



RESEARCH ARTICLE

GC-MS Analysis of Aqueous Leaf Extract of *Alternantera Sessilis*

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ABSTRACT

Alternantera sessilis is one of the medicinally important plants belonging to the family Amaranthaceae commonly known as Ponnannkannikkirai in Tamil. Traditionally, leaves are used in the treatment of skin disease and fever. It is an effective hepatoprotective agent. In present study the aqueous extract of a *Alternantera sessilis* has been subjected to GC-MS analysis. As a result of analysis of many constituents were found to be present in the *Alternantera sessilis* leaf extract. The major chemical constituent is *17 α -Acetoxy-1,1-dicarboethoxy-1 α ,2 α -dihydro-17 α -methyl-3H-cycloprop[1,2]-5 α -androst-1-en-3-one*.

KEYWORDS

Alternantera sessilis, Aqueous extract, GC-MS analysis

INTRODUCTION

Nature has been a source of medicinal agents for thousands of years. Various medicinal plants have been used for years in daily life to treat disease all over the world⁶ for thousands of years, the product of nature provided the only medicines for human illness and most of these remedies were obtained from higher plants.^{7,8} The number of species of higher plants on the planet earth is estimated between 370,000 and 50,000. All plants, in reaction to stress, infection, danger or environmental changes, produce a wide range of diverse chemicals, *secondary* (species) metabolites (SMs), many of which have therapeutic potential for a number of human ailments and are useful as medicines.^{7,8,9}

Plants are providing humankind with all needs including food, clothing, shelter, flavours and fragrances as not the least, medicines.

Plants form the basis of traditional medicine, Ayurvedic, Unani, Chinese amongst others. Medicinal plants have been used throughout the world, however, their wide usage had been limited to China, India, Japan, Pakistan, Sri Lanka, Thailand and African countries. Developed countries are also turning to encourage the usage of plant-based natural medicinal product in their healthcare systems. World Health Organization estimates that 80% of the world's inhabitants rely mainly on traditional medicines for their health care.^{10,11}

Plants owing to its medicinal value have continued to play a dominant role in the maintenance of human health since ancient times. The World Health Organization estimates that plant extracts or their active constituents are used as folklore medicine in traditional therapies of 80% of the world's population.² Over 50% of all modern clinical drugs are of natural product origin.³

In developing countries and particularly in India people belonging to the low income group such as farmers, people of small isolated villages and

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native communities use folklore medicine for the treatment of common infections.¹ *Alternanthera sessilis* Plants have been an important source of medicine for thousands of years. Even today, the World Health Organization estimates that up to 80 percent of people still rely mainly on traditional remedies such as herbs for their medicines. Today, Ayurvedic, Haner, and Unani, Physicians utilize numerous species of medicinal plants that found their way a long time ago into the Hindu Material Media.¹

India is a country rich in indigenous herbal resources which grow on its varied topography and under changing agro climatic conditions permitting the growth of almost 20,000 plant species, of which 2,500 have medicinal value.⁴

Ponnankannikkirai (Tamil) commonly known as *Alternanthera sessilis* comes under family Amaranthaceae. It is found throughout India and has historically been used to treat a wide assortment of diseases. It is known by various names in different languages as “Gudrisag” in Hindi, “Ponnagantikura” in Telugu, “Minannani, ponnannani, ponnankannikkira” in Malayalam, “Honugonesoppu” in Kannada, *Alternanthera sessilis* is reported to possess a number of medicinal properties.

Alternanthera Sessilis



Scientific Classification

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnoliopsida

Family : Amaranth

Subfamily : Gomphrenoideae

Genus : Alternanthera

Species : A sessilis

Binomial Name

Alternanthera sessilis

Synonyms

Alternanthera glabra, *Gomphrenasessilis*.

The plant is bitter, astringent, acrid, cooling, constipating and febrifuge and is useful in vitiated conditions of kapha and pitta, burning sensation, diarrhea, skin disease and fever. The plant is also found to possess hepatoprotective activity.⁵

MATERIALS AND METHOD

Preparation of Powder and Extract

The plant leaf was shade –dried for 60 days at room temperature and pulverized to powder in a mechanical grinder. The powder (50gm) was successively extracted with 250ml of distilled water. The extracts were placed in warmer at 40-60°C for 7 days. The extract of the plant leaf was used for GC-MS analysis. 2 mg of the aqueous extract of *Alternanthera sessilis* was employed for GC/MS analysis. Which was done at IIT (Indian Institute of Technology) Chennai? The graphs are shown in the Figure 1 and 2. In this graph *17a-Acetoxy-1,1-dicarboethoxy-1a,2a-dihydro-17a-methyl-3H-cycloprop[1,2]-5a-androst-1-en-3-one*, the compound which is present in maximum quantity is shown in the Figure 2.

GC-MS Instrumentation

Mass spectrometry has become one of the most important analytical tools of today. The use of it has spread to a large number of areas such as molecular physics, chemistry, biology and medicine. One of the important analytical tools placed in SAIF, IITM is GC-MS. It is a combination of Agilent technologies (Gas chromatographic system) and Jeol GC mateII (mass spectrometry).

GC Conditions

COLUMN : CP-Sil88m X 0.25mm, Film Thickness 0.1 μ m

OVEN TEMP : 100°C(1.5min) -> 20°C/min-> 180°C(0 min) -> 4° C/min -> 270°C (27 min)

INJECTION : optic 2 used 5 μ L

MS Conditions

Resolution : 3,000

Switching : Electric Field

Detector Voltage : 600 V

Pre amp : X100

Attenuator : 1/16

Cycle Time : 0.44sec

Ionization Voltage : 40V

RESULTS AND DISCUSSION

The studies on the active principles in the *ALTERNANTERA SESSILIS* leaf Aqueous extract by GC-MS analysis clearly showed the presence of ten compounds. The active principles with their retention time (RT), molecular formula, and molecular weight (MW), presented in Table-1. The GC-MS chromatogram of the more than 10 peak of the compounds detected was shown in Figure-1 and Figure 2. GC-MS analysis of the aqueous leaf extract of *ALTERNANTERA SESSILIS*. Showed the presence of 10 major peaks and the components corresponding to the peaks were determined as follows.

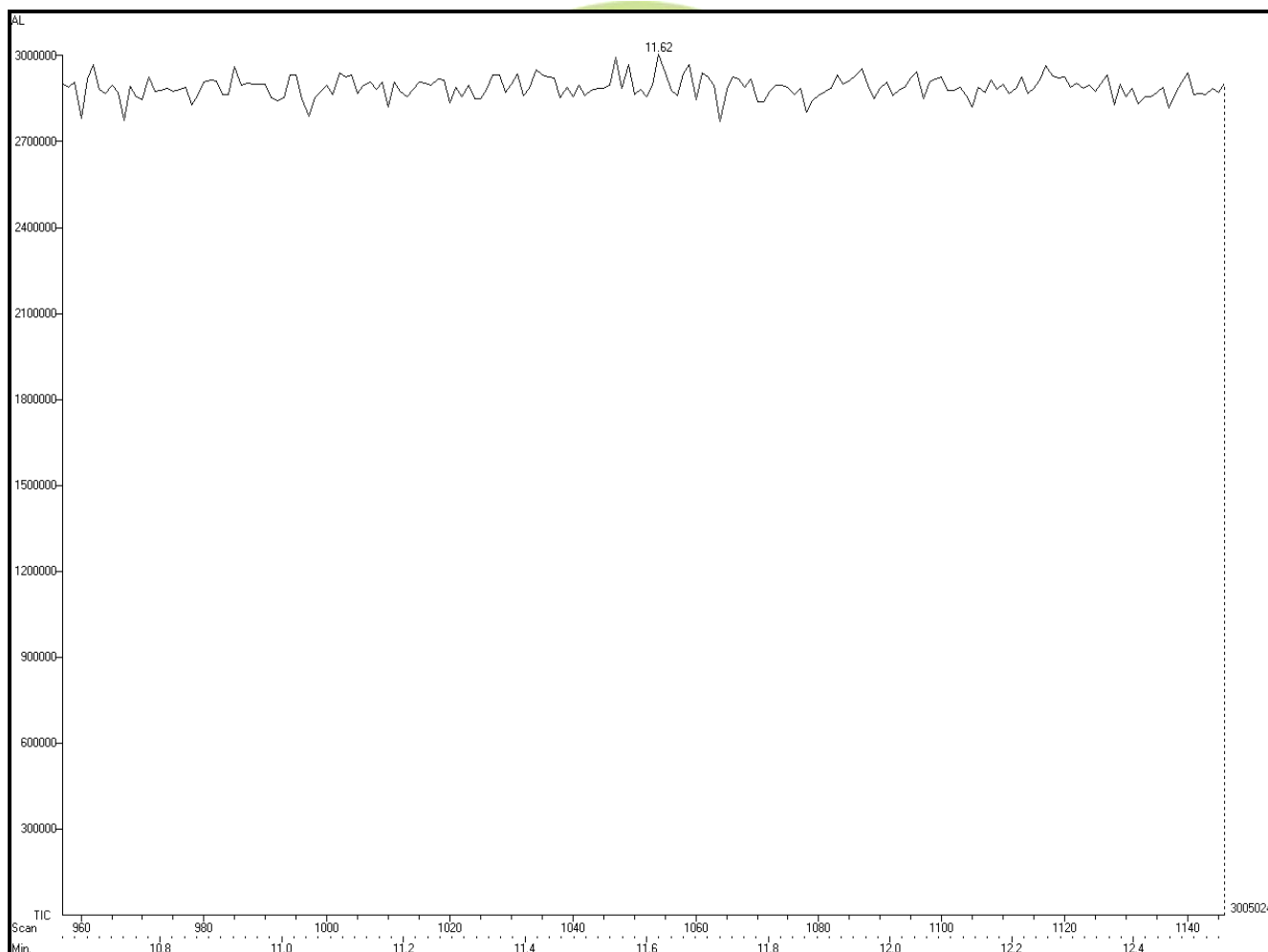


Figure 1: GC-MS Chromatography

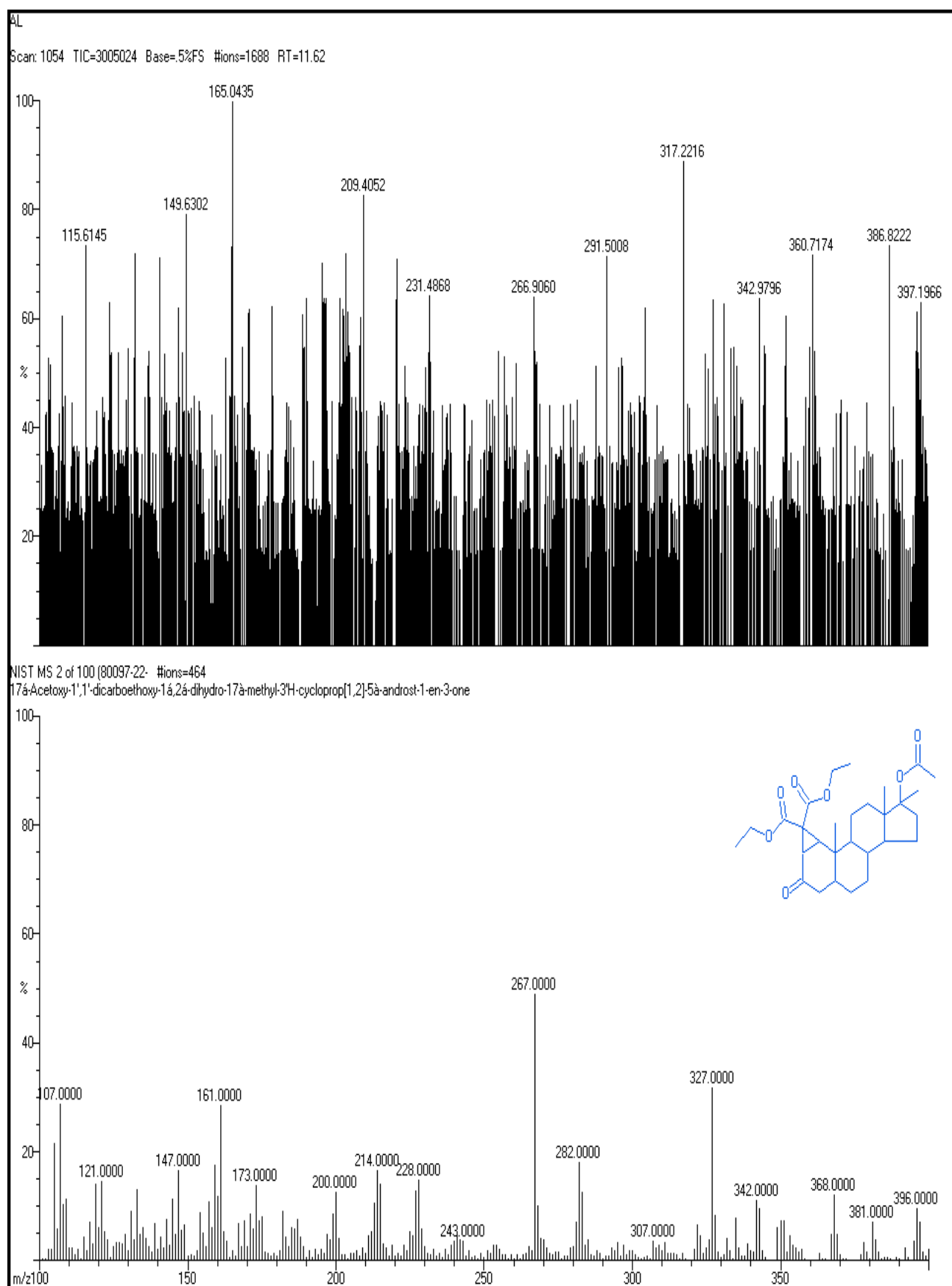


Figure 2: Mass Chromatography

Table 1: Chemical composition present in *alternanthera sessilis* leaf

S.No	Name of the Compound	Molecular Formula	Molecular Weight	RT
1	1-vinylclohexa -1,4-diene	C ₈ H ₁₁	107	11.62
2	1-isopropylcyclohexa-1,4-diene	C ₉ H ₁₃	121	11.62
3	(2Z,6E,8Z)-4-methylenecyclodeca-2,6,8-trienone	C ₁₁ H ₁₃ O ⁺	161	11.62
4	1,1,7a-trimethyl-2-methylene-1a,2,3,7,7a,7b-hexahydro-1H-cyclopropa[a]naphthalene	C ₁₅ H ₂₀	200	11.62
5	5-butyl-4-methylnaphalen-1(4H)-one	C ₁₅ H ₁₈ O	214	11.62
6	4a,8-dimethyl-1-methylene-1,4,4a,4b,5,8,8a,9,10, 10a-decahydrophenanthrene	C ₁₇ H ₂₄	228	11.62
7	1-(1-hydroxyethyl)-1-(methoxymethyl)-7a-methyl-octahydro-3H-cyclopropa[a]naphthalene-2(7bH)-one	C ₁₆ H ₂₆ O ₃	267	11.62
8	10,13,17-trimethyl-3-methylylene-2,3,4,5,6,10,12,13,14,15,16,17-dodecahydro-1H-cyclopenta[a]phenanthrene	C ₂₁ H ₃₀	282	11.62
9	1,1-bis(1-methoxyvinyl)-9b-methyl-4,5,6,7,8,9,9a,9b,9c-decahydro-1H-cyclopropa[c]phenanthrene	C ₂₂ H ₃₀ O ₂	327	11.62
10	1,1-bis(1-methoxyvinyl)-9b-methyl-2-methylene-tetradecahydro-1H-cyclopropa[c]phenanthrene	C ₂₃ H ₃₄ O ₂	342	11.62
11	Dimethyl 7-ethyl-9b-methyl-2-oxo-1a,2-dihydro-7H-cyclopropa[c]phenanthrene-1,1(9aH,9bH,9cH)-dicarboxylate	C ₂₂ H ₂₄ O ₅	368	11.62
12	7-ethyl-1,1-bis(1-methoxyvinyl)-2,7,9b-trimethyl-1a,2,7,8,9a,9b,9c-octahydro-1H-cyclopropa[c]phenanthrene	C ₂₆ H ₃₆ O ₂	381	11.62

DISCUSSION

In the present study it has been found that in *Alternanthera Sessilis* many chemical constituents are present. In this plant maximum peak compound is *17a-Acetoxy-1,1-dicarboethoxy-1a,2a-dihydro-17a-methyl-3H-cycloprop[1,2]-5a-androst-1-en-3-one* a chemical constituents been identified in the aqueous extract of the leaf of *Alternanthera Sessilis* and some other compound are also identified they are 1)1-vinylclohexa-1,4-diene;2)1-isopropylcyclohexa-1,4-diene;3) (2Z,6E,8Z)-4-methylenecyclodeca-2,6,8-trienone;1,1,7a-trimethyl-2-methylene-1a,2,3,7,7a,7b-hexahydro-1H-cyclopropa[a]naphthalene;4)5butyl4methylnaphalen-

1(4H)one;4a8dimethyl1methylene1,4,4a,4b,5,8,8a,9,10,10adecahydrophenanthrene;5)1(1hydroxyethyl)1(methoxymethyl)7amethyloctahydro3Hcyclopropa[a]naphthalene2(7bH)one;6)10,13,17trimethyl3methylylene2,3,4,5,6,10,12,13,14,15,16,17dodecahydro1Hcyclopenta[a]phenanthrene;7)1,1-bis(1-methoxyvinyl)-9b-methyl-4,5,6,7,8,9,9a,9b,9c-decahydro-1H-cyclopropa[c]phenanthrene;8)1,1bis(1methoxyvinyl)9bmethyl2methylenetetradecahydro1Hcyclopropa[c]phenanthrene;9)Dimethyl7-ethyl-9b-methyl-2-oxo-1a,2-dihydro-7Hcyclopropa[c]phenanthrene-1,1(9aH,9bH,9cH)-dicarboxylate;10)7-ethyl-1,1-bis(1-methoxyvinyl)-2,7,9b-trimethyl-1a,2,7,8,9a,9b,9c-octahydro-1H-cyclopropa [c]phenanthrene.

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