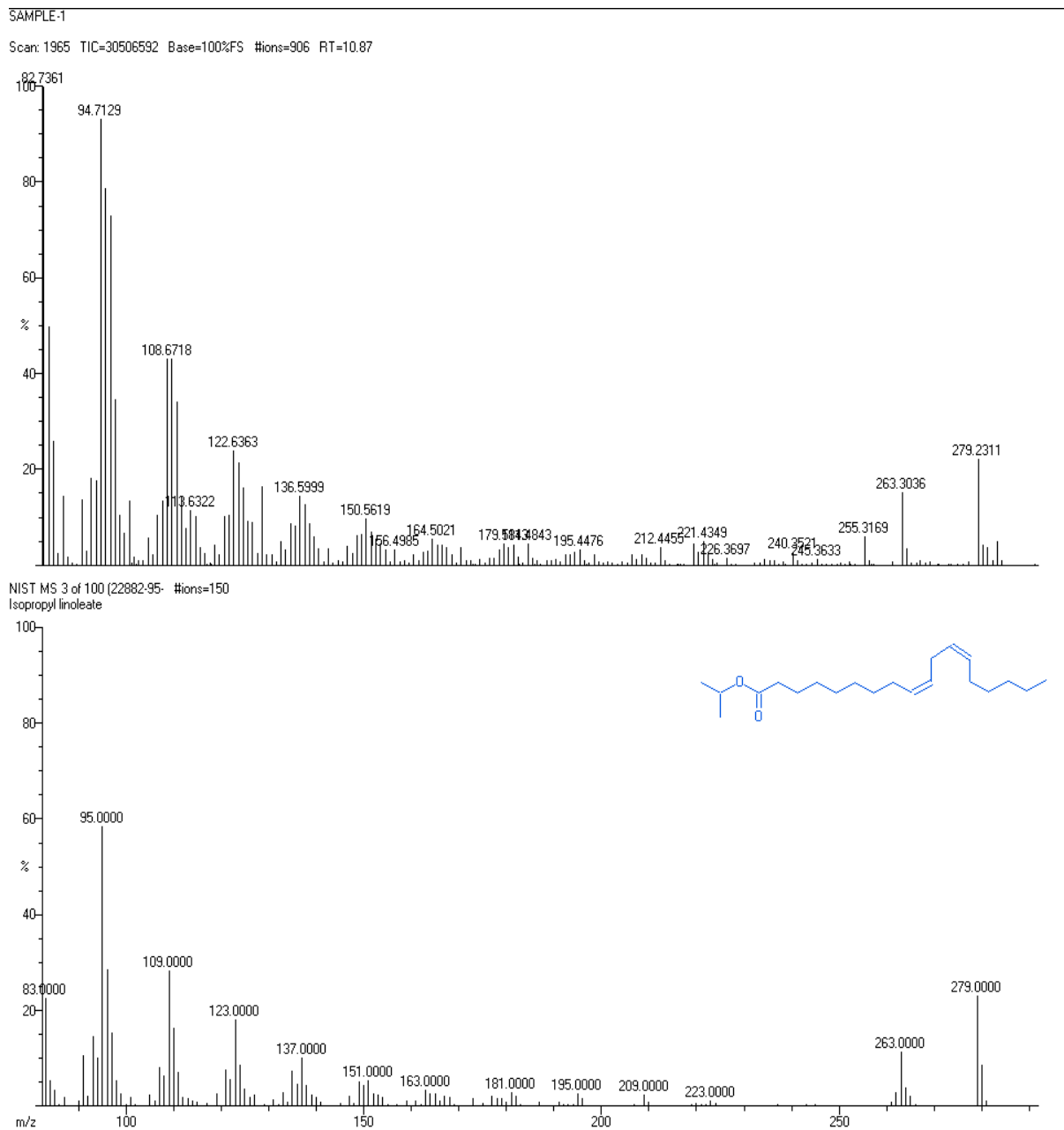
1. GC-MS Chromatogram of Petroleum Ether Leaf Extract from Clerodendrum phlomidis

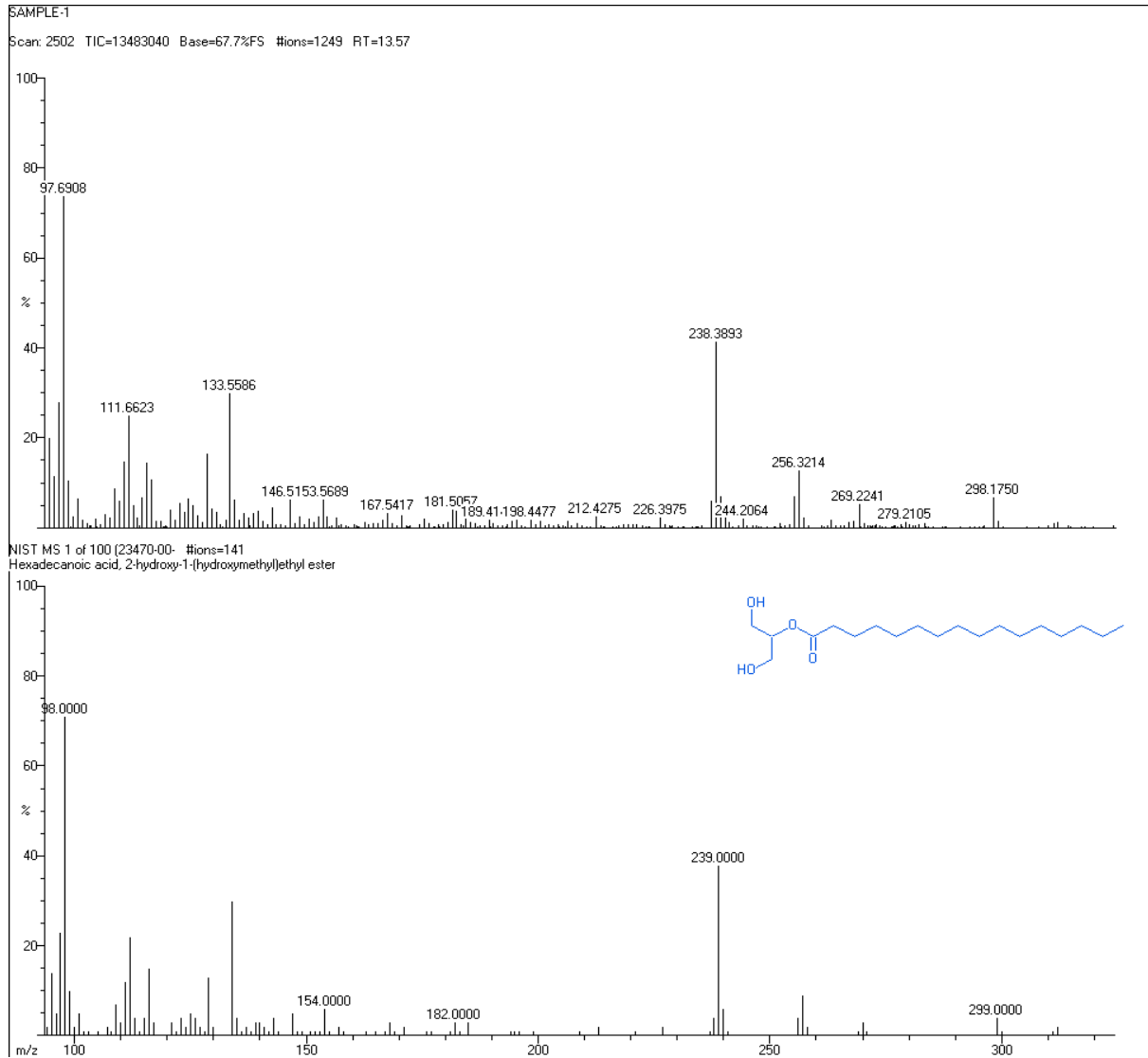
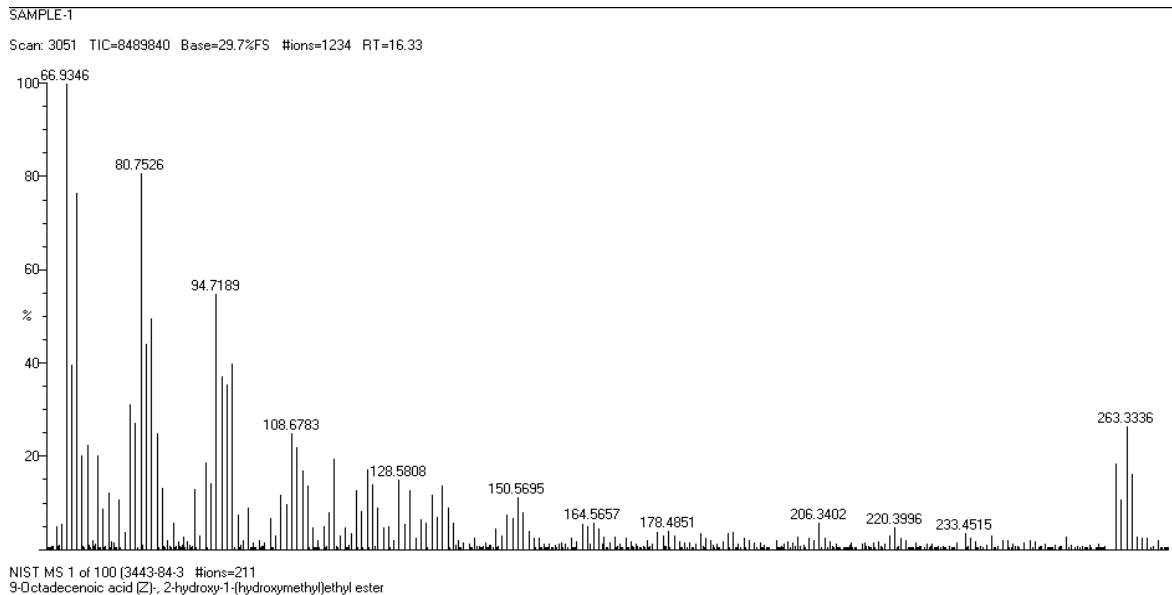
The GC-MS Chromatogram of Petroleum Ether Leaf Extract from Clerodendrum phlomidis are shown in the Figure 1. The GC-MS spectral studies reveals the presence of three compounds are as follows: **(1)** Isopropyl Linoneate, **(2)** Hexadecanoic Acid, 2-Hydroxyl-1-[Hydroxymethyl]Ethyl Ester, **(3)** 9-Octadecenoic Acid[Z]-,2-Hydroxy-1-[Hydroxymethyl]Ethyl Ester.

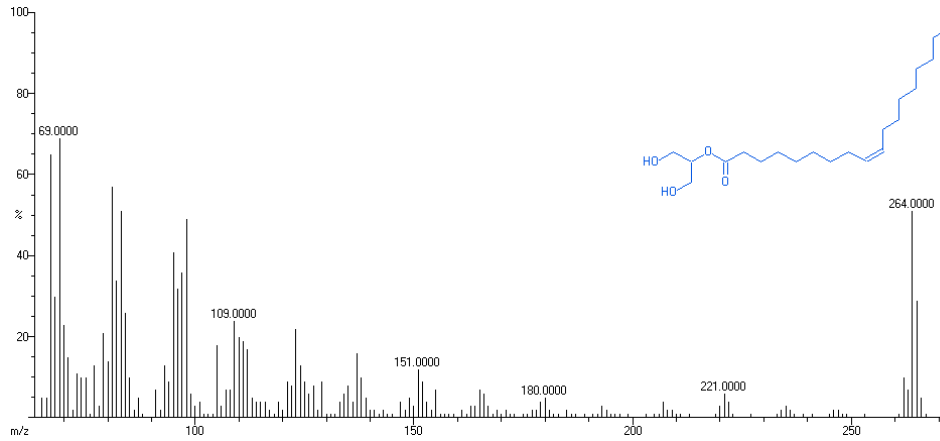
Table 1: GC-MS Analysis of Petroleum Ether Leaf Extract from Clerodendrum phlomidis

No.	RT	Name of the compound	Molecular formula	Molecular Weight1
1	10.87	Isopropyl Linoneate	C ₂₁ H ₃₈ O ₂	322.5252
2	13.57	Hexadecanoicacid,2Hydroxyl-1[Hydroxymethyl]Ethyl Ester	C ₁₉ H ₃₈ O ₄	330.5026
3	16.33	9-OctadecenoicAcid[Z]-,2-Hydroxy-1-[Hydroxymethyl]Ethyl Ester.	C ₂₁ H ₄₀ O ₄	356.54

(1) Isopropyl Linoneate



(2) Hexadecanoic Acid, 2- Hydroxyl-1-[Hydroxymethyl]Ethyl Ester.**(3) 9-Octadecenoic Acid[Z]-, 2-Hydroxy-1-[Hydroxymethyl]Ethyl Ester.**



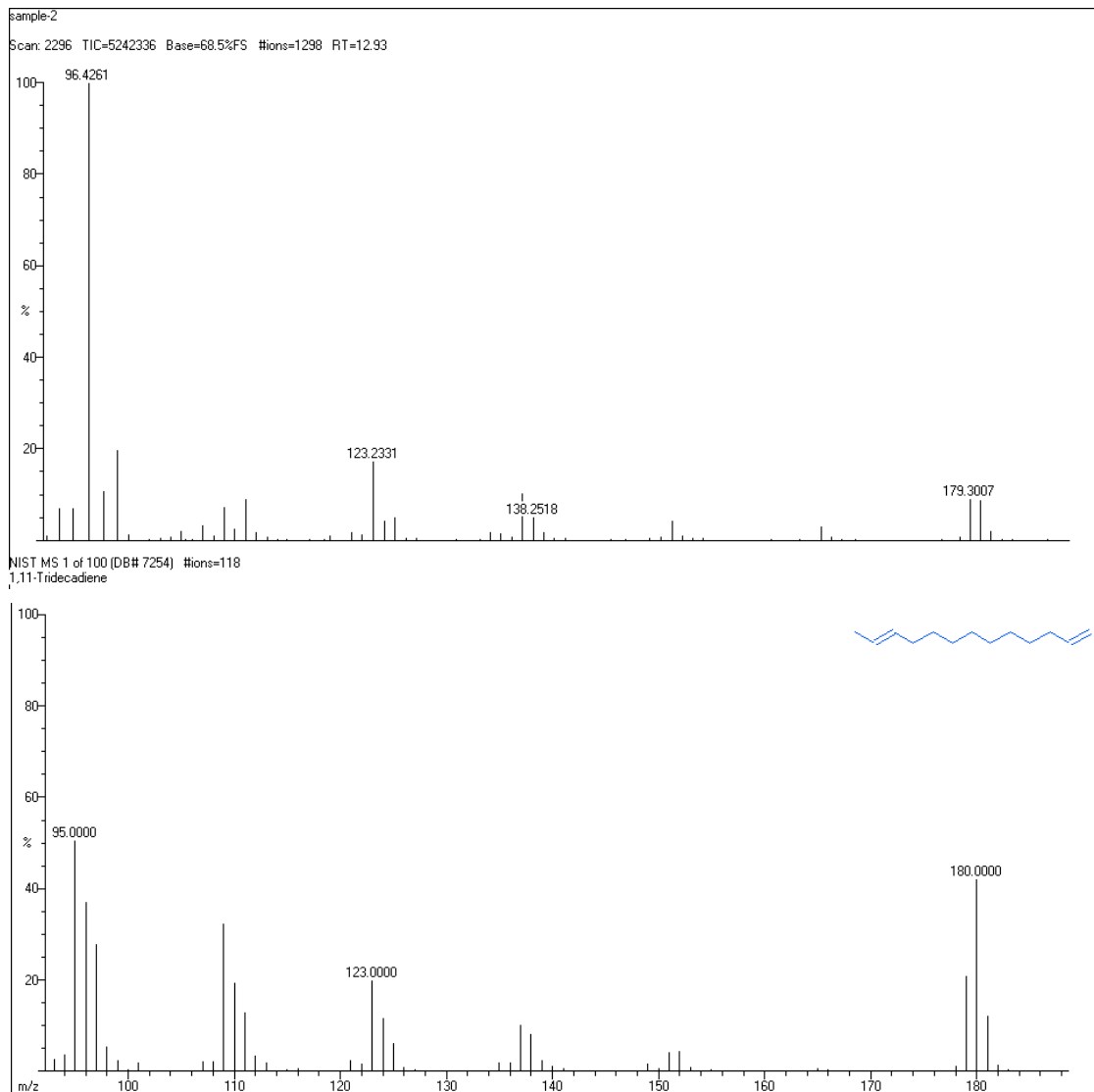
2. GC-MS Chromatogram of Ethyl Acetate Leaf Extract from Clerodendrum phlomidis

The GC-MS Chromatogram of Ethyl Acetate Leaf Extract from Clerodendrum phlomidis are shown in the Figure 1. The GC-MS spectral studies reveals the presence of one compound are as follows: **(1)** 1,11-Tridecadiene,

Table 2: GC-MS Analysis of Ethyl Acetate Leaf Extract from Clerodendrum phlomidis

No	RT	Name of the compound	Molecular formula	Molecular Weight
1	12.93	1,11-Tridecadiene	C ₁₃ H ₈	164.2026

(1) 1, 11-Tridecadiene



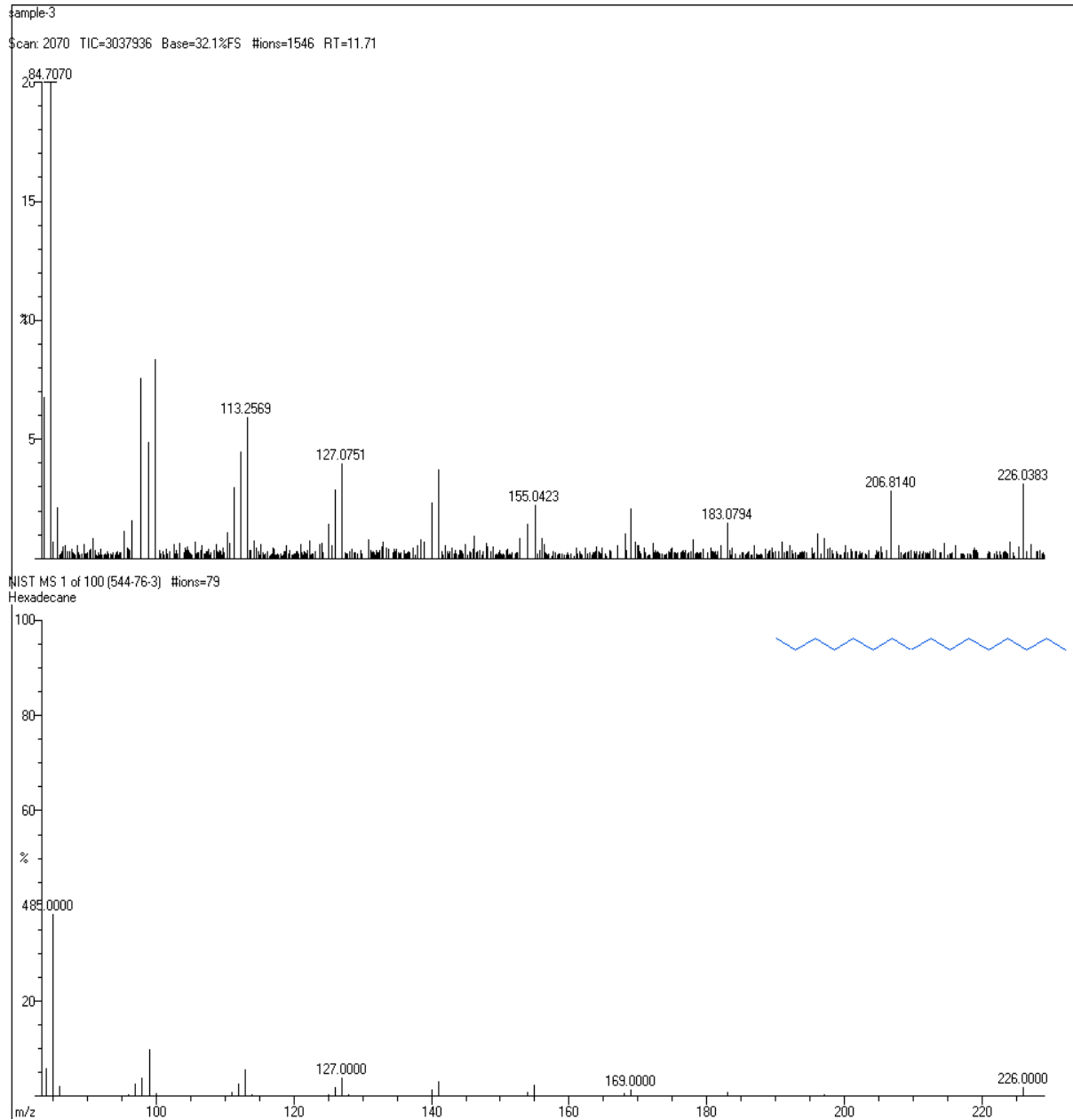
3. GC-MS Chromatogram of Ethanol Leaf Extract from Clerodendrum phlomidis

The GC-MS Chromatogram of Ethanol Leaf Extract from Clerodendrum phlomidis are shown in the Figure 1. The GC-MS spectral studies reveals the presence of two compounds are as follows: **(1)** Hexadecane, **(2)** Benzene, 1-methyl-4-nitroso-, **(3)** 1-[2Acetoxyethyl]3,6diazahomoadamantan-9-one oxime.

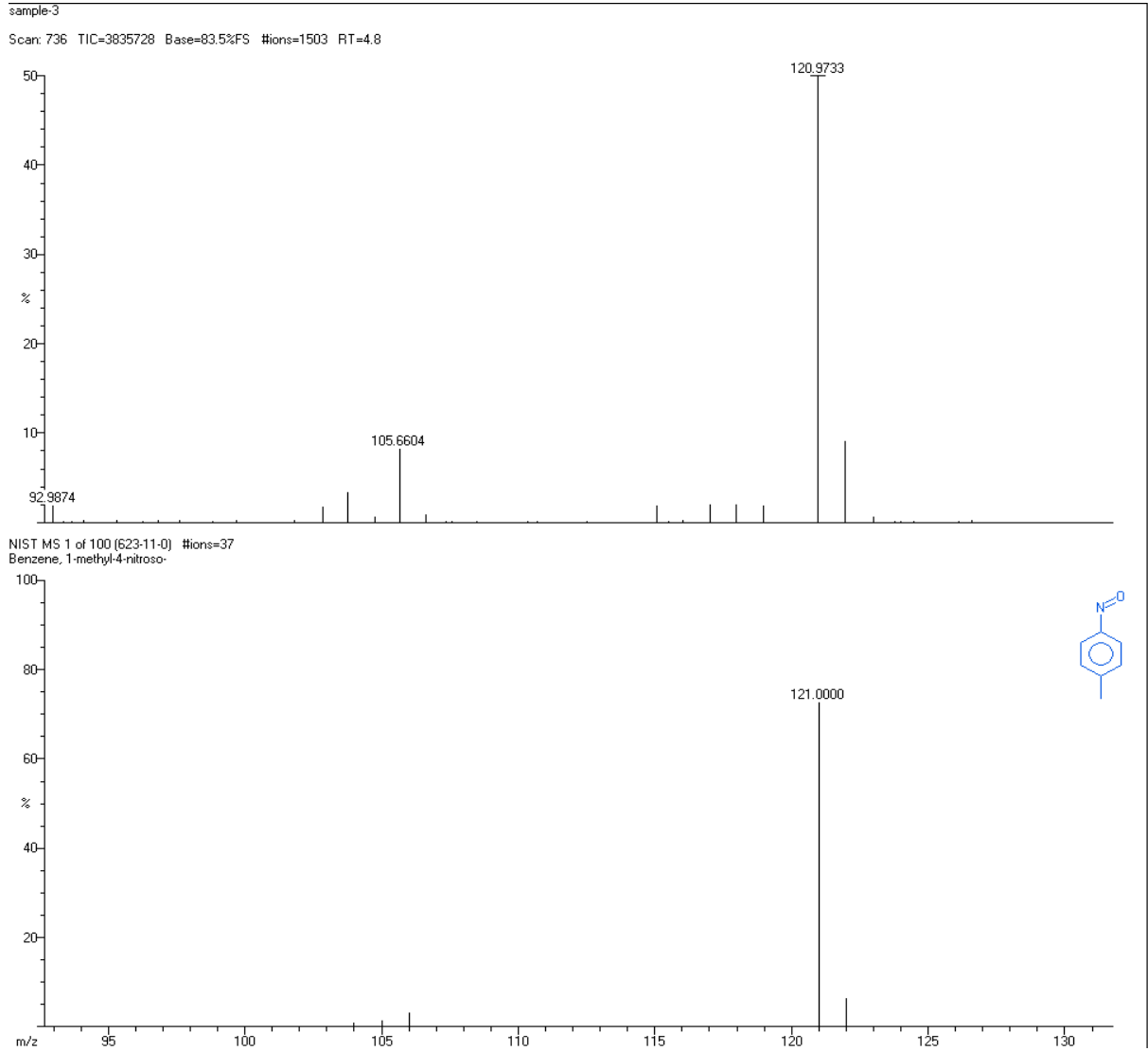
Table 3: GC-MS Analysis of Ethanol Leaf Extract from Clerodendrum phlomidis

No.	RT	Name of the compound	Molecular formula	MW
1	11.71	Hexadecane	C ₁₆ H ₃₄	226.4412
2	4.8	Benzene, 1-methyl-4-nitroso-	C ₇ H ₇ NO	121.1366
3	10.44	1-[2Acetoxyethyl]3,6diazahomoadamantan-9-one oxime.	C ₁₃ H ₂₁ N ₃ O ₃	267.32414

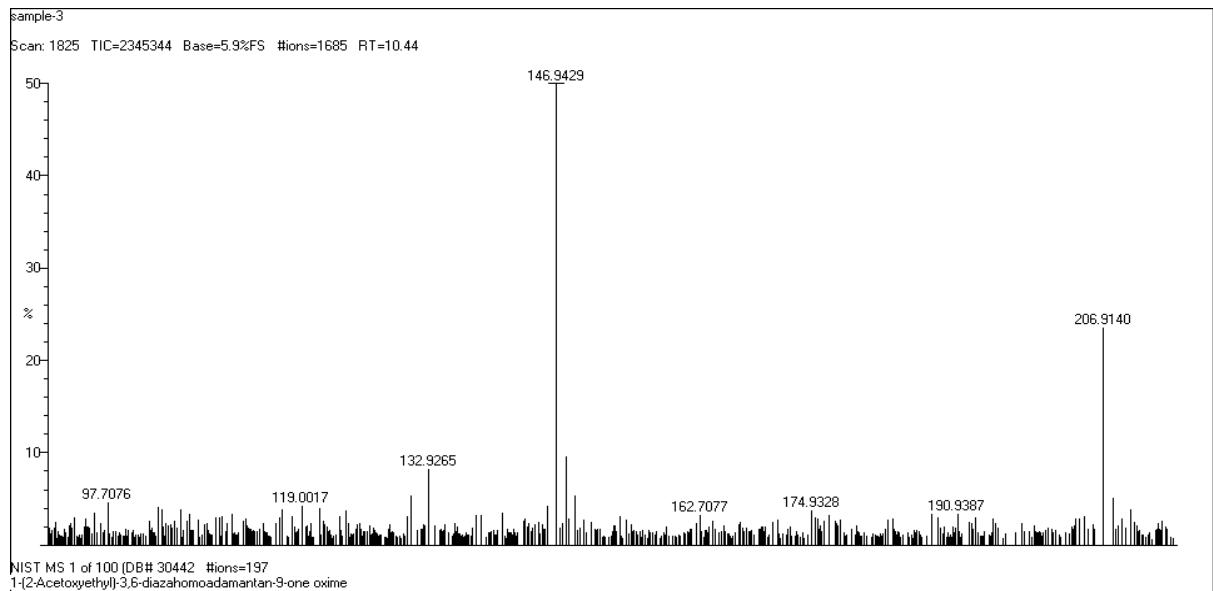
(1) Hexadecane

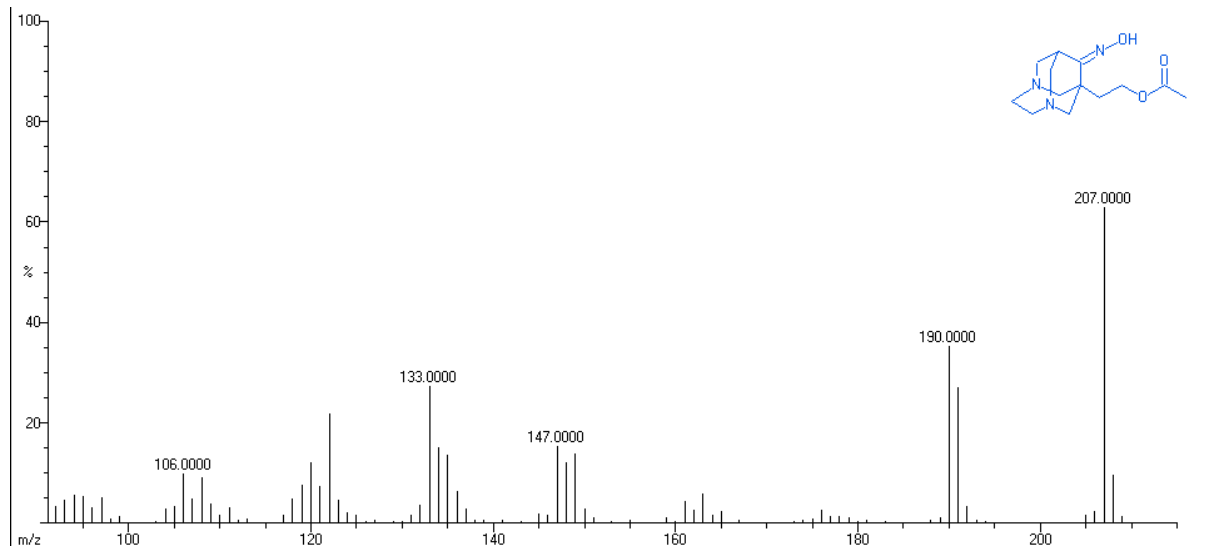


(2) Benzene, 1-methyl-4-nitroso-



(3) 1-[2Acetoxyethyl]3,6diazahomoadamantan-9-one oxime





CONCLUSION

In the present study three chemical compounds have been identified from the petroleum ether extract, two chemical compounds have been identified from the ethyl acetate and three chemical compounds identified from the ethanol extract of the leaves of *Clerodendrum phlomoidis* by Gas Chromatogram-Mass Spectrometry (GC-MS) analysis. The presence of various chemical compounds confirms the application of *Clerodendrum phlomoidis* possess medicinal value and further plan of study includes isolation and purification of chemical compounds.

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