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DETERMINATION OF BIOLOGICALLY ACTIVE COPMOUNDS FROM LEAVES EXTRACT OF *Sansevieria roxburghiana*

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ABSTRACT

Medicinal plants are an important source of high-quality medicines for thousands of years. Phytochemicals are chemicals extracted from plants. These organic chemicals are classified as primary or secondary components, depending on their role in plant metabolism. The GC-MS method used to analyze the resulting extracts can be an interesting tool for testing the amount of specific active ingredients in herbs used in various industries. The purpose of this study was to identify bioactive compounds from ethanol extracts from the leaves of the *Sansevieria roxburghiana* plant by gas chromatography and mass spectrometry (GC-MS). GCMS analysis of ethanol extracts was performed by standard protocol using Perkin-Elmer gas chromatography– mass spectrometry, and the mass spectra of the compounds contained in the extracts were consistent with the National Institute of Standards and Technology (NIST). GC-MS analysis revealed the existence of various compounds such as Hexadecanoic acid, Tetradecanal, Hexadecane, 1-Octadecanol, Benzaldehyde, 2-nitro, 1-Heptadecanol, 3,7,11,15-tetramethyl, 2-Hexadecen-1-ol, 9,12 Octadecadienoic acid and 9-Octadecenoic acid of *Sansevieria roxburghiana* leaves extract (SRLE). These outcomes provision the traditional use of *Sansevieria roxburghiana* leaves in various disorders.

KEYWORDS: *Sansevieria roxburghiana* ,Gas chromatography and Mass spectroscopy, Phytochemistry.

INTRODUCTION

Medicinal plants have been an important source of high-quality medicines for thousands of years. Plants are used medicinally in different countries and are the origin of many powerful and powerful medicines. It is used as a popular folk medicine, mainly in traditional treatments such as historical herbs (Sathyaprabha *et al*, 2010)). It has been demonstrated that in vitro screening methods can provide the preliminary observations necessary to select biophyte extracts with potentially useful properties for further chemical and pharmacological studies (Mathekaga and Meyer, 1998).

Phytochemistry or plant chemistry has developed in recent years as a separate field somewhere between the organic chemistry of natural products and plant biochemistry, and is closely related to both. Focusing on the vast variety of organic substances produced and accumulated by plants, we discuss the chemical structure of these substances, their biosynthesis, their regeneration and metabolism, their natural distribution, and their biological functions. (Harborne, 1986)). Phytochemicals are chemicals extracted from plants. These organic chemicals are classified as primary or secondary components, depending on their role in plant metabolism. Primary components include nucleic acids, common sugars such as chlorophyll, amino acids, proteins, purines, and pyrimidines. Secondary components are the remaining phytochemicals such as alkaloids (amino acid derivatives), terpenes (a group of lipids), phenolic compounds (carbohydrate derivatives) (Liu, 2004)). Plants produce these chemicals to protect themselves, but recent research has shown that this focuses on most plant sources of compounds that prevent and prevent these diseases. I am. As research further reveals the significant benefits of phytochemicals, their true nutritional role is likely to increase every day (Hamburger and Hostettmann, 1991)). Over the past decade, many remarkable advances have been made in analytical technology including TLC, UV, NMR and GC-MS that were powerful tools for separation, identification and structural determination of phytochemicals (Roberts and Xia, 1995).

Gas chromatography-mass spectrometry, a highly compatible technique and the most commonly used technique for the identification and quantification of biochemical components of medicinal plants, hyphen system (Ronald Hites, 1997). Medicinal plants were selected as, i.e *Sansevieria roxburghiana* leaves belongs to Agavaceae Family. *Sansevieria roxburghiana* leaves is widely distributed in southern India and Sri Lanka. The aim of this study is to determine the biologically active compounds present in the SRLE with the aid of GC-MS Technique.

MATERIAL METHODS

Collection of plant materials

The \ *Sansevieria roxburghiana* leaves were collected from Ariyalur, Tamil Nadu, India from a herb. The plant were identified and authenticated by Dr. S. John Britto, The 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.

Preparation of leaf extract

The collected *Sansevieria roxburghiana* leaves were washed several times with distilled water to remove the traces of impurities from the leaves. Then examined carefully old, infected and fungus damaged portion of the leaves were removed. Healthy leaves were spread out in a plain paper and shade dried at room

temperature for about 10 days and ground in to fine powder using mechanical grinder. The powder was extracted with ethanol for 24 hours. A semi solid extract was obtained after complete elimination of alcohol under reduced pressure. The *Sansevieria roxburghiana* leaves extract was stored in refrigerator until used.

GC –MS analysis

GC MS analysis was carried out on Shimadzu 2010 plus comprising a AOC-20i auto sampler and gas chromatograph interfaced to a mass spectrometer instrument employing the following conditions: column RTX 5Ms (Column diameter is 0..32 mm, column length is 30 m, column thickness 0.50 µm), operating in electron impact mode at 70eV; Helium gas (99.999%) was used as carrier gas at a constant flow of 1.73 ml /min and an injection volume of 0.5 µI was employed (split ratio of 10:1) injector temperature 270 ºC; ion-source temperature 200 ºC. The oven temperature was programmed from 40 ºC (isothermal for 2 min), with an increase of 8ºC/min, to 150ºC, then 8ºC/min to 250ºC, ending with a 20min isothermal at 280ºC. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds and fragments from 40 to 450 Da. Total GC running time is 51.25 min. The relative percentage 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 Turbo Mass Ver 5.2.0 (Srinivasan *et al*., 2013).

Identification of components

Interpretation on GCMS 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 (Dr. Dukes, 2013).

RESULT AND DISCUSSION

Gas chromatography – mass spectrometry (GC-MS) is a method of combining the properties of gas-liquid chromatography and mass spectrometry to identify different substances in a test sample (Kell et al, 2005)). In recent years, GC-MS has firmly established itself as an important technology platform for secondary metabolite profiling of plant and non-plant species (Fernie et al, 2004)). Plants have an almost unlimited ability to synthesize aromatic substances, most of which are phenols or their oxygen-substituted derivatives. Most are secondary metabolites, of which at least 12,000 have been isolated and are estimated to account for less than 10% of the total. These substances act as a defense mechanism for plants against insects and herbivores. Flavonoids exhibit several biological effects, including anti-inflammatory, anti-fungal, anti-hepatotoxic, and anti-ulcer effects (De-Fatima et al, 2006)). Interpretation of the mass spectrum GC-MS was performed using the National Laboratory Standard Technology (NIST) database of over 62,000 models. The spectra of unknown components were compared to the spectra of known components stored in the NIST library. The name, molecular weight, and component structure of the test material were determined.

Twenty compounds were identified in *Sansevieria roxburghiana* leaves by GC-MS analysis. The active principles with their retention time (RT), molecular formula, molecular weight (MW) and concentration (%) are presented in (Table 1 and Figure 1). The prevailing compounds were Hexadecanoic acid, Tetradecanal, Hexadecane, 1-Octadecanol, Benzaldehyde, 2-nitro, 1-Heptadecanol, 3,7,11,15-tetramethyl, 2-Hexadecen-1-ol, 9,12 Octadecadienoic acid and 9-Octadecenoic acid.

The biological activities of identified compounds were listed (Table 2) are based on Dr. Duke's Phytochemical and Ethnobotanical Databases by Dr. Jim Duke of the Agricultural Research Service/USDA.

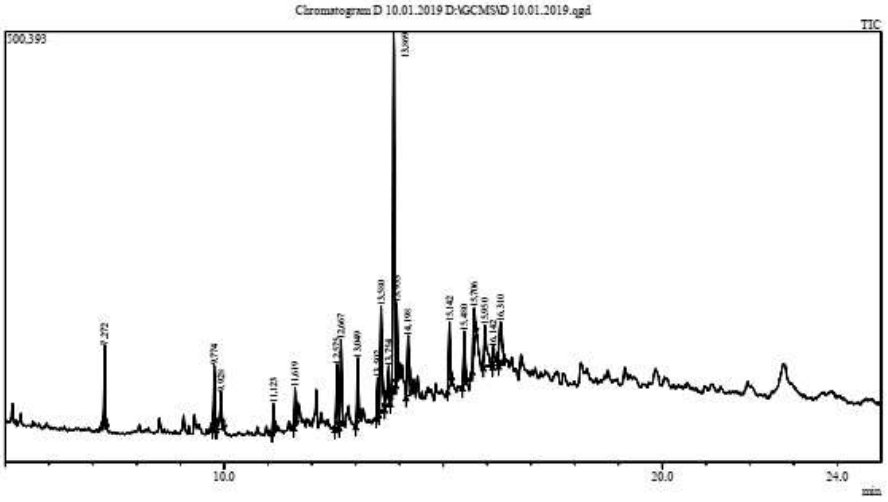

Figure 1: GC MS Chromatogram of *Sansevieria roxburghiana* leaves extract

Table1: Identification of bioactive compounds in ethanolic extract of *Sansevieria roxburghiana* leaves extract using GC MS

Peak#	R.Time	Area%	Molecular formula	Molecular weight	Molecular Name
1	7.272	3.72	$C_{13}H_{28}$	184	Tridecane
2	9.774	3.32	$C_{15}H_{32}$	212	Pentadecane
3	9.928	3.07	$C_7H_5NO_3$	151	Benzaldehyde, 2-nitro.
4	11.123	1.54	$C_{12}H_{26}$	170	Decane, 3,7-dimethyl
5	11.619	1.87	C_9H_{20}	128	Hexane, 2,4,4-trimethyl
6	12.575	4.56	$C_{14}H_{28}O$	212	Tetradecanal
7	12.667	5.18	$C_{13}H_{26}O$	198	2-Undecanone, 6,10-dimethyl
8	13.049	4.29	$C_{18}H_{38}O$	270	1-Octadecanol
9	13.502	2.03	$C_{14}H_{30}$	198	Decane, 2,3,5,8-tetramethyl
10	13.580	8.52	$C_{14}H_{22}N_2O$	234	Xycaine
11	13.754	3.43	$C_{20}H_{42}O_2$	314	Octadecane, 1,1-dimethoxy-
12	13.869	25.17	$C_{16}H_{32}O_2$	256	Hexadecanoic acid
13	13.933	4.53	$C_{16}H_{34}$	226	Hexadecane
14	14.198	5.08	$C_{18}H_{36}O_2$	284	Hexadecanoic acid, ethyl ester
15	15.142	3.97	$C_{17}H_{36}O$	256	1-Heptadecanol
16	15.480	3.89	$C_{20}H_{40}O$	296	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]
17	15.706	3.77	$C_{18}H_{32}O_2$	280	9,12-Octadecadienoic acid
18	15.950	4.64	$C_{18}H_{34}O_2$	282	9-Octadecenoic acid
19	16.142	2.52	$C_{13}H_{28}$	184	Decane, 2,3,4-Trimethyl
20	16.310	4.91	$C_{18}H_{36}O_2$	284	Hexadecanoic acid, ethyl ester

Table 2: Biological activity of phytocomponents identified in the ethanol leaf extract of *Sansevieria roxburghiana* leaves

S. No	Compound name	Biological activities
1	Benzaldehyde, 2-nitro	Antimicrobial activity.
2	Tetradecanal	Antioxidant, Lubricant, Hypercholeste rolemia, Cancer-preventive, Cosmetic Antibacterial activity

3	1-Octadecanol	Antibacterial, antioxidant, anticancer activity.
4	Hexadecanoic acid	Antioxidant, hypocholesterolemic , Anti androgenic , hemolytic, Alpha reductase inhibitor.
5	Hexadecane	Antimicrobial and antioxidant activity.
6	1-Heptadecanol	Antimalarial, antifungal, Antioxidant activity.
7	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl	Anti-cancer, Antioxidant, Anti-inflammatory, Diuretic, Cytotoxicity, Anti-microbial, Cancer preventive
8	9,12-Octadecadienoic acid	Anti-inflammatory, Hypocholesterolemic cancer preventive, hepatoprotective, nematicide, insectifuge, antihistaminic antieczemic, anticancer, 5-Alpha reeducates inhibitor, anti-androgenic, Anti-arthritic, anti-coronary.
9	9-Octadecenoic acid	Antihypertensive, Increase HDL and decrease LDL Cholesterol.

****Duke's. Phytochemical and Ethnobotanical Databases,www.ars-gov/cgi-bin/duke/, 2013.**

Among the identified phytochemicals hexadecanoic acid is suggested to be a fatty acid ester and it may employed as antioxidant, antimicrobial, flavor, hypocholesterolemic agent and larvicidal activities (Bodoprost and Rosemeyer, 2007; Falodun *et al*., 2009). 1, 2- benzenedicarboxylic acid, diisooctyl ester is a plasticizer compound and acts as antimicrobial and antifouling agent (Heinonen *et al*., 1998).

Compounds like n-hexadecanoic acid, 12-octadecanoic acid, dodecanoic acid, tetradecanoic acid, 1,2-Benzenedicarboxylic acid, dibutyl ester, hexadecanoic acid, ethyl ester and 9,12-octadecadienoic acid (Z,Z) were identified in the ethanolic leaf extract of *Vitex altissima*, a Verbenaceae member (Sathish *et al*., 2012). Likewise, hexadecane, dodecanoic acid, nonadecane, eicosane, tetradecanoic acid, oleic acid, heptacosane, 9,12- octadecenoic acid, ethyl ester; n-hexadecanoic acid; 1,2-benzenedicarboxylic acid and 9-octadecenoic acid (Z)-ethyl ester were reported in *Clerodendrum inerme* and *C. phlomidis* leaves (Anandhi and Ushadevi, 2013; Balaji and Kilimozhi, 2014).

CONCLUSION

The study concluded that the higher the extraction capacity of ethanol, the more active ingredients involved in many biological activities may have been produced. In order to use these in the development of traditional medicines, further research is needed to extract new active compounds from medicinal plants and create new ways to treat many incurable diseases.

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