IJIRSET
International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

e-ISSN: 2319-8753 | p-ISSN: 2347-6710

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 1, January 2022

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.569

9940 572 462 | 6381 907 438 | ijirset@gmail.com | www.ijirset.com

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 11, Issue 1, January 2022 ||

| DOI:10.15680/IJIRSET.2022.1101076 |

Profiling of Biologically Active Compounds from *Sansevieria Cylindrica* Bojer Ex Hook. Using GCMS

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ABSTRACT : The aim of this study was to carry out the identification and profiling of bioactive compounds from the chloroform extract of *Sansevieriacylindrica*Bojer ex Hook.leaves by Gas chromatography and Mass spectroscopy (GC-MS). The GCMS analysis revealed the presence of 24 various compounds like 4-(4-Hydroxyphenyl)-4-methyl-2-pentanone, Arsenous acid, tris(trimethylsilyl) ester, Tetrasiloxane, decamethyl, Tris(tert-butyldimethylsilyloxy)arsane, 2,4,6-Cycloheptatrien-1-one, 3,5-bis-trimethylsilyl, 9-Tricosene, (Z)-, Dichloroacetic acid, heptadecyl ester, Heptacos-1-ene, 9-Hexacosene, 3-Eicosene, (E)- , Pentasiloxane, dodecamethyl, 2,6-Dihydroxyacetophenone, 2TMS derivative, Benzoic acid, 4-methyl-2-trimethylsilyloxy-, trimethylsilyl ester, Pentasiloxane, dodecamethyl, Phthalic acid, di(2-propylpentyl) ester, Phthalic acid, di(6-methylhept-2-yl) ester, Bis(2-ethylhexyl) phthalate, Phthalic acid, 6-ethyloct-3-yl 2-ethylhexyl ester, Diisooctyl phthalate, Phthalic acid, 6-ethyl-3-octyl butyl ester, Phthalic acid, hept-4-yl isobutyl ester, Phthalic acid, butyl 2-pentyl ester, Phthalic acid, 2-ethylbutyl propyl ester, Phthalic acid, cyclohexylisohexyl ester in the chloroform extract of *S.cylindrica*Bojer ex Hook.leaves. Further studies are needed to isolate active compounds of the extract as well as to explicate their exact mechanism of action in various biological activities.

KEYWORDS: SansevieriacylindricaBojer ex Hook., GC-MS analysis, Chloroform extract.

I. INTRODUCTION

In olden days itself the importance of medicinal plants have been discovered and utilized as a wide source for discovering novel drug or compounds. Now a day's medicines obtained from different parts of the plant have made a huge contributions towards human health and well-being and most of the medicinal plants possesses antimicrobial and antioxidants activity (Rout and Kar,2013) which are vital in the management of many diseases(Rengasamy et al., 2019). Medicinal plants develop drugs without the adverse effects of the synthetic drugs (Andrade et al., 2019).

In India the medical systems using medicinal plants are Ayurveda, Siddha, Homeopathy, etc., to treat various ailments (Pushpangadan and Atal,1984). Plants and natural products form the basis of both modern and traditional medicines and nowadays they are widely used in the production of commercially produced drug.The main reasons for using medicinal herbs are as follows: (i) they correspond more closely to the patient's ideology, (ii) they reduce concerns about the side effects of synthetic medicines, (iii) they are more affordable, (iv) they satisfy a desire for more personalized health care, and (v) they also allow more people's access to health information (Benzie and Wachtel-Galor, 2011).

It has been estimated that around 80% of the world populations used traditional medicine for cure as primary health care. It is also reported that traditional medicines played an important role in the primary health care system (Rout and Kar,2013).The role of World Health Organization (WHO) is to encourage, promote and facilitate the effective herbal medicine for the primary use in developing countries for different health programs.

It is believed that crude extract from medicinal plants are more biologically active than isolated compounds due to their synergistic effects (Jana and Shekhawat ,2010). Phytochemical screening of plants has revealed the presence of numerous chemicals including alkaloids, flavonoids, tannins, steroids, glycosides and saponins. Secondary metabolites from plant serve as defense mechanisms against predation by many microorganisms, insects and herbivores (Cowan,1999). These phytocompounds from medicinal plants are important in pharmaceutical industry for drug development and preparation of therapeutic agents (Nishaet al, 2011). Since the phytochemicals cure diseases without causing any harm to human beings these can also be considered as "man-friendly medicines" (Amarasingham,1964). In

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recent years GC-MS studies have been increasingly applied for the analysis of medicinal plants as this technique has proved to be a valuable method for the analysis of biological components present in the plants (Banu and Cathrine,2015).

Gas Chromatography Mass Spectroscopy, a hyphenated system which is a very compatible technique and the most commonly used technique for the identification and quantification purpose. GC-MS is the best technique to identify the bioactive constituents of long chain hydrocarbons, alcohols, acids, esters, alkaloids, steroids, amino, nitro compounds, etc.,(Karuppasamy, 2012)The unknown organic compounds in a complex mixture can be determined by interpretation and also by matching the spectra with reference spectra (Hites,1997).

Hence, the present study was aimed to carry out the identification of bioactive compounds from the chloroform extract of *S.cylindrica*Bojer ex Hook.leaves by Gas chromatography and Mass spectroscopy**.**

II. MATERIALS AND METHOD

2.1 COLLECTION OF PLANT MATERIAL AND PREPARATION OF PLANT EXTRACTS

The *Sansevieriacylindrica*Bojer ex Hook. from Holy Cross College (Autonomous) campus, Nagercoil. Taxonomic identification of the plant was identified and authenticated by Dr. Arulanandam, Director, the Rapinat Herbarium and center for molecular systematics, St. Joseph's college Trichy-Tamil Nadu. India. A Voucher specimen has been deposited at the Rapinat Herbarium, St. Josephs College, Thiruchirappalli, Tamil nadu, India.

2.2 PREPARATION OF PLANT EXTRACT:

The collected plants were cleaned properly to remove adhering sand and dust particles on the outer surface of the plant. Then the plant was cut in to small pieces and shade dried. These dried samples were stored in airtight container for future purposes. The sample can be extracted by chloroform solvent using Soxhlet apparatus, then the extract was evaporated to dryness using rotary evaporator (Mukherjee,2002). The extract was concentrated to obtain crude chloroform extract and then stored at 4°C until required for future use. The final residue obtained was then subjected to GC-MS analysis.

2.3 GCMS analysis:

GCMS analysis is a common confirmation test. It is best used to make an effective chemical analysis. This analysis will provide a representative spectral output of all the compounds that get separated from the sample. The first step of GCMS was started by injecting the sample to the injected port of the Gas chromatography (GC) device. The GC instrument vaporizes the sample and then separates and analyzes of the various components. Each component was ideally produces a specific spectral peak that may be recorded on a paper chart electronically. The time elapsed between elution and injection is called the "retention time". Differentiate between some compounds was identified using the Retention time. The peak is measured from the base to the tip of the peak. This technique is also well recognized for its ability in unknown compound analysis and multi-component quantitation.

The chloroform extract of plant was subjected to GC-MS at the Council of Scientific and Industrial Research-Central Salt and Marine Chemical Research Institute, Bhavnagar, Gujarat by using Q2010 Gas Chromatography Mass Spectrometer (GC-2020 coupled with GC-MS QP-2010) equipped with an autosampler (AOC-5000) Shimadzu, Japan

2.4 IDENTIFICATION OF PHYTOCOMPONENTS:

Injection volume was 200µl and samples were run full in GC-MS apparatus and interpreton mass-spectrum using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown components was compared with the spectrum of known components stored in the NIST library. The name, molecular weight, and structure of the components of the test materials were ascertained.

III. RESULTS & DISCUSSION

The analysis and extraction of plant material play an important role in the development, modernization and quality control of herbal formulations. Hence the present study was aimed to find out the bioactive compounds present in the chloroform extract of *S. cylindrica*Bojer ex Hook. by using Gas chromatography and Mass spectroscopy. The active compounds with their peak number, concentration (peak area %), and retention time (RT) are presented in Table 3.1 and Fig. 1 which shows the presence of 24 bioactive phytochemical compounds in the chloroform extract of *S.cylindrica*Bojer ex Hook.with the retention time ranged between 16.65 to 19.68. Phthalic acid, di(2-propylpentyl) ester showed the highest peak area percentage with the value of 86.55% and 4-(4-Hydroxyphenyl)-4-methyl-2-pentanone showed the lowest peak area percentage of 1.36%. The previous literature supports that the identified compounds of *S.cylindrica*Bojer ex Hook**.**

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Table.3.1.Bioactive compounds of chloroform extract from *S. cylindrica*Bojer ex Hook. Leaf

S.No	Compound name	Molecular Formula	Molecular weight	Biological activity
1	4-(4-Hydroxyphenyl)-4-methyl-2-pentanone	$C_{15}H_{24}O_2Si$	264 g/mol	Antineoplastic (Cervical cancer), Antiinflammatory, Antidiabetic
2	Arsenous acid, tris(trimethylsilyl) ester	$C_9H_{27}AsO_3Si_3$	342g/mol	Antiviral, Antithyroid,Anticatract
3	Tetrasiloxane, decamethyl	$C_{10}H_{30}O_3Si4$	310g/mol	Antifungal,Antibacterial,Antileprosy
4	Tris(tert-butyldimethylsilyloxy)arsane	$C_{18}H_{45}AsO_3Si_3$	468 g/mol	Antineoplastic(Colon cancer), Antiulcerative, Antifungal
5	2,4,6-Cycloheptatrien-1-one, 3,5-bis-trimethylsilyl	$C_{13}H_{22}OSi_2$	250g/mol	Antineoplastic(liver,lung cancer), Bipolar disorder treatment,Antioxidant
6	9-Tricosene, (Z)-	$C_{23}H_{46}$	322g/mol	Antineurotic, Antifungal, Anticatract
7	Dichloroacetic acid, heptadecyl ester	$C_{19}H_{36}Cl_2O_2$	366 g/mol	Antiseptic,Antithyroid, Anticrcinogenic
8	Heptacos-1-ene	C27H54	378g/mol	Antiviral,Antituberculosic, Antileprosy
9	9-Hexacosene	C26H52	364 g/mol	Biliary tract disorders treatment, Antifibrinolytic, Anticarcinogenic
10	3-Eicosene, (E)-	C20H40	280 g/mol	Wound healing agent, Antifungal Phobic disorder treatment
11	Pentasiloxane, dodecamethyl-	$C_{12}H_{36}O_4Si_5$	384 g/mol	Nercolepsy treatment, Antiinflammatory, Antihematotoxic
12	2,6-Dihydroxyacetophenone, 2TMS derivative	$C_{14}H_{24}O_3Si_2$	296g/mol	Carminative, Antioxidant, Anticatract
13	Benzoic acid, 4-methyl-2-trimethylsilyloxy-, trimethylsilyl ester	$C_{14}H_{24}O_3Si_2$	296g/mol	Antiuremic,Anesthetic, Antihemorrhagic
14	Pentasiloxane, dodecamethyl-	$C_{12}H_{36}O_4Si_5$	384g/mol	Endocrine Cancer, Gaucher disease treatment,Antileprosy
15	Phthalic acid, di(2-propylpentyl) ester	$C_{24}H_{38}O_4$	390g/mol	Dementia treatment, Diabetic Nephropathy treatment, Cardioprotectant
16	Phthalic acid, di(6-methylhept-2-yl) ester	$C_{24}H_{38}O_4$	390g/mol	Antithrombotic, Antidiabetic, Antiseptic
17	Bis(2-ethylhexyl) phthalate	$C_{24}H_{38}O_4$	390 g/mol	Antithrombotic, Anticatract, Anesthetic
18	Phthalic acid, 6-ethyloct-3-yl 2-ethylhexyl ester	$C_{26}H_{42}O_4$	418g/mol	Antifungal,Anticatract, Gaucher disease treatment
19	Diisooctyl phthalate	$C_{24}H_{38}O_4$	390g/mol	Antioxidant,Antidiabetic, Antibacterial
20	Phthalic acid, 6-ethyl-3-octyl butyl ester	$C_{22}H_{34}O_4$	362 g/mol	Antiviral, Anticatract, Antiinflammatory
21	Phthalic acid, hept-4-yl isobutyl ester	$C_{19}H_{28}O_4$	320 g/mol	Antimicrobial, Antifungal
22	Phthalic acid, butyl 2-pentyl	$C_{17}H_{24}O_4$	292 g/mol	No activity reported

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	ester			
23	Phthalic acid, 2-ethylbutyl propyl ester	$C_{17}H_{24}O_4$	292 g/mol	Cardiotonic, Rheumatid arthritis treatment,carminative
24	Phthalic acid, cyclohexylisohexyl ester	$C_{17}H_{24}O_4$	304 g/mol	Antibacterial,Dimentiatreatment, Narcolepsy treatment

Diisooctyl phthalate possess antioxidant,antidiabetic, antibacterial activity (Shen*et al* 2019). Phthalic acid derivatives were suggested to have been used to cure chronic cardiovascular and cerebrovascular diseases and had anti-tumour, anti-inflammatory, antibacterial functions (Ge*et al* 2015). The anti-microbial activities were believed to be due to phthalic acid derivative Nakalembe and Kabasa (2012). According to Akpuaka et al. (2013), eicosene which is a fatty acid have antibacterial, antitumor and cytotoxic activities. Due to the presence of above mentioned compounds in the chloroform extract of *S.cylindrica*Bojer ex Hook.leaves, it can be used in various pharmaceutical and industrial applications.

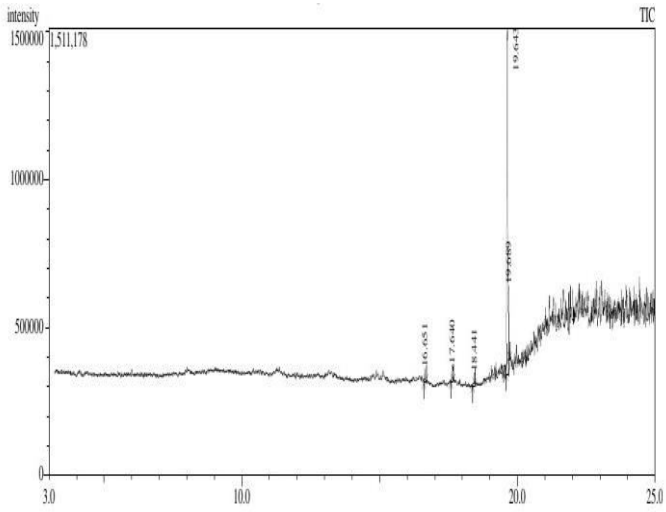

Fig.3.1 Chromatogram of the plant extract

IV. CONCLUSION

The demand in study of plants, which is one of the richest sources of promising versatile chemical compounds, is growing persistently throughout the world during the last few decades. Plant could play a great role in exploring new resources against the threats of new and recent diseases.The presence of these bioactive compounds as revealed by profiling of the chloroform extract of the leaves of *S.cylindrica*Bojer ex Hook., therefore, provides the scientific backings and validates the use of the plant in the practices of herbal medicine.

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| DOI:10.15680/IJIRSET.2022.1101076 |

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