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Research Article

GC-MS ANALYSIS OF NARINGI CRENULATA (ROXB.) NICOLS. LEAVES

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ABSTRACT

The present study focuses on the analysis of the ethanol extract of *Naringi crenulata* leaves by GC-MS. The phytocomponents of the ethanol extract of *Naringi crenulata* were investigated by using Gas Chromatography-Mass spectrometry, while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. The study revealed the presence of 28 phytocomponents.

Keywords: *Naringi crenulata*; GC-MS, Phytocomponents.

INTRODUCTION

The indigenous traditional knowledge of medicinal plants of various ethnic communities, where it has been transmitted orally for centuries is fast disappearing form the face of the earth due to the advent of modern technology and transformation of traditional culture. The local people and researchers face the challenging task of not only documenting knowledge on plants, but also applying the results of their studies to biodiversity conservation and community development (Sandhya et al., 2006).*Naringi crenulata* (Roxb.) Nicols. belonging to the family Rutaceae. It is commonly known as Mahavilvam in Tamil. It is distributed throughout India, especially in the southern Western Ghats, South and Central Sahyadris and Indomalysia. Trees upto 8m tall , trunk with thorns;bark dark grey, smooth;blaze yellowish. Young branchlets terete, glabrous, thorny. Leaves are compound, imparipinnate, 15cm long, alternate, spiral;rachis with oblanceolate wings, glabrous; leaflets 5-7, opposite, sessile, 2-4.5x1-1.5cm, elliptic to obovate, apex emarginated or obtuse, base acute, margin crenulate or irregularly serrulate, glandular punctuate, glabrous;secondary nerves 7-10 pairs, looped near margin; tertiary nerves admedially ramified (Gamble 1935, Sald. & Nicols.1976, Sasidharan 2004, Saldanha 1996). All parts of this tree viz. root, stem, bark, leaf and fruit are used in several ailments. Root is used as remedy for cobra bite (Sekhar et al 2011) bodypain (Chiranjibi Pattanaik 2008), colic (Senthil Kumar 2006), vomiting and dysentery (Ramachandran 2010). Stem powder prevents acne and anti aging (Mayuree Kanlayavattanakul 2009). Bark is used as a remedy for puerperal fever (Prayaga murty 2010) and pitta(Ramalingam Ramani 2010). Leaves are used for curing dysentery (Prayaga murty 2010) and epilepsy (Ramalingam Ramani 2010). Therefore the current study was aimed to determine the number of compounds present in the ethanol extract of dried leaves of *Naringi crenulata* (Roxb.) Nicols. which will be useful for the proper identification of compounds of therapeutic value.

MATERIALS AND METHODS

Plant material

The plant specimen was collected from Adiannamalai region of Tiruvannamlai, Tamilnadu, India. The taxonomic identification of the plant was confirmed by Botanical Survey of India (BSI), Coimbatore. Tamilnadu, India. (Certificate No. BSI/SRC/5/23/10-11/Tech.1134) and the specimens voucher were deposited in the Department of Botany, Government Arts College (Autonomous), Kumbakonam, Tamilnadu, India.

Preparation of Plant extract

The collected fresh plant leaves were rinsed with distilled water and air-dried at room temperature. The dried plant material was then homogenized by electric mixer grinder to obtain coarse powder and stored in air-tight bottles for further analysis. The shade dried, powdered leaf was extracted (Mukherjee 2002) with ethanol solvent by hot extraction method using soxhlet apparatus for GC-MS analysis.

Gaschromatography-Massspectrometry analysis

The Gas Chromatography-Mass spectrometry (GC-MS) analysis of the extracts was performed using a GC-MS Model: QP 2010 series, Shimadzu, Tokyo, Japan equipped with a VF-5ms fused silica capillary column of 30m length, 0.25mm diameter and 0.25µm film thickness. For GC-MS detection, an electron ionization system with ionization energy of 70eV was used. Helium gas (99.99%) was used as a carrier gas at a constant flow rate of 1.51ml/min. injector and mass transfer line temperature were set at 200 and 240°C respectively. The oven temperature was programmed from 70 to 220°C at 10°C/min, held isothermal for 1min and finally raised to 300°C AT 10°C/min. 2µl of respective diluted samples was manually injected in the split less mode, with split ratio of 1:40 and with mass scan of 50-600 amu. Total running time of GC-MS is 35min. The relative percentage of the each extract constituents was expressed as percentage with peak area normalization.

Identification of components

Interpretation on mass spectrum GC-MS was conducted using the database of WILEY and National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST08.LIB (Mc Lafferly 1989) and WILEY8.LIB (Stein 1990) library sources were used for matching the identified components from the plant material.

RESULTS AND DISCUSSION

The GC and MS running time for ethanol extract of leaves of *Naringi crenulata* (Roxb.) Nicols. was 32 min. The GC-MS Chromatogram of *Naringi crenulata* leaf extract was presented in Fig.1. The compounds identified by the mass spectroscopy were presented in the Table 1.

Totally 28 compounds were identified in *Naringi crenulata* leaf extract by GC-MS analysis. The active principles with their Retention time (RT), Molecular formula and Concentration (%) are presented in (Table 1).The prevailing compounds were 7-Tetradecenal,(Z)-(34.11%) and n-Hexadecanoic acid (23.37 %) was found as major component followed by 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-,(all-E)-$$All-trans-squalene(10.29%),2-Heptadecyloxirane (6.94%) , 1-Nonadecene (3.07%), Lup-20(30)-en-3-one(2.06%), 1-Nonadecene(1.54%), Hexahydroaplotaxene(1.17%). other major and minor constituents were also present. This study represents the first step to identify the phytocomponents present in the ethanol extract of *Naringi crenulata* leaves by GC-MS analysis. The leaf extract of *Naringi crenulata* shown to possess a number phytocomponents, it may be a very important source of phytochemical for new drug leads. However, further plan of study includes isolation and purification of active phytocompounds.

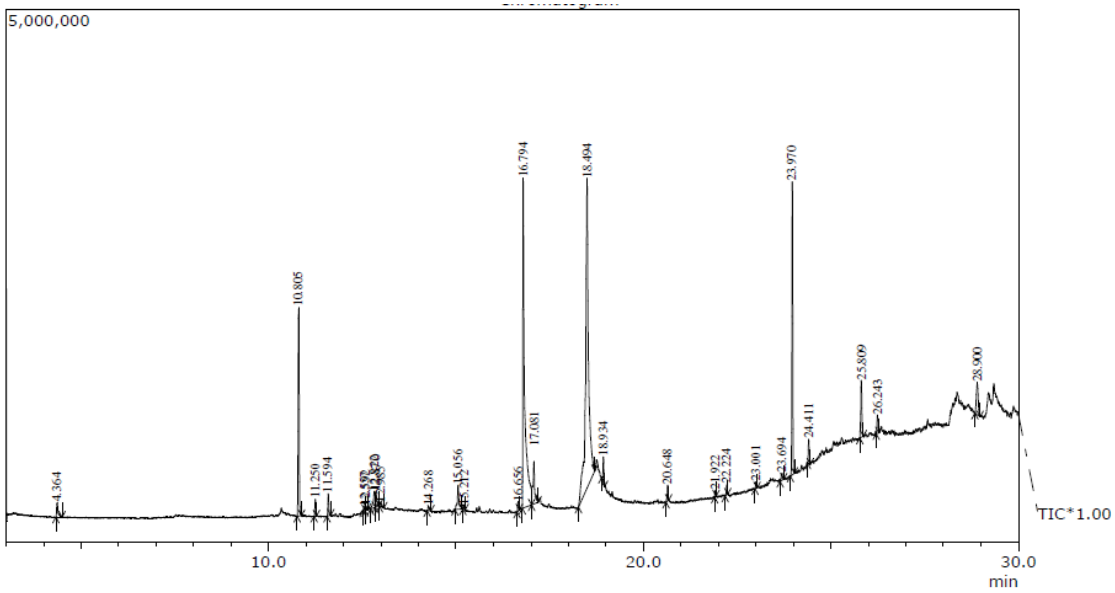

Fig. 1: GC-MS Chromatogram of *Naringi crenulata* leaf - ethanol extract

Table 1: List of Phytocomponents identified in the *Naringi crenulata* leaf – ethanol extract

No.	Retention time	Constituents	Molecular formula	Peak Area %
1	4.364	Tetraethyl silicate$$silicic acid (H_4SiO_4),tetraethyl ester	$C_8H_{20}O_4Si$	0.74
2	10.805	Caryophyllene $$ bicyclo (7.2.0)undec-4-ene,4,11,11-trimethyl-8-methylene, [1R-(1R*,4E,9S*)	$C_{15}H_{24}$	6.87
3	11.250	.alpha.-Caryophyllene $$ 1,4,8-Cycloundecatriene,2,6,6,9-tetramethyl-,(E,E,E)-	$C_{15}H_{24}$	0.53
4	11.594	1,6-Cyclodecadiene,1-methyl-5-methylene-8-(1-methylethyl)-,[ss-(E,E)]-$$Germacrene D	$C_{15}H_{24}$	0.79
5	12.557	4-Methyl-dodec-3-EN-1-ol	$C_{13}H_{26}O$	0.19
6	12.592	Nonanal $$ pelargonaldehyde	$C_9H_{18}O$	0.16
7	12.822	Hexahydroaplotaxene	$C_{17}H_{34}$	1.17
8	12.870	Caryophyllene oxide $$ 5-oxatricyclo [8.2.0.0(4,6)-]dodecane,4,12,12-trimethyl-9-methylene-,	$C_{15}H_{24}O$	0.75
9	12.985	4,4-Dimethyl-2-cyclohexen-1-ol	$C_8H_{14}O$	0.24
10	14.268	2,2',5,5'-Tetramethyl-1,1'-Biphenyl	$C_{16}H_{18}$	0.20
11	15.056	1-Nonadecene	$C_{19}H_{38}$	1.54
12	15.212	2-Ethyl-1-Dodecene	$C_{14}H_{28}$	0.16
13	16.656	Isophytol $$ 1-hexadecen-3-ol, 3,7,11,15-tetramethyl-	$C_{20}H_{40}O$	0.34
14	16.794	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	23.37
15	17.081	1-Nonadecene	$C_{19}H_{38}O$	3.07
16	18.494	7-Tetradecenal, (Z)-	$C_{14}H_{26}O$	34.11
17	18.934	n-Tetracosanol-1 $$ Lignoceric alcohol	$C_{24}H_{50}O$	0.76
18	20.648	Pentafluoropropionic acid, hexadecyl ester	$C19\ H_{33}F_5O_2$	0.57
19	21.922	Dioctyl phthalate	$C_{24}H_{38}O_4$	0.19
20	22.224	1-Octadecanol	$C_{18}H_{38}O$	0.38
21	23.001	n-Eicosane	$C_{20}H_{42}$	0.17
22	23.694	Henicosyl formate	$C_{22}H_{44}O_2$	0.35
23	23.970	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-,(all-E)-$$ All-trans-squalene	$C_{30}H_{50}$	10.29
24	24.411	n-Nonacosane	$C_{29}H_{60}$	0.83
25	25.809	n-Hexatriacontane	$C_{36}H_{74}$	2.43
26	26.243	.alpha.-Tocopherol-acetat (vitamin E acetate)	$C_{29}H_{50}O_2$	0.80
27	28.900	Lup-20(30)-en-3-one	$C_{30}H_{48}O$	2.06
28	30.944	2-Heptadecyloxirane	$C_{19}H_{38}O$	6.94

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