



GC-MS ANALYSIS OF ETHYL ACETATE EXTRACT OF *SEMECARPUS ANACARDIUM* NUTS

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ABSTRACTS

In present investigation phytochemical compounds of *Semecarpus anacardium* nuts using GC-MS technique was carried out to determine the structure of phytochemicals present in it. The mass spectra of the phytocompounds found was matched with the National Institute of Standards and Technology library. Dried SA nut was successively extracted with petroleum ether, ethyl acetate, methanol and water using

soxhlet apparatus. This extracts was purified and stored in refrigerator. The ethyl acetate extract of SA nuts was analyzed by Agilent 7890A GC with 5975MS. Nine compounds were indentified ie benzoic acid, 4-ethoxy ethyl ester, phenol. 2,4- bis (1,1-dimethyl), Eicosane, 7-hexyl. The compounds were identified by comparing their retention time and peak area with literature and structure determination was done by interpretation of mass spectra. Present investigation by GC-MS analysis of ethyl acetate extract of SA is done.

Abbreviation

SA = *Semecarpus anacardium*

GC-MS = Gas Chromatography Mass Spectroscopy

TLC = Thin layer Chromatography

NIST =National Institute Standard and Technology

TDA =Toluene-diamine

EI = Electron Ionization

PCI = Positive Chemical Ionization

NCI = Negative Chemical Ionization

RT = Retention Time

MF = Molecular Formula

MW = Molecular Weight

amu = atomic mass unit

KEY WORDS: Bhilwa, Phytochemical, Herbal medicine, Anacardiaceae

INTRODUCTION

Semecarpus anacardium (SA) belongs to Anacardiaceae family commonly known as bhallataka or marking nut.^[1] SA nuts are used in the Ayurveda and Siddha systems of medicine, with various therapeutic properties such as anti-atherogenic effect^[2], anti-inflammatory^[3], anti-oxidant^[4], anti-microbial^[5], CNS^[6], hypoglycemic^[7], anticarcinogenic^[8], hyperlipidemic activity.^[9] Reported constituent of SA seeds are blilawanol, anacardoside, in fruits are nicotinic acid, riboflavin, thiamine, arginine, histidine, isoleucine, leucine, lysine, methionene, pheynylanine, threonine, tryptophan, valine, in nuts are tetrahydroamentoflavone, biflanoids A, B, C, 3, 8- binaringenin, 3,8-biliquiritigeninnn, nallaflavanone, oil are anacardiac acid, cardol and catechol.^[10-13] The medicinal properties of this plant were attributed due to its variety of active phytochemical constituent. Although the plant had received a great interest for the phytochemical investigation since many years Various parts of SA were investigated mainly for the presence of major types of phytochemical compounds. Hence the objective of the present study is due to identify the phytochemical constituent of the ethyl acetate extract with the aid of GC-MS technique and to correct the activities with the active constituent present.

MATERIAL AND METHODS

Collection of plant materials

The nuts of SA was collected during the month of September from the tribal area of Ambikapur (Wadrafnagar, Madhna) Chhattisgarh India. The plant was taxonomically identified by Professor Dr. K. P. Sahu, Botony Department, Govt. Model Science College, Jabalpur.

Preparation of extracts Organic solvent of increasing polarity were used extraction according to the methodology of Indian pharmacopoeia.^[14] Dried SA nut was successively extracted with petroleum ether, ethyl acetate, methanol and water using soxhlet apparatus. This extracts was purified and stored in refrigerator.

GC-MS analysis of material

Instruments Agilent 5975C TDA series gas chromatography/mass spectroscopy selective detector system offer high performance and flexibility with many options. Gas chromatograph Agilent 7890 A is the auto sampler, oven temperature is ambient +4-450⁰C and 20/21 negative ramps allowed and mass selective detector includes standard mode- EI, optional mode-PCI, NCI and EI acquisition with CI source, EI Ion source type-non coated inert EI source, Ion source temperature-150⁰C to 350⁰C, Quadruple temperature-106-200⁰C, mass filter-monolithic hyperbolic quadrupole, minimum mass- 1.6 μ , maximum mass - 1050 μ , mass axis stability-better than 0.10 μ /48h, detector-triple axis.

Method of GC-MS analysis and chromatographic condition Crude ethyl acetate extract (1 μ l) of SA nut was used in GC-MS analysis. GC-MS of ethyl acetate extract was performed using Agilent 7890A. Column used on Agilent (5975C MS) 5% poly siloxane column 30 \times 250 μ m \times 0.25 μ m size. Oven temperature was programmed as follows: Isothermal temperature was 5⁰C/min and held for 1.75 min then increased to 275⁰C at the rate of 8⁰C/min and kept constant for 5min. The run time was 25min. Ionization of sample components were performed on EI mode (70eV).

Identification of components Interpretation on mass spectrum GC-MS was done using the database of National Institute Standard and Technology (NIST). The spectrum of the NIST library. The name molecular weight and structure of the compounds of the ethyl acetate ascertained.

RESULTS AND DISCUSSION

GC-MS chromatogram of the ethyl acetate extract of SA nuts (Fig-1) showed nine peaks indicating the presence of nine compounds. The chemical compounds identified in the ethyl acetate extract of the nuts of SA are presented in Table-1. GC-MS analysis revealed the presence of benzoic acid, heptadecane 9 hexyl, octadecane 3-ethyl -5 (2-ethylbutyl), glucobrassicin, eicosane, 7- hexyl. Keeping in view the tremendous pharmacological activities of its constituent, SA is utilized to alleviate the symptoms of variety of diseases. Phenol 2,4 bis (1,1-dimethyl ethyl) has good antibacterial activity.^[15] The wide spread of availability and extensive literature of SA in India thus makes it an attractive target for further pre-clinical and clinical research. These compounds are repeated first time from GC-MS analysis of SA nuts ethyl acetate extract.



Sample ID: SA-EA-02

Instrument: Agilent 7890A GC
with 5975C MS system

Supervisor:

Column: HP-5

Method: General_1_HPS_80_DEG.M

Acquisition date: 27/05/14

Operator: IISERB-CIF-Mass Facility

Ionization: EI (70 eV)

MSD: Single Quad.

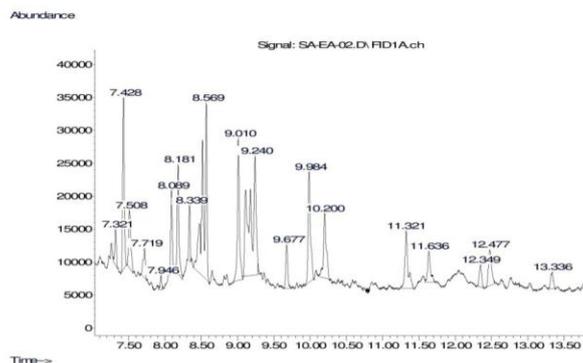


Fig:1. GC of SA nuts crude extract in ethyl acetate

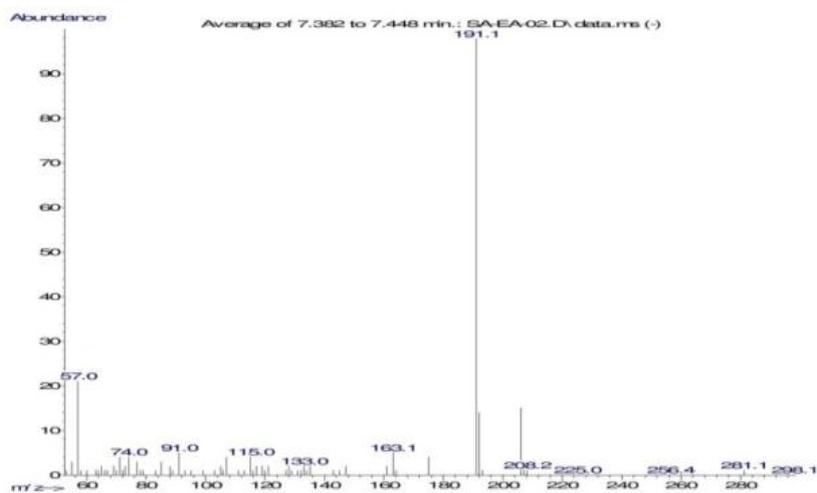


Fig1(a).MS of Phenol, 2,4-bis(1,1-dimethyl ethyl)

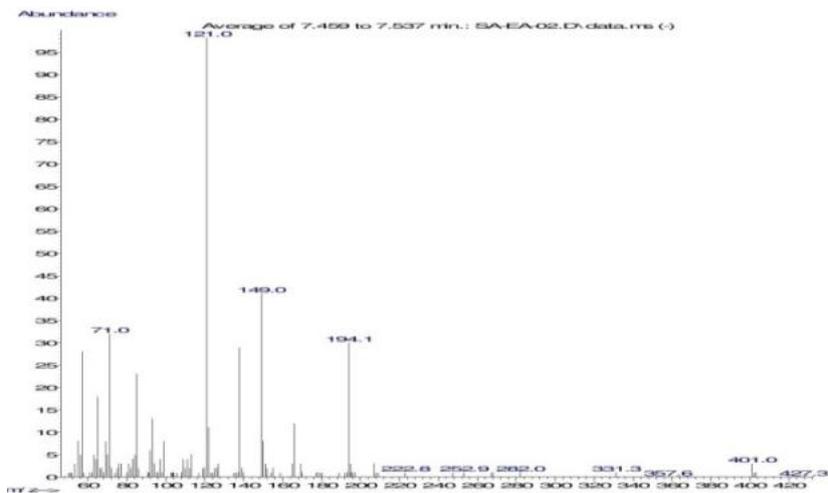
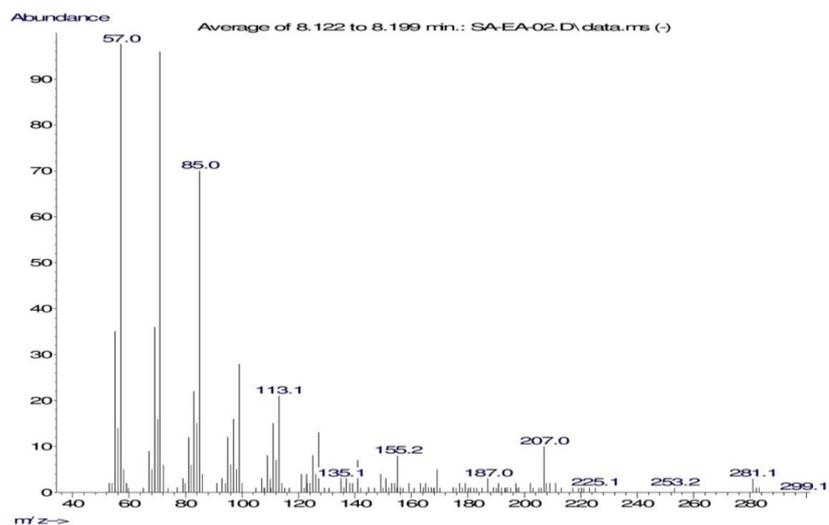
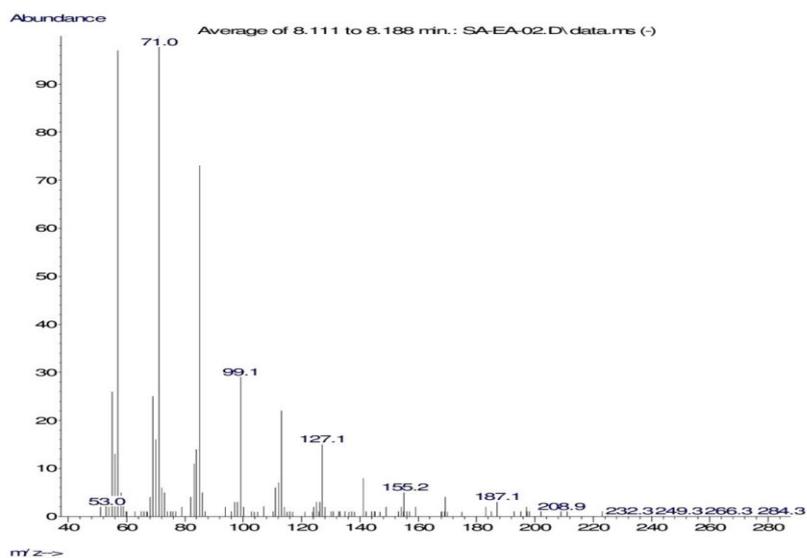
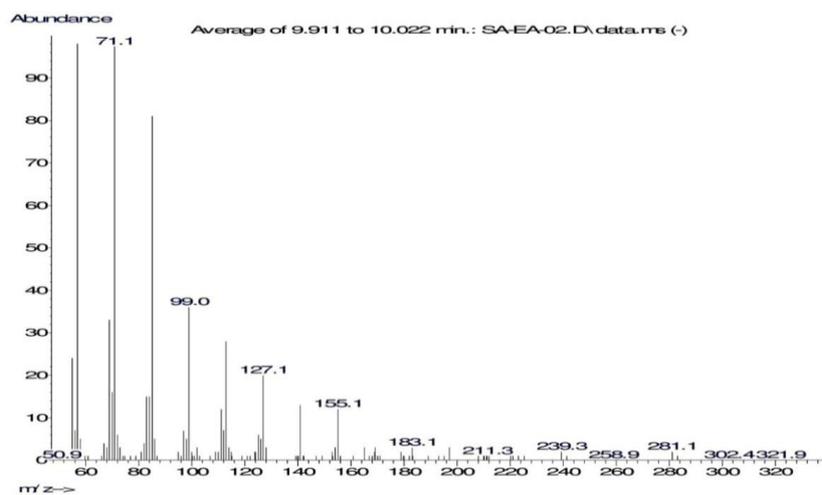


Fig 1(b). MS of Benzoic acid, 4-ethoxy-ethyl ester

**Fig 1(C). MS of Eicosane, 2-methyl****Fig 1(D): MS of Icosane****Fig 1(E): MS of Tetracosane**

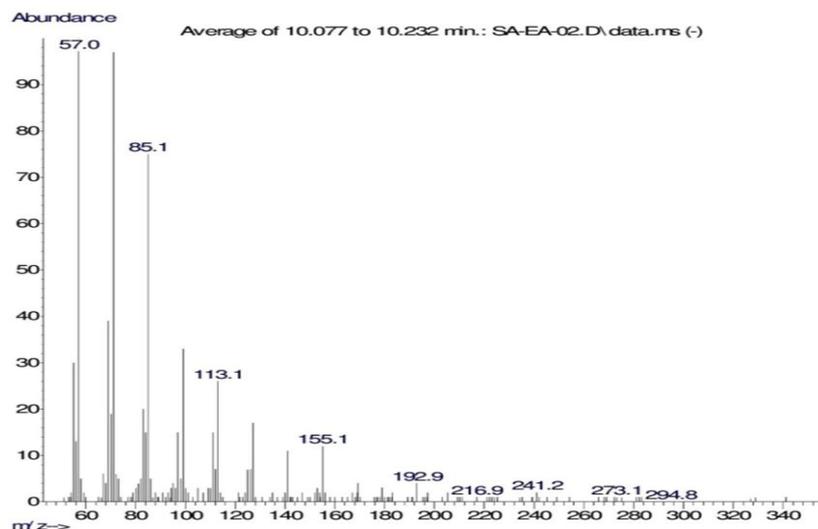


Fig 1(F). MS of Heptadecane, 9-hexyl

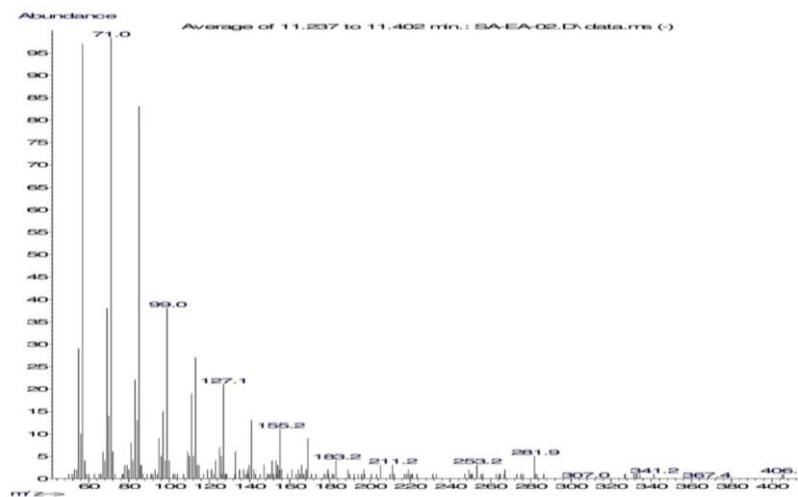


Fig 1 (G). MS of Octadecane, 3-ethyl-5(2-ethyl butyl)

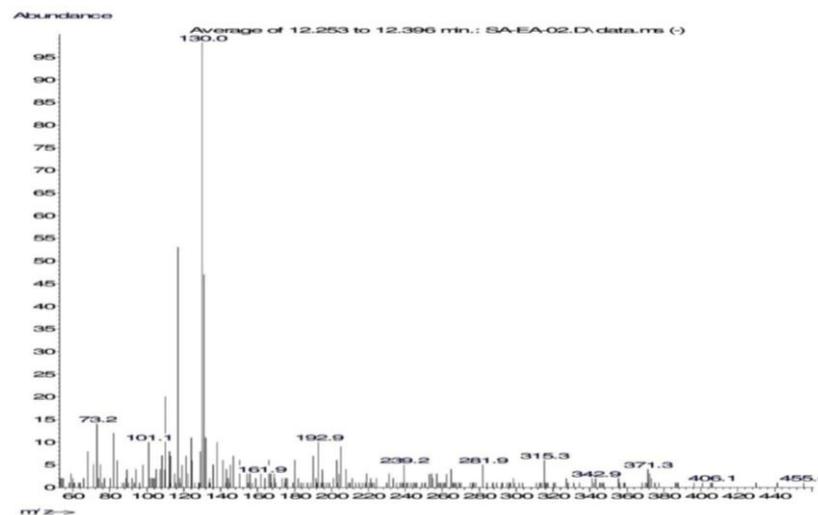


Fig 1 (h). MS of Glucobrassicin

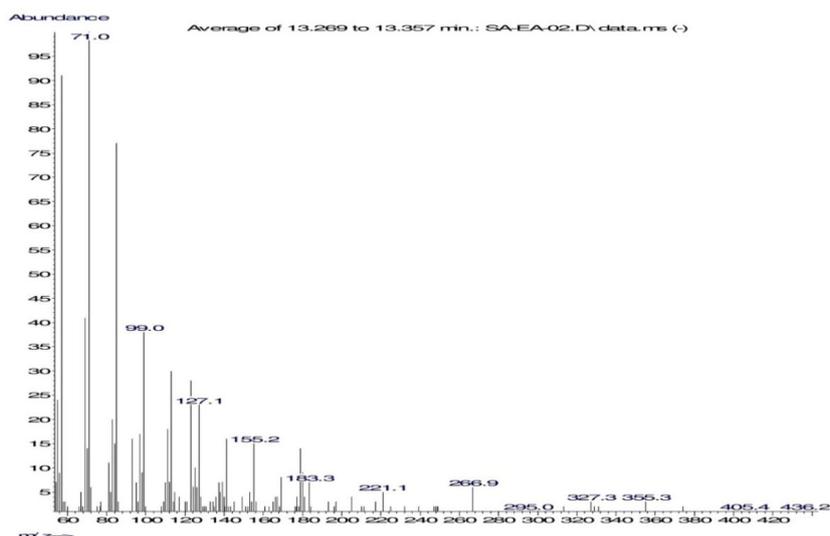


Fig 1 (I). MS of Eicosane, 7-Hexyl

Table 1: Phytochemicals identified in crude SA nuts extract in ethyl acetate of by GC-MS

S. No.	RT (In min.)	Name of the isolated compound	Molecular formula	MW (amu)	Peak % area
1	7.44	Phenol 2,4-bis (1,1-dimethylethyl)	C ₁₄ H ₂₂ O	206	7.79
2	7.53	Benzoic acid, 4-ethoxy- ethyl ester,	C ₁₁ H ₁₄ O ₃	194	3.60
3	8.14	Icosane	C ₂₀ H ₄₂	282	3.51
4	8.19	Eicosane, 2-methyl	C ₂₁ H ₄₄	296	5.32
5	9.98	Tetracosane	C ₂₄ H ₅₀	338	7.30
6	10.20	Hepatadecane,9-hexyl	C ₂₃ H ₄₈	324	5.19
7	11.32	Octadecane,3-ethyl-5- (2-ethyl butyl)	C ₂₆ H ₅₄	366	4.96
8	12.32	Glucobrassicin	C ₁₆ H ₂₀ N ₂ O ₉ S ₂	448	3.06
9	13.51	Eicosane, 7- hexyl	C ₂₆ H ₅₄	366	1.24

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