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GC-MS analysis of diethyl ether extract of *Sauromatum venosum* (Aiton) Kunth leaves

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Abstract

This study explores the chemical profile of *Sauromatum venosum* (Aiton) Kunth leaves through Gas Chromatography- Mass Spectrometry (GC-MS) analysis. The leaves of *S. venosum* were subjected for extraction using diethyl ether solvent. The GC-MS analysis of the extract revealed the presence of 10 different phytocompounds. The prevailing bioactive compounds in the diethyl ether extract were Piperidine-1-carboxylic acid, 4-(5-hydroxy-4-methyl-2H-pyrazol-3-yl)-, ethyl ester (3.7303%), 3-(2-Benzyl-benzoimidazol-1-yl)-propane-1,2-diol (4.1074%), Silicic acid, diethyl bis (trimethylsilyl) ester (3.7648 %), Cyclotetrasiloxane, octamethyl- (3.9250%), 1H-[1,2,3]Triazole-4-carboxylic acid, 1-(4-dimethylamino-6-methoxy-[1,3,5]triazin-2-yl)-5-methyl-, ethyl ester (5.4439%), 3-Isopropoxy-1,1,1,5,5,5- hexamethyl-3- (trimethylsiloxy) trisiloxane (4.1720%), Cyclotrisiloxane, hexamethyl (4.2308%), Tris(tert-butyldimethylsilyloxy) arsane (4.0116%), Benzene, 1,2,3,5-tetramethyl-4,6-dinitro- (3.6856%) and 1,4-Bis (trimethylsilyl) benzene (3.8709%). The mass spectra of the compounds were compared with National Institute of Standards and Technology 14 (NIST 14) library database.

Keywords: *Sauromatum venosum* (Aiton) Kunth, Araceae, diethyl ether extract, GC-MS analysis.

1. Introduction

The *Sauromatum venosum* (Aiton) Kunth, commonly known as "Voodoo Lily", is a fascinating tuberous geophyte belonging to the Araceae family. This species is native to tropical regions of Africa, the Arabian Peninsula, the Indian Subcontinent, and extending to China and Myanmar [1]. The presence of *S. venosum* has been recorded in the Western ghats and Eastern Himalayan regions. It thrives in warm and typical humid climates of these regions.

Sauromatum venosum (Aiton) Kunth (Synonyms: *Sauromatum guttatum* Schott, *Arum venosum* Aiton, *Typhonium venosum* (Aiton) Hett. & P.C.Boyce) has been traditionally used in inflammation and wound healing [2**Error! Reference source not found.**].

Phytochemicals are the large number of secondary metabolites present in plants [**Error! Reference source not found.**]. Previous phytochemical studies of various extracts of *S. venosum* have reported presence of active phytoconstituents [4]. The studies on *S. venosum* revealed high antibacterial activity, as well as significant antioxidant activities [5].

The Gas chromatography–mass spectrometry (GC-MS) is a powerful analytical technique, used to identify components in a mixture and to determine purity of organic compound qualitatively and quantitatively. GC-MS is used to identify compounds with purity, also compounds that are present in least amount. [6] The present study was conducted to identify the phytocompounds present in the diethyl ether leaves extract of *S. venosum* using GC-MS analysis.

2. Methodology

Collection and identification of plant materials

The fresh leaves of the *Sauromatum venosum* (Aiton) Kunth were collected from the local sites of Mokhada, Palghar District. The plant species was authenticated and identified by the taxonomist Dr. A. N. Chandore, Department of Botany, Rayat Shikshan Sanstha's Arts, Science & Commerce College, Mokhada, Palghar (MS).

Preparation of Plant Extract

The fresh were properly washed in running tap water and allowed to dry in shade for few weeks at room temperature. The dried plant material was grinded and powdered form was prepared. The powdered sample was extracted with diethyl ether solvent overnight. The extract was filtered and concentrated for further analysis.

Gas chromatography- Mass spectrometry analysis.

The diethyl ether leaves extract was analyzed using Gas Chromatograph-Mass Spectrometry (GC-MS) technique. The GC-MS analysis of extract was performed with Shimadzu (Kyoto, Japan) GC-2010 plus equipment, which comprises the autoinjector (AOC-20i). The system was fused with an SH-RXI-5Sil MS capillary column (30 m × 0.25 mm ID × 0.25µm film thickness). The components were separated using Nitrogen (N_2) gas as carried gas with 64.1 cm/seconds of linear velocity and with a column flow rate of 2.71 mL/min. The injection temperature was set at 250°C with split injection mode (split ratio 45.0). The oven temperature was initially programmed to increase temperature from 110°C to 200°C at a rate of 10°C/min (held for 2 mins), further temperature increased to 280°C at a rate of 5°C/min (held for 9 mins). The ionization voltage was 70eV.

Identification of compounds

Interpretation of mass spectrum of GC-MS was carried out using National Institute Standard and Technique 14 library (NIST Version- Year 2014). The compounds were identified by comparing their relative retention times and mass spectra with those of known reference compounds.

3. Results and Discussion

The GC-MS chromatogram of diethyl ether leaves extract of *S. venosum* showing distinct peaks of identified compounds in Figure 1.

GC-MS analysis of diethyl ether leaves extract of *Sauromatum venosum* (Aiton) Kunth. reveals the presence of 10 different compounds with specific retention time (RT), molecular weight (g/mol), and concentration (% peak area) as shown in Table 1. Compounds were differentiated on the basis of % peak area. The 10 compounds identified were Piperidine-1-carboxylic acid, 4-(5-hydroxy-4-methyl-2H-pyrazol-3-yl)-, ethyl ester (3.7303%), 3-(2-Benzyl-benzoimidazol-1-yl)-propane-1,2-diol (4.1074%), Silicic acid, diethyl bis(trimethylsilyl) ester (3.7648 %), Cyclotetrasiloxane, octamethyl- (3.9250%), 1H-[1,2,3]Triazole-4-carboxylic acid, 1-(4-dimethylamino-6-methoxy-[1,3,5]triazin-2-yl)-5-methyl-, ethyl ester (5.4439%), 3-Isopropoxy-

1,1,1,5,5,5-hexamethyl-3-(trimethylsiloxy)trisiloxane (4.1720%), Cyclotrisiloxane, hexamethyl (4.2308%), Tris(tert-butyldimethylsilyloxy) arsane (4.0116%), Benzene, 1,2,3,5-tetramethyl-4,6-dinitro- (3.6856%) and 1,4-Bis (trimethylsilyl) benzene (3.8709%).

In Table 1, the results shown that 1H-[1,2,3]Triazole-4-carboxylic acid, 1-(4-dimethylamino-6-methoxy-[1,3,5]triazin-2-yl)-5-methyl-, ethyl ester is present in maximum amount in the extract with RT: 31.635 mins and a % peak area: 5.4439 %.

The identified bioactive compounds isolated from diethyl ether leaves extract of *S. venosum* by GC-MS analysis were listed in Table 2, along with their molecular formula, biological activity and chemical structures.

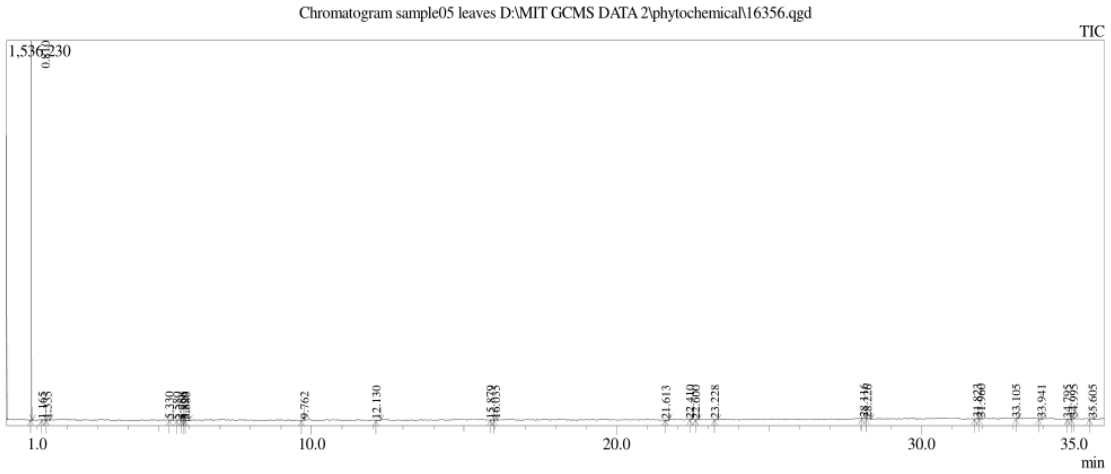
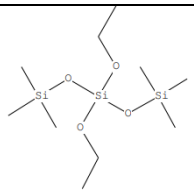
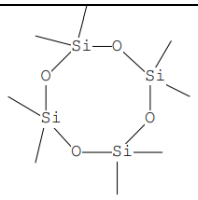
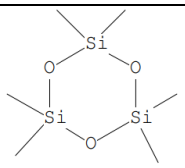
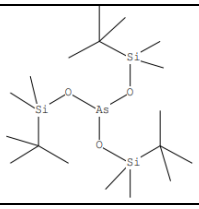


Figure 1: GC-MS chromatogram showing peaks of identified compounds in the diethyl ether leaves extract of *Sauromatum venosum*

Table 1. Phytocompounds identified in the diethyl ether leaves extract of *Sauromatum venosum* by GC-MS analysis.

Sr. No	R.T. (min)	Name of the Compound	Molecular Formula	Molecular weight (g/mol)	Peak Area %
1.	25.977	Piperidine-1-carboxylic acid, 4-(5-hydroxy-4-methyl-2H-pyrazol-3-yl)-, ethyl ester	$C_{17}H_{23}N_3O_3$	317.4	3.7303
2.	30.541	3-(2-Benzyl-benzoimidazol-1-yl)-propane-1,2-diol	$C_{17}H_{18}N_2O_2$	282.34	4.1074
3.	31.288	Silicic acid, diethyl bis(trimethylsilyl) ester	$C_{10}H_{28}O_4Si_3$	296.59	3.7648
4.	31.503	Cyclotetrasiloxane, octamethyl-	$C_8H_{24}O_4Si4$	296.62	3.9250
5.	31.635	1H-[1,2,3]Triazole-4-carboxylic acid, 1-(4-dimethylamino-6-methoxy-[1,3,5]triazin-2-yl)-5-methyl-, ethyl ester	$C_{12}H_{17}N_7O_3$	307.31	5.4439
6.	32.530	3-Isopropoxy-1,1,1,5,5,5-hexamethyl-3-(trimethylsiloxy)trisiloxane	$C_{12}H_{34}O_4Si_4$	354.74	4.1720
7.	34.371	Cyclotrisiloxane, hexamethyl-	$C_6H_{18}O_3Si_3$	222.46	4.2308
8.	34.673	Tris(tert-butyldimethylsilyloxy)arsane	$C_{18}H_{45}AsO_3Si_3$	468.7	4.0116
9.	35.080	Benzene, 1,2,3,5-tetramethyl-4,6-dinitro-	$C_{10}H_{12}N_2O_4$	224.21	3.6856
10.	35.260	1,4-Bis(trimethylsilyl)benzene	$C_{12}H_{22}Si_2$	222.47	3.8709

Table 2. Compounds with their names, biological activity and chemical structure from GC-MS analysis of diethyl ether leaves extract of *Sauromatum venosum*.

Name of compound	Reported Biological activity	Chemical structure
Silicic acid, diethyl bis(trimethylsilyl) ester	Antioxidant,[Error! Reference source not found.] Antibacterial [Error! Reference source not found.]	
Cyclotetrasiloxane, octamethyl-	Antimicrobial, Antiseptic [Error! Reference source not found.]	
Cyclotrisiloxane, hexamethyl-	Antibacterial,[Error! Reference source not found.] Antimicrobial,[Error! Reference source not found.] Antidiabetic [Error! Reference source not found.]	
Tris(tert-butyldimethylsilyloxy)arsane	Antifungal, Antiulcerative, Antineoplastic [Error! Reference source not found.]	

The diethyl ether extract of *S. venosum* contains different bioactive compounds, some compounds exhibit a variety of biological activities reported in the previous studies. For instance, Silicic acid, diethyl bis(trimethylsilyl) ester is noted for antioxidant and antibacterial properties [7-8]. Cyclotetrasiloxane, octamethyl- contributes antimicrobial and antiseptic properties [9]. Cyclotrisiloxane, hexamethyl- contributes antibacterial, antimicrobial and antidiabetic properties [10-12]. Tris (tert-butyldimethylsilyloxy) arsane contributes antifungal, antiulcerative and antineoplastic properties [13].

Conclusion

The GC-MS is a powerful and highly reliable technique, which can extract the compounds in their pure form. This study has focused on the plant *S. venosum*, exploring its GC-MS profile and biological activities. Through GC-MS analysis, our study confirms the presence of 10 phytochemical compounds known for their various biological activities. These results underscore the medicinal potential of plant to be a potent source of bioactive compounds. Analysis data about the chemical composition of *S. venosum* can be useful for future drug development. Further investigation of the bioactive compounds may lead to discovery of novel drugs.

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