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GCMS EVALUATION OF BIOACTIVE COMPOUNDS FROM THE SEEDS OF *SPERMACOCE HISPIDA* LINN

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ABSTRACT

Spermacoce hispida is one of the vital plants belonging to the family of Rubiaceae and widely used in Siddha system of medicine. The plant has been widely studied for its phytochemical composition and a large number of active ingredients. The present study is focused on the chemical characterization of seeds of *Spermacoce hispida* by GCMS analysis. The bio active compounds of the seed extract such as compound name, respective retention time, structure and molecular weight of different compounds were identified by GC-MS. The GC-MS chromatogram of the methanolic extract of the seeds of *Spermacoce hispida* has twenty five peaks. It reveals that 9, 12-Octadecadienoic acid, ethyl ester (35.58%) was the major component followed by 9, 12-Octadecadienoic acid (Z, Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester(25.95)%. It also shows small amount of α-Tocopherol. This study reveals that seeds of *Spermacoce hispida* are a rich source of fatty acids as well as effective natural antioxidants.

KEYWORDS: *Spermacoce hispida*, GC-MS, antioxidant, fatty acid.

INTRODUCTION

India is a rich source of herbal medicine and their products can be used for human welfare. An impressive number of modern drugs have been isolated from natural sources; many of these isolations were based on the uses of the agents in traditional medicine. This plant-based, traditional medicine system continues to play an essential role in health care, with about 80%

of the world's inhabitants relying mainly on traditional medicines for their primary health care.[1] In recent days, maximum numbers of plants are screened for their potential pharmacological value. According to World Health Organization, medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated to better understand their properties, safety and efficacy.[2]

One of such plants with medicinal and a food value is *Spermacoce hispida* Linn. popularly known as 'nattaichuri' in Tamil and 'Shaggy button weed' in English and belongs to the family of Rubiaceae. The plant is widely distributed in the Western Ghats of Kerala and Maruthamalai forest of TamilNadu.[3] The whole plant is used for various medicinal properties. Seeds of *Spermacoce hispida* are crushed into paste and taken orally to treat stomach problems. The seed extract has been used as a remedy for curing internal injuries of nerves and kidney.[4] The plant is rich in flavonoids.[5] The plant exhibits various pharmacological activities like anti-inflammatory, analgesic, hypolipidemic, antidiabetic, antihypertensive, antifungal, anticancer and hepatoprotective activity.[6] The present study aims to investigate the presence of bioactive compounds of seeds of *spermacoce hispida* by GC-MS analysis.

MATERIALS AND METHODS

Collection of plant material

The seeds of *S. hispida* were collected from Kollimalai, TamilNadu. The dried seeds were made into coarse powder and were kept separately in an airtight container until use.

GC-MS Analysis

About 5g of seed powder of plant was taken in a flask and soaked in 25mL of 80% methanol. GC-MS was performed with GC Clarus 500 PerkinElmer equipment. Compounds were separated in Capillary Column Elite-5ms (5%Phenyl 95% dimethylpolysiloxane). The oven was programmed as 100˚C (3 min) - 300ºC @ 10ºC/min (10min). Samples were injected at a temperature of about 280˚C with a flow rate of Helium 1ml/min. Mass detector turbo mass gold-perkin Elmer was used as detector. The constituents were identified after comparison with those available in the computer library attached to the instrument and reported.

RESULT AND DISCUSSION

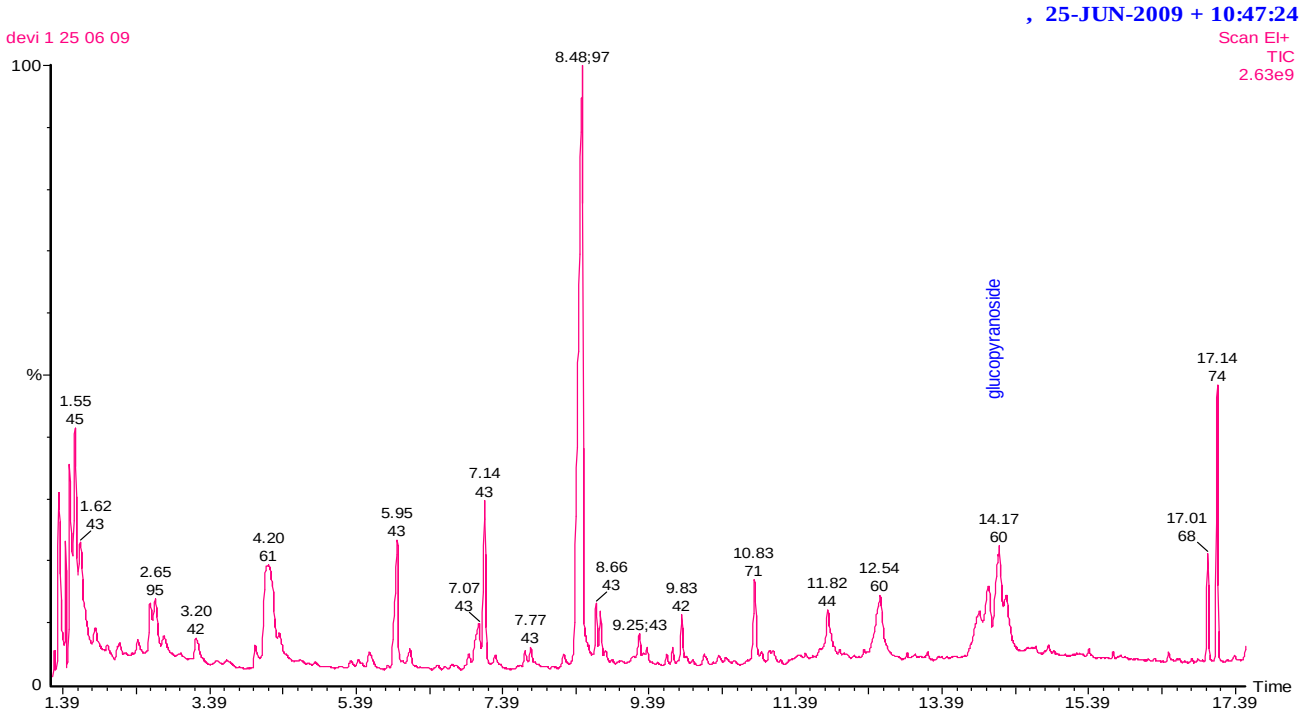
Chemical characterization of *Spermacoce hispida* was performed by GCMS analysis. Phytoconstituents like monoterpene compounds, hydrocarbons, ketones, aldehydes, esters,

etc., were carried out. The compound name, respective retention time, structure and molecular weight of different compounds identified by GC-MS are tabulated in the table.

The GC-MS chromatogram of the methanolic extract of the seeds of *spermacoce hispida* has twenty five peaks (Fig. 1). The compounds that showed the greater areas (%) were: 2-Furancarboxaldehyde, 5-(hydroxymethyl)-(7.21%); Hexadecanoic acid, ethyl ester (8.52%); 9,12-Octadecadienoic acid (Z,Z)-, methyl ester (4.68%); 9,12-Octadecadienoic acid, ethyl ester (35.58%); Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester (5.64%); 9,12-Octadecadienoic acid (Z,Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester (25.95%). 9,12-Octadecadienoic acid was the major fatty acid found in various ester forms such as methyl-ethyl ester, 2-hydroxy-1-(hydroxymethyl)ethyl ester, methyl ester and ethyl ester.

Fatty acids always occur in plants. Fatty acids in plants react with alcohols in an esterification reaction to form esters.[7] The constituent with the highest quantity in the seed was 9,12-Octadecadienoic acid ethyl ester having a composition of 35.58%. Unsaturated fatty acids are important to every cell in the body for normal growth, especially of the blood vessels and nerves and to keep the skin and other tissues youthful and supple trough their lubricating quality. [8] It is suggested that the seed extract of the plant remove signs of old age, purify blood and improves vitality and has been used by the tribals living in the forest regions of the Western Ghats of Kerala since ancient times.[6] The presence of unsaturated fatty acids may be the reason for the above.

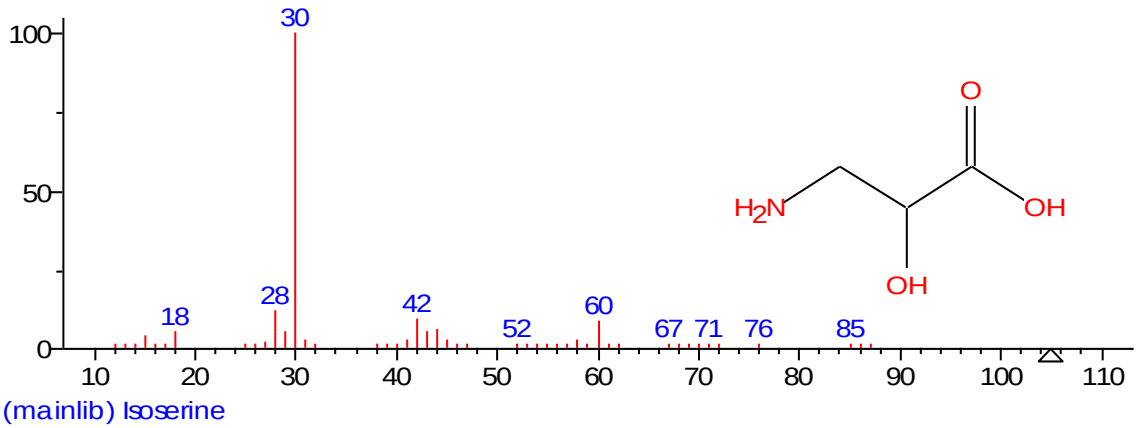
The GC-MS chromatogram of the seed extract of *Spermacoce Hispida* also shows certain amound of α-Tocopherol. α-Tocopherol, the most biologically active form of vitamin E, is the second-most common form of vitamin E in the diet. α-Tocopherol is an important lipid-soluble antioxidant. It performs its functions as antioxidant in the glutathione peroxidase pathway,[9]and it protects cell membranes from oxidation by reacting with lipid radicals produced in the lipid peroxidation chain reaction.[10,11] It helps improve our immunity levels, prevents memory loss, reduces signs of ageing, prevents hair problems, heart disease, cancer, etc and many other ailments. Therefore, diets incorporated with the seed flour should be recommended to people with such health problems. Hence the use of *Spermacoce hispida* seeds in food possesses no health problems but provides nutritional and medicinal benefits.



S.No.	Peak name	Retention time	Peak Area	%Peak Area
1	Name: Propanamide, 2-hydroxy- Formula: $C_3H_7NO_2$ MW: 89	1.49	25634662	1.0054
2	Name: Ethanamine, 2-propoxy- Formula: $C_5H_{13}NO$ MW: 103	1.62	41871636	1.6423
3	Name: Isoserine Formula: $C_3H_7NO_3$ MW: 105	2.41	3492354	0.1370
4	Name: Furfural Formula: $C_5H_4O_2$ MW: 96	2.65	15623930	0.6128
5	Name: 2-Propanone, 1,3-dihydroxy- Formula: $C_3H_6O_3$ MW: 90	3.21	8680139	0.3405
6	Name: 1,2,4-Cyclopentanetrione, 3-methyl- Formula: $C_6H_6O_3$ MW: 126	5.95	31797162	1.2472
7	Name: Glycylsarcosine Formula: $C_5H_{10}N_2O_3$ MW: 146	6.12	6643889	0.2606
8	Name: 2-Propanamine, N-methyl-N-nitroso- Formula: $C_4H_{10}N_2O$ MW: 102	6.93	3430017	0.1345
9	Name: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	7.14	31219252	1.2245

	Formula: $C_6H_8O_4$ MW: 144			
10	Name: 2-Furancarboxaldehyde, 5-(hydroxymethyl)- Formula: $C_6H_6O_3$ MW: 126	8.46	183846064	7.2108
11	Name: Benzeneacetaldehyde, à-ethyl- Formula: $C_{10}H_{12}O$ MW: 148	8.73	3431061	0.1346
12	Name: 6-Acetyl-á-d-mannose Formula: $C_8H_{14}O_7$ MW: 222	8.79	499861	0.0196
13	Name: 5-(Hydroxymethyl)-2-(dimethoxymethyl)furan Formula: $C_8H_{12}O_4$ MW: 172	9.36	4553867	0.1786
14	Name: à-D-Glucopyranoside, O-à-D-glucopyranosyl-(1.fwdarw.3)-á-D-fructofuranosyl Formula: $C_{18}H_{32}O_{16}$ MW: 504	9.51	345906	0.0136
15	Name: D-Glucose, 4-O-à-D-glucopyranosyl- Formula: $C_{12}H_{22}O_{11}$ MW: 342	9.71	1882633	0.0738
16	Name: N-Nitroso-2,4,4-trimethyloxazolidine Formula: $C_6H_{12}N_2O_2$MW: 144	9.83	8993256	0.3527
17	Name: Desulphosinigrin Formula: $C_{10}H_{17}NO_6S$ MW: 279	10.34	2224785	0.0873
18	Name: D-Allose Formula: $C_6H_{12}O_6$ MW: 180	12.54	36413180	1.4282
19	Name: Ethyl à-d-glucopyranoside Formula: $C_8H_{16}O_6$ MW: 208	14.16	48479632	1.9015
20	Name: Hexadecanoic acid, ethyl ester Formula: $C_{18}H_{36}O_2$ MW: 284	17.82	217460336	8.5293
21	Name: 2-Myristynoyl pantetheine Formula: $C_{25}H_{44}N_2O_5S$ MW: 484	18.75	5834657	0.2288
22	Name: 9,12-Octadecadienoic acid (Z,Z)-, methyl ester Formula: $C_{19}H_{34}O_2$ MW: 294	18.85	119409320	4.6835
23	Name: 9,12-Octadecadienoic acid, ethyl ester Formula: $C_{20}H_{36}O_2$	19.50	907313536	35.5868

	MW: 308			
22	Name: 2H-Benzo[f]oxireno[2,3-E]benzofuran-8(9H)-one, 9-[[[2-(dimethylamino)ethyl]amino]methyl]octahydro-2,5a-dimethyl- Formula: $C_{19}H_{32}N_2O_3$ MW: 336	22.02	14144983	0.5548
23	Name: Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester Formula: $C_{19}H_{38}O_4$ MW: 330	22.57	143946784	5.6459
24	Name: 9,12-Octadecadienoic acid (Z,Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester Formula: $C_{21}H_{38}O_4$ MW: 354	24.15	661630016	25.9506
25	Name: ç-Tocopherol Formula: $C_{28}H_{48}O_2$ MW: 416	28.07	20775994	0.8149
				100.000



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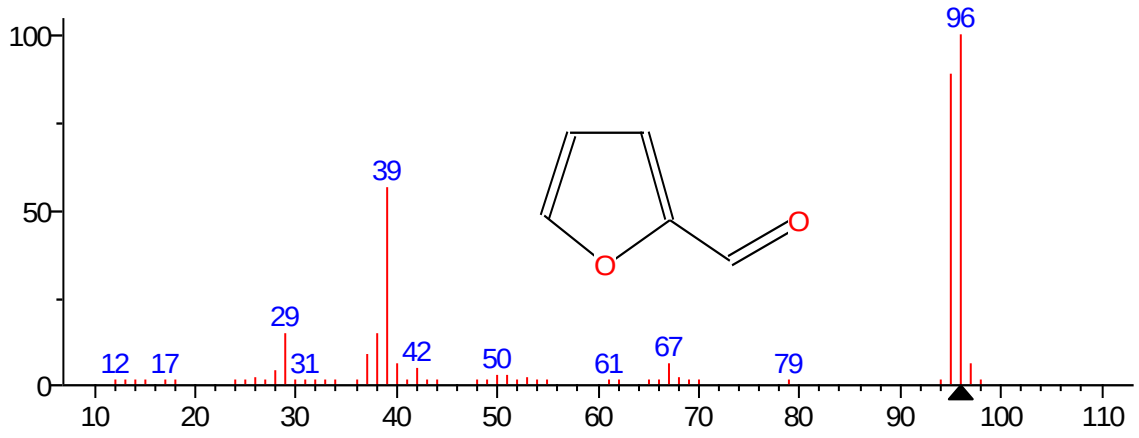

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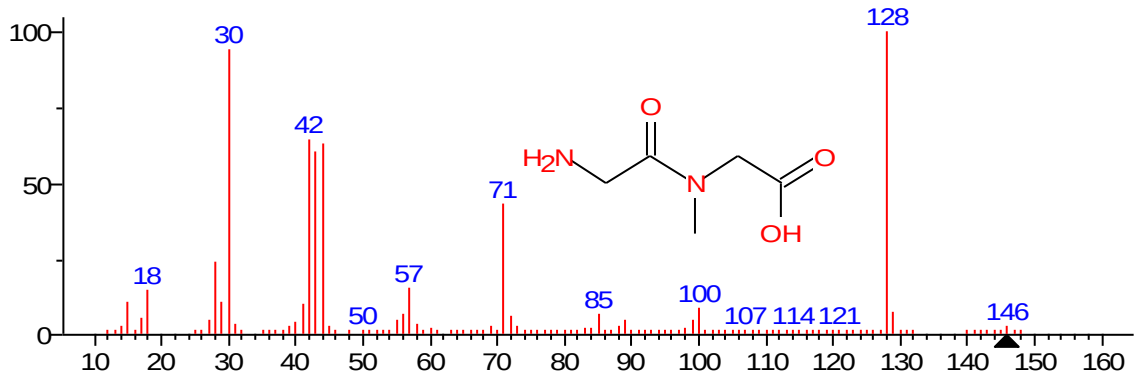

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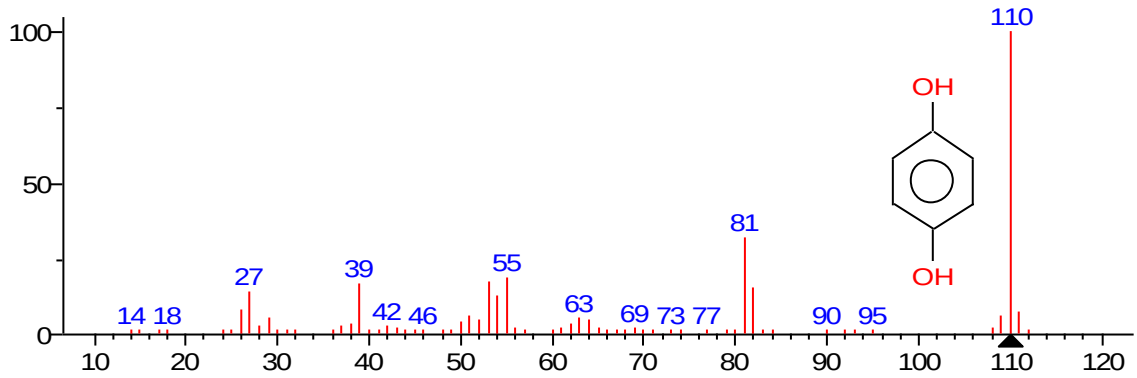

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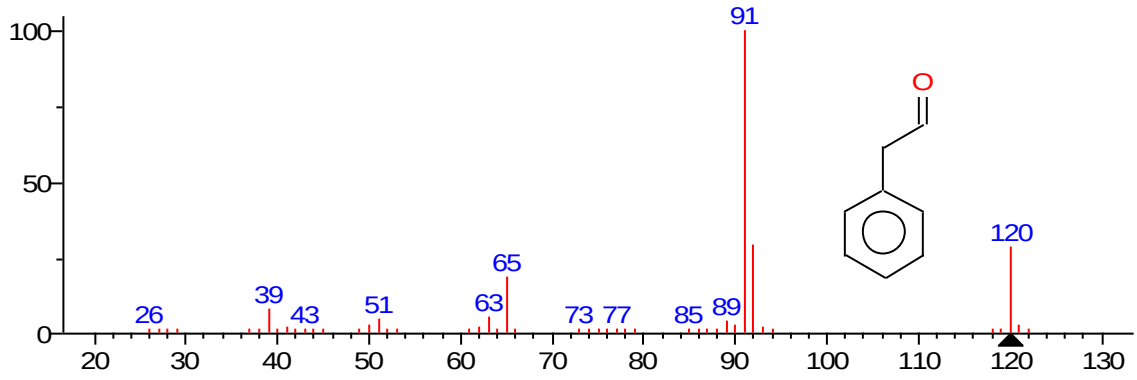
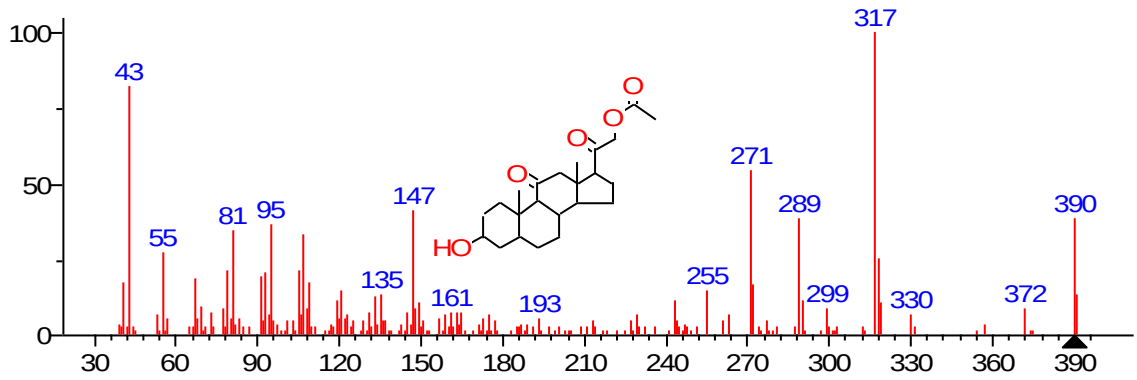
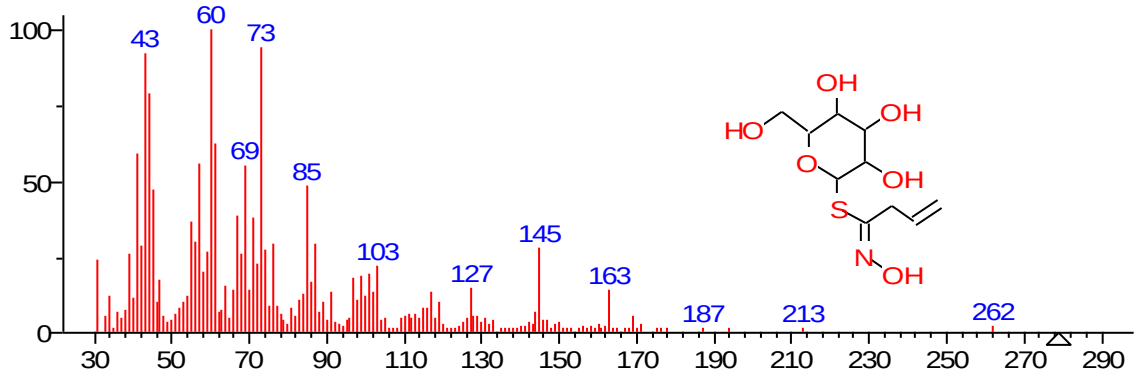


(mainlib) Benzeneacetaldehyde



(mainlib) Pregnane-11,20-dione, 21-(acetyloxy)-3-hydroxy-, (3à,5à)-



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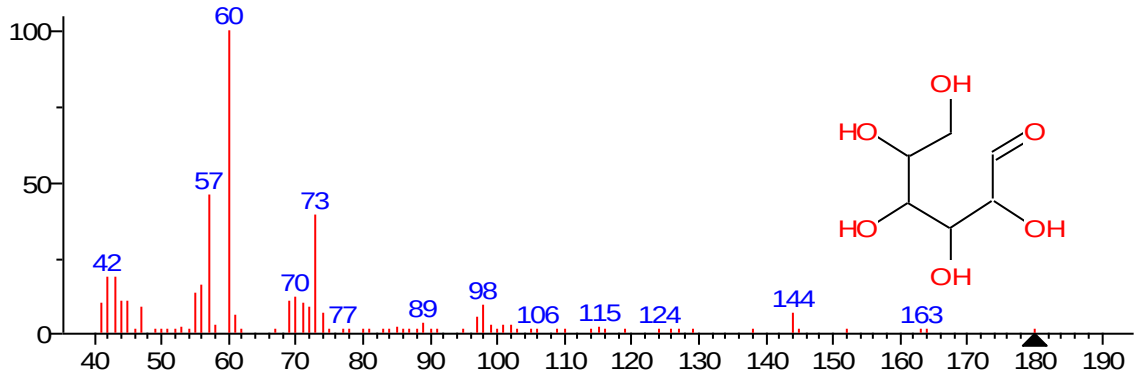

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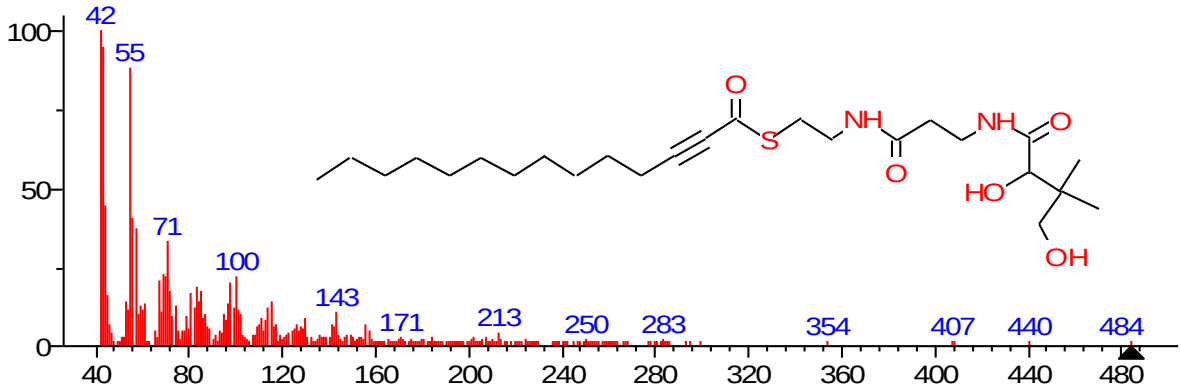

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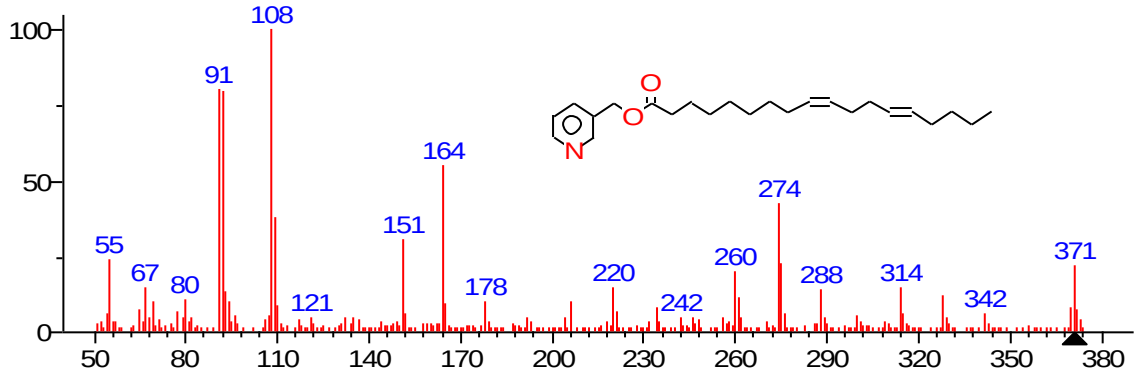
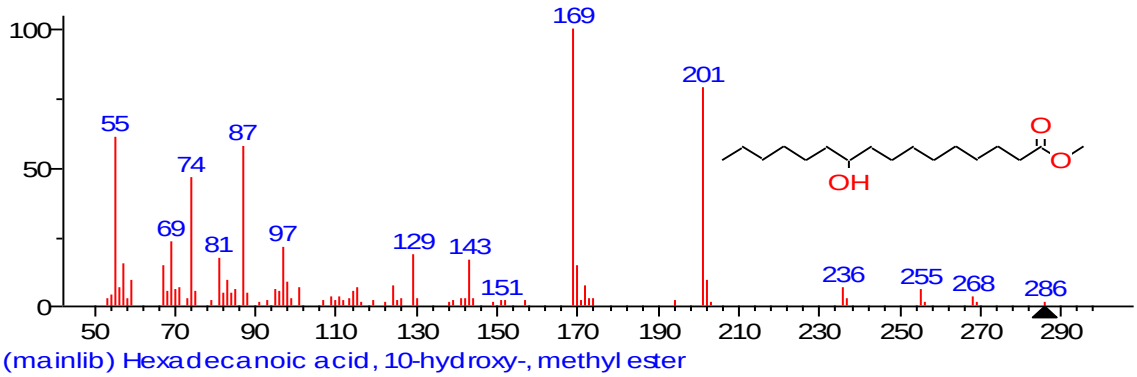
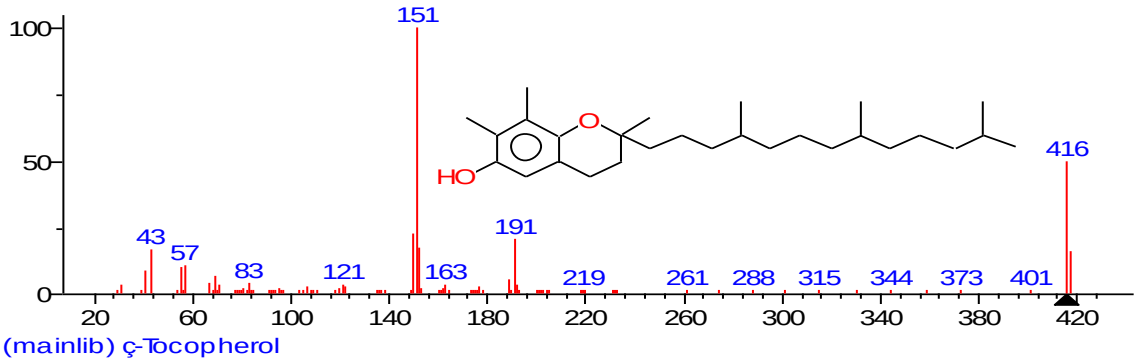


(mainlib) (Z,E)-Octadeca-9,13-dienoic acid, picolinyl ester





CONCLUSIONS

In the present study methanolic extract of seeds of *Spermacoce hispida* under GCMS analysis detected twenty five bio active compounds which are essential for the human life. Because of the wealth of the compounds we concluded that the seeds of *Spermacoce hispida* have important potential as a phytotherapic, being an alternative source of bioactive compounds that can be used for the treatment of various diseases. This justifies future studies to evaluate its different biological activities.

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