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GC-MS ANALYSIS OF CRUDE EXTRACTS OF *MOULLAVA SPICATA* (DALZ.) NICOLSON

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ABSTRACT

M.spicata is candy corn plant, it shows various biological activities. The investigation was carried out to determine the chemical constituents of *M.spicata* aerial parts using RTx-5MS Gas – chromatography – Mass spectroscopy, while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. GC-MS analysis of petroleum ether (MSPE), ethyl acetate (MSEA) and methanol (MSME) extracts of aerial parts of *M.spicata* revealed the existence of various chemical constituents. The results of this study offer a platform of using *M.spicata* aerial part as a herbal alternative for various diseases.

KEYWORDS: GC –MS analysis, Moullava *spicata*, Chemical constituents.

INTRODUCTION

In many industrialized countries herbal medicines are gaining popularity as alternative and complimentary therapies. Some of the plants are used as food or medicine. These plants exhibit a wide range of biological and pharmacological activities such as antibacterial, antifungal, antimalarial and antituberculosis. The secondary metabolites of plants provides humans with numerous biologically active products which has been used extensively as drugs, foods, additives, flavors, insecticides, colorants, fragrances and chemicals. Plants are a rich source of secondary metabolites with interesting biological activities. In general these secondary metabolites are an important source with a variety of structural arrangements and properties. Essential oils are known as to possess remarkable biological properties.[1] In

developing countries, herbal medicines are gaining popularity as alternative and complimentary therapies. The plants exhibit a wide range of biological and pharmacological activities.[13] Plants are rich source of secondary metabolites with interesting biological activities.[13] The herbal medicines occupy distinct position right from the primitive period to present day.[15] India has wealth of medicinal plants, most of which have been traditionally used in Ayurveda.[15] Phytochemical constituents are responsible for medicinal activity of plant species.[16] Medicinal plants are the richest bio- resources of folk medicines and traditional systems of medicine and food supplements, nutraceuiticals, pharmaceutical industries and chemical entities for synthetic drugs.[22] Modern medicine has evolved from folk medicine and traditional system only after through chemical and pharmacological screening. India is the birth place of renewed system of indigenous medicine such as Siddha, Ayurveda and Unani. The synthetic drugs have many side effects than often lead to serious complications.[17] Comparing to modern medicine the herbal medicine was the lifesaving drug. Among 4, 00,000 plant species only 6% of the plants are studied for their biological activity and only few have been phytochemically investigated. It shows that the investigation is needed for many medicinal plants for its activity and pharmacological properties.[17] World Health Organization (WHO) has estimated that nearly 80% of the total population in the developing countries relies on medicinal plants for health care. *M.spicata* is used to cure many diseases; it shows prominent antioxidant activity.[9,11] In present investigation *M.spicata* aerial part extracted in different solvents with their increasing polarity. GC – MS analysis of crude extracts was done.

MATERIALS AND METHODS

Collection of Plant Material

The fully matured *M.spicata* aerial parts were collected in Feb.2015 from Radhanagari, Kolhapur (MS). Plant material was identified and authenticated by Mrs.Dr.A.S.Upadhye, Scientsit, Agharkar Research Institute, Pune (MS).

Extraction of plant material

Collected plant material was cleaned; shade dried for 10 days, powdered in pestle and mortar .500 gm powdered plant material is extracted in petroleum ether for six hours in soxhlet extractor then filtered through whatmann filter paper No.41 along with 2 gm sodium sulfate to remove the sediment and traces of water in the filtrate. The filtrate is then concentrated on rotary evaporator (Buchi. Rotavapor, R-3) at reduced pressure. Thimble was dried in an oven

at 60^0C and then same plant material extracted in ethyl acetate using soxhlet extractor, solvent is evaporated, thimble was dried at 75^0C in an oven. The same plant material was further extracted in methanol by soxhlet apparatus, dry extracts are labeled as MSPE, MSEA, and MSME.

GC-MS analysis

GC MS analysis was carried out on Shimadzu – GCMS QP-2010 Ultra model at S.P.Pune University, Pune. This system comprising a gas chromatograph interfaced to a mass spectrometer instrument employing the following conditions. Column RTx-5MS fused silica column (30 m X 0.25 mm X 0.25 µm composed of 5% Phenyl / 95% dimethylpolysiloxane) operating in electron impact mode at 70 ev, helium (99.999%) was used as carrier gas at a constant flow of 1 ml / min and an injection volume of 0.5 µl was employed (split ratio 25:1) Injection temperature 240^0C ion source temperature 200^0C. The oven temperature was programmed from 75^0C (isothermal for 3 min) with an increase of 10^0 C / min to 240^0C, ending with 9 min , isothermal at 290^0C , Mass spectra were taken at 70 ev, a scan interval of 0.5 seconds and fragments from 40 to 440 Da. Total GC running time is 26.83 min.

RESULTS AND DISCUSSION

Gas chromatography mass spectroscopy analysis of crude extracts of *M.spicata* was done. The total ion chromatogram (TIC) of petroleum ether, ethyl acetate and methanol extract of *M.spicata* showing the GC-MS profile of the compounds identified is given in the figures 1, 2,3 respectively. The peaks in the chromatogram were integrated and were compared with the database of spectrum of known components stored in the GC-MS library. The detailed GC-MS analyses of the extracts are given in Table 1, Table 2, Table 3 respectively.

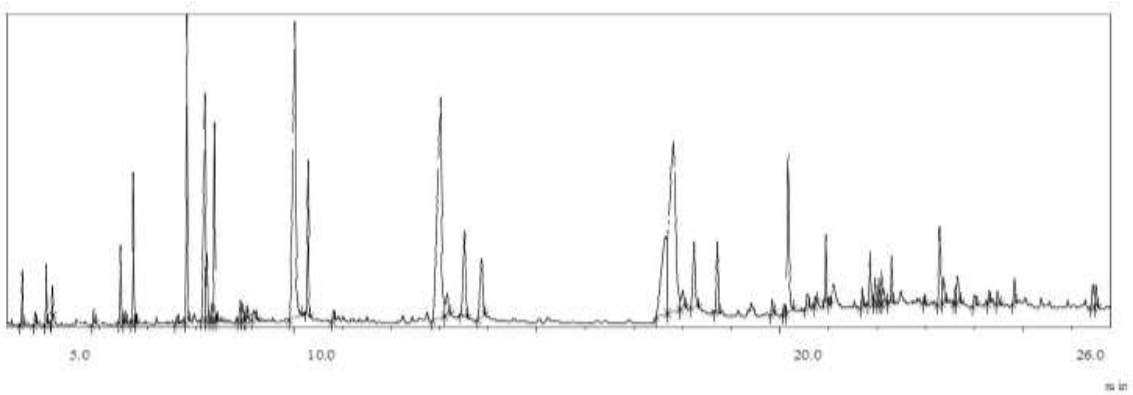


Figure 1: Total Ion Chromatogram (TIC) of petroleum ether (MSPE) extract of *M.spicata.*

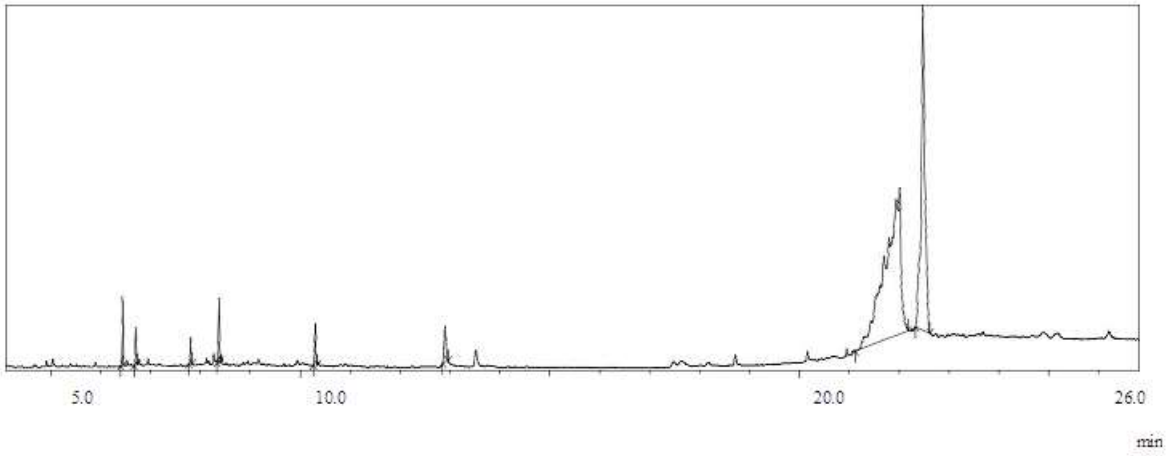


Figure 2: Total Ion Chromatogram (TIC) of Ethyl acetate (MSEA) extract of *M.spicata.*

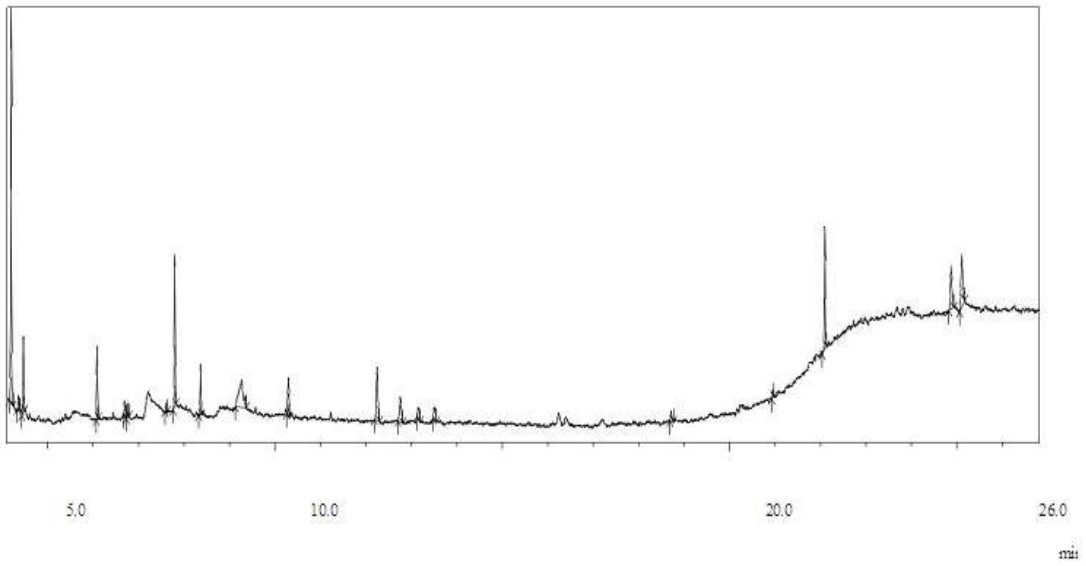


Figure 3: Total Ion Chromatogram (TIC) of Methanol (MSME) extract of *M.spicata.*

Table 1: Phytochemicals identified in the petroleum ether extract of *M.spicata.*

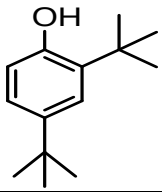
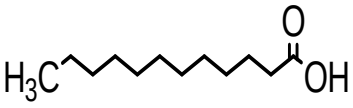
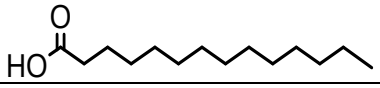
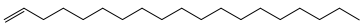
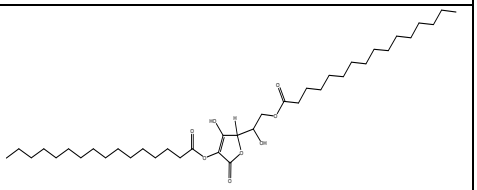
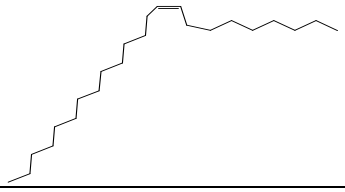
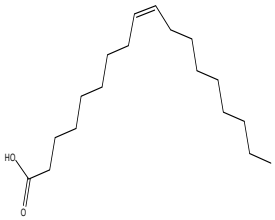
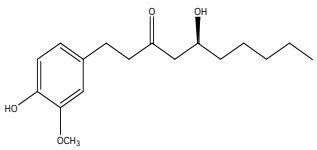
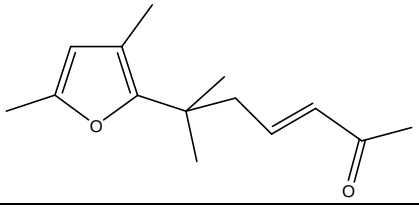
Ret. Time (min.)	Name of the Compound	M.F	M.W.	Area %	Compound Structure
7.799	2,4 –ditertiary butyl phenol	$C_{14}H_{22}O$	206	4.71	
8.150	Dodecanoic Acid	$C_{12}H_{24}O_2$	238	2.65	
8.370	1-Heptadecene	$C_{17}H_{34}$	238	5.97	
10.020	Tetradecanoic Acid	$C_{14}H_{28}O_2$	228	12.80	
10.305	1-Nonadecane	$C_{19}H_{38}$	266	2.83	
13.020	(+) Ascorbic Acid 2,6-dihexadecanoate	$C_{38}H_{68}O_8$	652	13.31	
13.500	(Z)9-Tricosene	$C_{23}H_{46}$	322	2.89	
17.810	Oleic Acid	$C_{18}H_{34}O_2$	282	5.12	
20.170	Gingerol	$C_{17}H_{26}O_4$	294	3.96	
23.300	6-(3,5-Dimethyl furan -2yl)-6-methyl-hept-3-ene-2-one	$C_{14}H_{20}O_2$	220	2.35	

Table 2: Phytochemicals identified in the ethyl acetate extract of *M.spicata.*

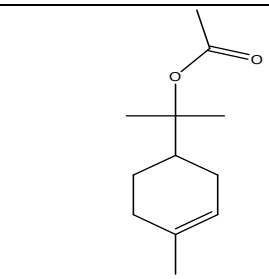
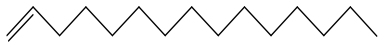
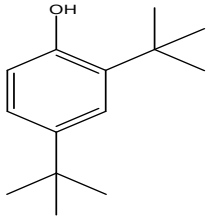
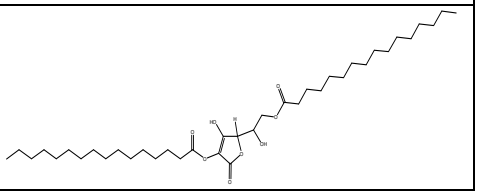
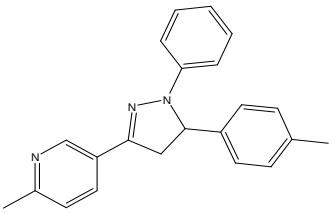
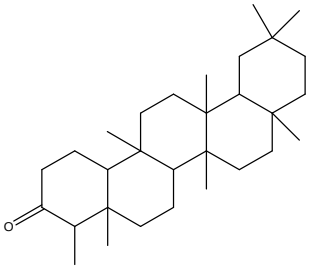
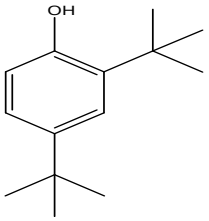
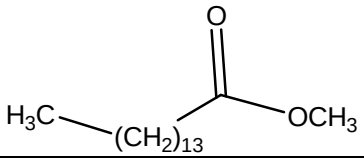
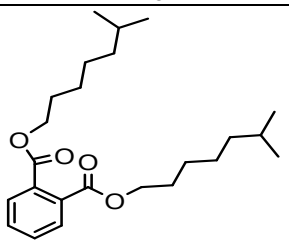
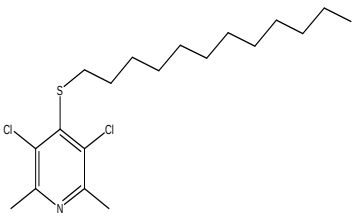
Ret.Time (min.)	Name of the Compound	M.F	M.W.	Area %	Compound Structure
6.445	3-cyclohexene-1-methanol,α,α-4-trimethyl acetate	$C_{12}H_{20}O_2$	196	1.66	
6.700	1-pentadecene	$C_{15}H_{30}$	210	0.87	
7.800	2,4-dit.butyl phenol	$C_{14}H_{22}O$	206	0.61	
8.365	1-Heptadecene	$C_{17}H_{34}$	238	1.52	
12.905	(+)-Ascorbic Acid 2,6-dihexadecanoate	$C_{38}H_{68}O_8$	652	1.91	
22.015	3-(6-methyl-3-Pyridyl)-1-phenyl-5(-p-tolyl)-2-pyrazoline	$C_{22}H_{21}N_3$	327	59.52	
22.505	Friedelan-3-one	$C_{30}H_{50}O$	426	100	

Table 3: Phytochemicals identified in the methanol extract of *M.spicata.*

Ret. Time (min.)	Name of the Compound	M.F	M.W.	Area %	Compound Structure
7.795	2,4-ditert.butyl phenol	$C_{14}H_{22}O$	206	9.74	
12.240	Hexadecanoic Acid methyl ester	$C_{17}H_{34}O_2$	270	4.48	
22.090	Diisooctyl phthalate	$C_{24}H_{38}O_4$	390	10.26	
25.105	3,5-Dichloro-4(dodecylsulfanyl)-2,6-dimethyl pyridine	$C_{19}H_{31}O_2NS$	375	6.96	

The GC MS analysis of crude extracts of *M.spicata* was performed using Shimadzu – GCMS QP-2010 Ultra. MSPE shows presence of ten compounds, MSEA shows presence of eight compounds and MSME shows presence of four compounds. Some of the peaks are unidentified.

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