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GC-MS analysis of bioactive constituents from coastal sand dune taxon: *Sauropus bacciformis*

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Abstract
Sauropus bacciformis is a coastal plant. The aerial parts of the plant is used as a green vegetable. The present investigation was carried out to determine the bioactive phytoconstituents in the methanol extracts of leaf and stem of *S. bacciformis*. The GC/MS analysis methanol extractive of leaf and stem was found to be value added. 10 compounds were identified in leaf extract and 4 compounds from stem. Squalene (27.30%), Tetradecane,1-iodo(17.06%), Dodecane,1-iodo(10.24%), Vitamin E acelate (6.83%) are the prevailing compounds in leaf extract and 1,2-Benzenedicarboxylic acid diisooctyl ester(95.68%)is the major phytoconstituents in stem extract of *Sauropus bacciformis*.

Keywords: GC-MS, squalene, *Sauropus bacciformis*, vitamin E acelate

Introduction
Plants are man's friend in survival, giving him food and fuel and medicine from the days beyond dawn of civilization. *Sauropus bacciformis* is commonly called Kuruvi Thengai, Thengai Keerai and it is used by the rural folk for medicinal purpose. They use the aerial parts as a green vegetable. The aerial parts of the plant is used against gastrointestinal problems. The plant paste is given with Piper betel orally (Muralidharan and Narasimhan, 2012) [2]. The plant is also used by the local people for skin diseases.

Materials and Methods
Collection and identification of plant material
Sauropus bacciformis was collected from Hare Island, Thoothukudi district, East Coastal Region, Tamil Nadu, India and botanical identity of the plant was authenticated by Botanical Survey of India (Southern Circle), Coimbatore. Voucher specimens were deposited in St. Mary's College Herbarium (SMCH), Thoothukudi.

Preparation of powder and extract
Fresh leaves and stem of *Sauropus bacciformis* were shade dried and pulverized to powder in a mechanical grinder (Anonymous, 1998) [1]. 25gm of powder (leaf and stem) were packed in Soxhlet apparatus and extracted with methanol. The extracts were evaporated using a rotary evaporator. The dried extracts were stored at 20C in vials for further studies.

GC-MS Analysis
GC-MS analysis of the extracts were carried out with GC-MS - Clarus 500 perkin Elmer system and Gas chromatograph interfaced to a mass spectrometer (GC-MS) employing following conditions: Column Elite-1 fused silica capillary column (30mm x 0.2mm ID x 1 f1mdf: composed of 100% Dimethyl poly silaxane) operating in electron impact mode at 70ev, Helium (99.999%) was used as a carrier gas at constant flow of 1ml/min and an injection volume of 0.5/p1 was employed (Split ratio of 10:1) injector temperature 250º C. Ion source temperature was 280º C. The oven temperature was programmed from 110º C (isothermal for 2 min) with an increase of 10º C/min to 200º C then 5C/min isothermal at 28º C. Mass spectra were taken at 70 eV; a scan interval of 0.5 seconds and fragments from 40 to 550 Da. Total GC running time was 36 min.

Characterization of compounds
Interpretation on mass spectra of GC-MS was conducted using the database of National Institute of Standard and Technology (NIST). The mass spectra of unknown compound was compared with the known components stored NIST - Library. The name, molecular weight and structure of the compounds of the test materials were ascertained (Table 1 and 2; Fig.1 and 2).

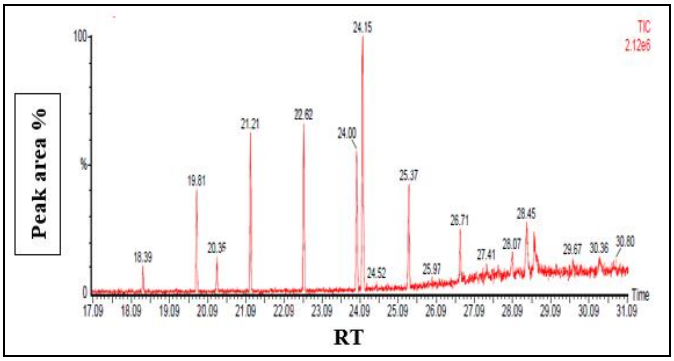

Fig 1: GC-MS Chromatogram of Methanol extract of leaves of *Sauropus bacciformis*

Table 1: Bioactive Components identified and their activity in Leaf Methanol extract of Sauropus bacciformis by GC MS study.

RT	Name of the compound	Molecular formula	MW	Peak Area %	***Activity
18.39	3 -hexanone,2,5-dimethyl	$C_8H_{16}O$	128	1.71	Antioxidant, Hypo cholesterolemic, Hemolytic,5-Alpha reductase inhibitor
19.81	Dodecane,1-iodo	$C_{12}H_{25}I$	296	10.24	Antimicrobial.
20.35	1,2-Benzenedicarboxylic acid,dipentyl ester	$C_{18}H_{26}O_4$	306	3.06	Antimicrobial, antifouling preservative.
21.21	1-iodoundecane	$C_{11}H_{26}O_4$	282	13.65	Antibacterial, Antiviral
22.62	Tetradecane,1-iodo	$C_{14}H_{29}I$	324	17.06	Antioxidant, Cancer preventive, Nematicide, Hypocholesterolemic.
24.15	Squalene	$C_{30}H_{50}$	410	27.30	Antibacterial, Antioxidant, Antitumour, Cancer preventive, Immuno stimulant, Chemopreventive.
25.37	1-iodoundecane	$C_{11}H_{23}I$	282	10.24	Hypocholesterolemic, 5-Alpha reductase inhibitor, Antiandrogenic.
26.71	Tetradecane,1-ioda	$C_{14}H_{29}I$	324	6.83	Antioxidant, Cancer preventive, Nematicide, Antiinlammatory, Antitumour.
28.45	Vitamin E acelate	C31H52O3	472	6.83	Anticancer, Antioxidant, Antiinflammatory.
28.65	2-(3-(4-tert Butyl phenoxy)-2hydroxy-propysulfany)-4,6,-dimethyl-nicotinonitrile	$C_{21}H_{26}N_2O_2S$	370	3.07	Antimicobial, Antioxidant, Antiinflammatory, Antiarthritic, Antiasthma.

*** ***Source*:** Dr. Duke's Phytochemical and Ethnobotanical database.

Table 2: Bioactive components identified and their activity in the methanol stem extract of *Sauropus bacciformis* [GC MS study].

RT	Name of the compound	Molecular formula	MW	Peak Area %	***Activity
20.38	1,2-benzenedicarboxylic acid diisooctyl ester	$C_{24}H_{38}O_4$	390	95.68	Antioxidant, Antimicrobial
21.25	Hexadecane	$C_{16}H_{34}$	226	0.62	Antioxidant, Hypocholesterolemic Antiandrogenic.
22.65	Heptane,2,2,3,3,5,6,6-heptamethyl-	$C_{14}H_{30}$	198	0.93	Antimicrobial, Antiinflammatory, Antiarthritic, Antiasthma.
24.20	Trideca-1,3,7,11-tetraene-1,1-dicarbonitrile,4,8,12-trimethyl-(E,E)	$C_{12}H_{24}N_2$	268	2.78	Antibacterial, Antioxidant, Antitumour, Cancer preventive.

*** ***Source*:** Dr. Duke's Phytochemical and Ethnobotanical database.

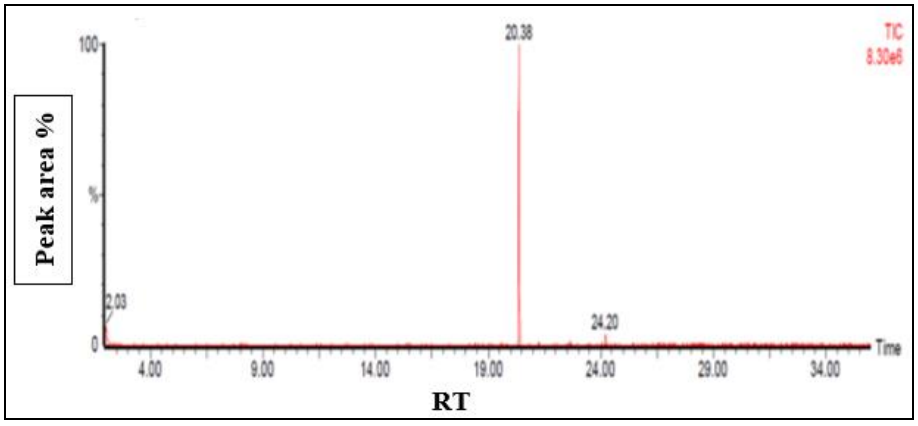

Fig 2: GC-MS Chromatogram of Methanol extract of stem of Sauropus bacciformis

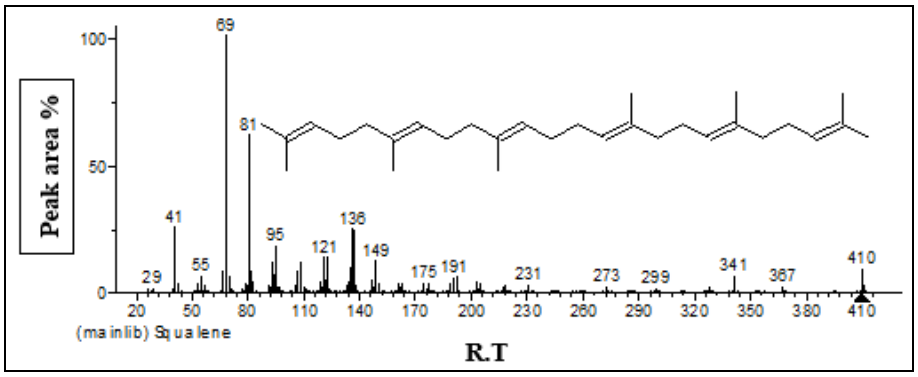

Fig 3(a): Mass spectrum of Squalene

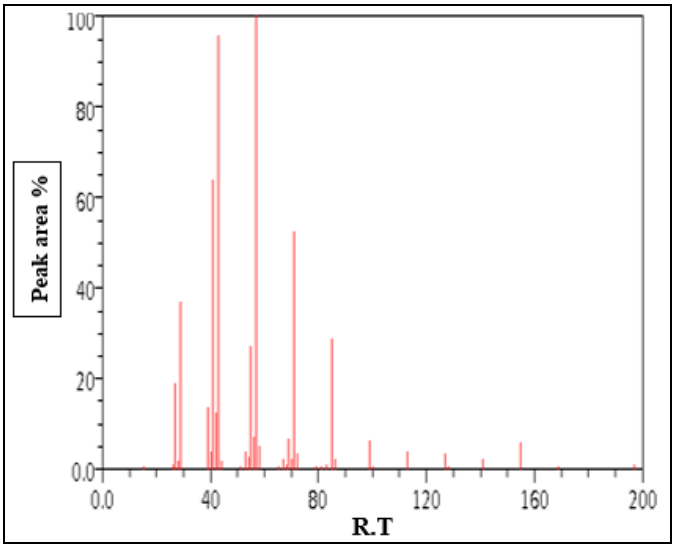

Fig 3(b): Mass spectrum of Tetradecane, 1-iodo

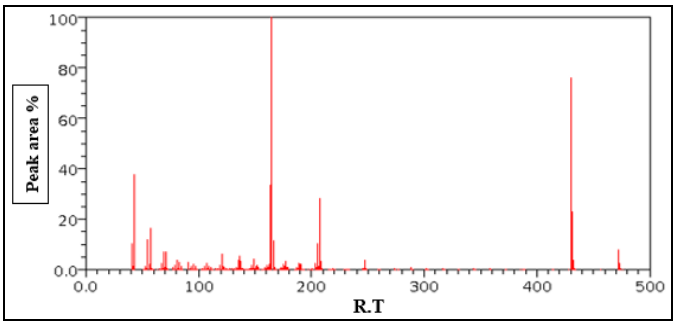

Fig 3(c): Mass spectrum of Vitamin E Acetate (Tocopheryl acetate)

GC-MS Mass spectrum of some compounds present in the stem methanolic extracts of *Sauropus bacciformis*

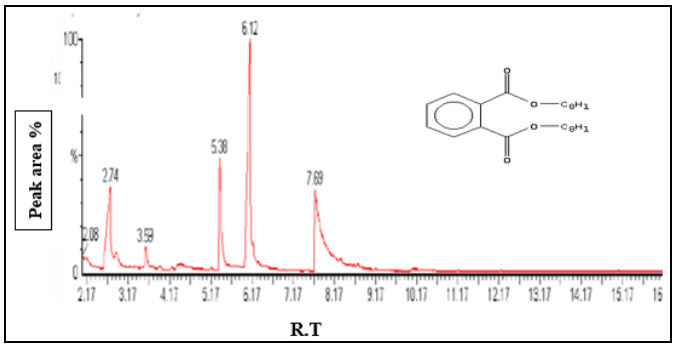

Fig 4(a): Mass spectrum of 1,2-Benzenedicarboxylic acid, diisooctyl ester

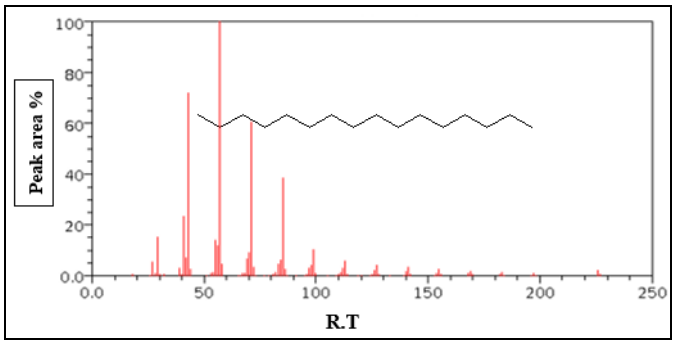

Fig 4(b): Mass spectrum of Hexadecane

Results and discussion

In GC-MS analysis carried out, ten compounds were identified from the leaf methanol extract of *Sauropus bacciformis*. The retention time (RT) and percentage peak of the bioactive compounds were presented in Table 1. The major phytoconstituents present in the leaf extract were Squalene (27.30%), Tetradecane, 1-iodo (17.06%), Dodecane, 1-iodo (10.24%), Vitamin E acelate (6.83%). (Fig 1) Squalene is a poly unsaturated hydrocarbon liquid. It appears to function in the skin, protecting human skin surface from lipid peroxidation due to exposure to UV and other source of ionizing radiation. In humans, squalene may be useful addition to potentiate the effect of some cholesterol lowering drugs. The primary therapeutic use of squalene currently is in adjunctive therapy in a variety of cancers (Smith, 2000).

In the GC-MS chromatogram of methanol extractive of stem, four compounds were identified. The compounds identified were 1,2 Benzenedicarboxylic acid diisooctyl ester (95.68%), Trideca-1,3,7,11-tetraene-1,1-dicarbonitrile,4,8,12-trimethyl-(E,E) (2.78%), Heptane,2,2,3,3,5,6,6-heptamethyl-(0.93%), Hexadecane (0.62%). These compounds were with retention life from 20.38 to 24.65. Peak area percentage was more than 50% for1, 2 Benzenedicarboxylic acid diisooctyl ester (Fig.2). The details of these bioactive compounds were given in Table 2.

Kala *et al*. (2011) [4] identified squalene have the property of antioxidant. Recently squalene possesses chemopreventive activity against colon carcinogenesis. Squalene is a hydrocarbon and a triterpene. It chemical however can being involved in the synthesis of cholesterol, steroid hormones and vitamin D in the human body and it is also able to protect human against cancer (Musa *et al*., 2012) [6]. The leaf extract was rich in Vitamin E. Vitamin E is the main lipid. Soluble antioxidant in the body. As antioxidant, Vitamin E acts in cell membrane where prevents the propagation of free radical reaction, although it has been also shows to have proxidant activity (Herrera and Barbas, 2001) [5]. It protects the skin from environmental pollution. It has a protecting action against UV radiation - although it cannot be classed as a sunscreen. It is an excellent moisturizer. It contains powerful anti-inflammatory action - and this can prevent the signs of premature ageing, as inflammatory conditions in the skin is a leading cause of skin ageing. It has excellent wound healing properties. (www.oskiakincare.com) Squalene, Tetradecane, 1-iodo, Dodecane, 1-iodo, Vitamin E acelate, 1, 2 Benzenedicarboxylic acid diisooctyl ester, Trideca-1,3,7,11-tetraene-1,1-dicarbonitrile,4,8,12-trimethyl-(E,E), Heptane, 2,2,3,3,5,6,6-heptamethyl-,Hexadecane compounds are with antioxidant propertie (Dr. Duke's phytochemical and Ethnobotanical Databases).

Conclusion

In the present study, 10 compounds and 4 compounds were identified from methanol extracts leaf and stem of *Sauropus bacciformis* respectively by Gas Chromatography - Mass Spectrometry (GC-MS) analysis. The presence of various bioactive compounds justifies the use of the whole plant for various ailments by traditional practitioners. However, subjecting it to pharmacological activity will definitely give fruitful results.

Acknowledgement

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References

1. Anonymous. Quality control methods for medicinal plant materials, WHO Press, World Health Organisation, Switzerland, 1998.
2. Muralidharan R, Narasimhan D. Ethnomedicinal plants used against gastrointestinal problem in Gingee hills of Villupuram District, Tamil Nadu. Journal of Applied Pharmaceutical Science, 2012; 2(10):123-125.
3. Smith TJ, Squalene. potential chemopreventive agent. Expert opinion on Investigational Drugs. 9(8):1841-1848.
4. Kala SMJ, Balasubramanian T, Tresina Soris, VR Mohan. GC-MS determination of bioactive components of *Eugenia singampattiana* Bedd. Int. J Chem. Tech. Res. 2011; 3:1534-1537.
5. Harrera E, Barbas C. Facultad de Ciencias Experimentales Technicas, Universidad San Pablo CEU, Boadilla del Monte, Madrid, Spain. Cherrera @ ceu.es. J Physiol. Biochem. 2001; 57(2):42-56.
6. Musakeshavarz, Abdul-Reza Dabbagh. Compositions in the leaves extract, *Avicennia marina* Forssk. from Bander -e Kamair Southern Coast of Iran, American Journal of Scientific Research**,** 2012; 45:85-89.