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GC-MS Study of Methanolic and Ethanolic Extract of Ruta graveolens Leaves

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Abstract:- The family of Rutaceae content variety of aromatic compositions. The local use of *Ruta Graveolens* on treatment of joint pain, paralysis, nervous disorder. The drugs is useful in the disorder of kidney,urinary bladder and helps regulate the function of these organs. The herb and the oil act as stimulants, their influences being chiefly directed to the uterine and nervous system. Pharmacognestic study of crude plant leaves by methanolic and ethanolic extract of *Ruta Graveolens* carried out by GC-MS. Studies by GC-MS shows bioactive chemicals in methanolic and ethanolic extract azuleno[5,6b]oxiren4one; dMannose; Cyclopropanecarboxylic acid,nonylester;2Undecanone;Stigmasta5,24(28)dien 3ol,(3á,24Z).Ethanolic extract 9Octadecenoicacid (Z), L-Proline,tri(cyclopentadienyl cobalt)hexapropenylbenzene;dMannose;Cyclopropanec arboxylic acid,Molybdenum,bis [(1,2,3,4,5ü)1,3bis(1,1dimethylethyl)24cyclopentadien1yl],diæcarbonyldicarbonyldi,(momo)

Keywords:- *GC-MS,Soxhlet,ChemicalComposition,Phytochemical,Methanolic&Ethanolic*

I. INTRODUCTION

The *Rutaceae* are family, commonly known as rue, genus *Ruta*[1] family of flowering plant contain aromatic constituents. It is cultivated and grows on waste stony ground[2]. The Rutaceae is one of the largest plant families with approximately 150 genera and 1,500 species distributed largely in tropical and subtropical parts of the world[3].A variety of plants of the family Rutaceae are used in traditional system of medicine world-wide. The most common medicinal plant of this family is Ruta graveolens L., which is commonly known as Rue or Sitab. It is an ornamental evergreen shrub of up to one meter tall and has considerable medicinal importance. More than 120 natural compounds mainly including acridone alkaloids, coumarines, essential oils, flavonoids, and furo quinolines[4]. This plant is commonly cultivated in India and is commonly called as sudab or sadab[5].The herb and oil acts as stimulants, their influence being uterine[6]. In traditional system of medicine it is used as stimulant, emmenagogue, diuretic, and abortefacient, resolvent[7].

➢ *Medicinal uses in Traditional medicine*

- The medicinal use with honey on treatment of paralysis, tremor, joint pain and nervous disorders[8].
- The decoction of Sitab when used as enema relieves colitis, flatulence and flatulent colitis[9].
- Being an analgesic, it"s useful in the chest pain caused by pneumonia and pleurisy. It is also useful in sciatica, gout, arthritis and flatulent colic[10].
- The local application of paste of Sitab leaves, on the abdomen is effective in dropsy[11].
- The infusion of Sitab leaves is used as nasal drop to treat the infantile paralysis[12].
- The drug is useful in the disorders of kidney, urinary bladder and helps regulate the function of these organs. It also relieves the back pain and chest pain[13].

II. MATERIAL AND METHOD

A. *Collection of plant material*

The fresh leaves of *Ruta Graveolens* plants were collected from Melghat Chikhaldara. Dist-Amravati(Maharashtra).The experimental site is located between co-ordinates 20.91°N,77.75°E and altitude of 312m in foot hills of Central India experiencing the subtropical climate during winter season in the month September and October 2018 and authentication of plant confirmed by Dr. S. R. Kadu, Department of Botany ASC College, Chikhaldara, Dist-Amravati.

B. *Preparation of plant extract*

The *Ruta Graveolens* plant leaves wash and dried over ambient temperature, dried sample were powdered by grinder was extracted in Methanol and Ethanol by using Soxhlet apparatus and extracts were concentrated by evaporating the respective solvent on rotary evaporator. The concentrated extract was collected and kept in cool prior to analysis.

➢ *GC-MS Analysis of Ruta graveolens*

- *Gas Chromatography and Mass Spectroscopy:-*

A JEOL G-mateII benchtop double-focusing magnetic sector mass spectrometer operating in electron ionization (EI) mode with TSS-2000[1]software was used for analysis. Low-resolution mass spectra were acquired at a resolving power of 1000(20%hight definition)and scanning from 25m/z to 700m/z at 0.3 second per scan with a 0.2 second inter-scan delay. High resolution mass spectra were acquired at a resolving power of 5000(20% height definition) and scanning the magnet from m/z 750 at 1 second per scan.

- *Identification of chemical constituents:-*

Identification of the chemical constituents was done on the basis of retention index(RI)using a mass spectra library NIST and by compare the mass spectral and retention data with literature[13].The relative amounts of individual componants were calculated based on the GC peak area(FID response)without using a correction factor.

Sr. No	Rention Time	Name of chemical constituent	Molecular Formula	Peak Area %
1	3.01	4HCyclopropa[5',6']benz[1',2':7,8]azuleno[5,6b] oxiren4one	$C_{27}H_{36}O_{10}$	2.31
2	3.58	dMannose Desulphosinigrin LGlucose	$C_6H_{12}O_6$ $C_{10}H_{17}NO_6S_3$ $C_6H_{12}O_6$	17.78
3	8.49	Cyclopropanecarboxylic acid, nonyl ester 2Nonene Methyl nonyl ether	$C_{13}H_{24}O_2$ C_9H_{18} $C_{10}H_{22}O$	52.48
4	9.29	2Undecanone 2Dodecanone 2Decanone	$C_{11}H_{22}O$ $C_{12}H_{24}O$ $C_{10}H_{20}O$	20.44
5	24.30	Stigmasta5,24(28)dien3ol,(3á,24Z)	$C_{29}H_{48}O$	6.98

Table 1:- Chemical Composition by Ethanol Extract of *Ruta Graveolens* leaves

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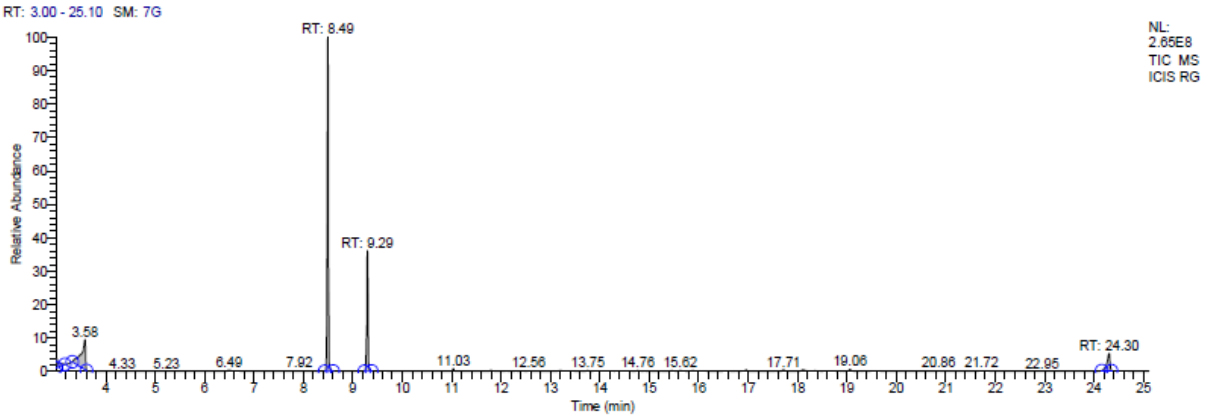

Fig 1:- Gas chromatogram of ethanol extract of Ruta Graveolens leaves

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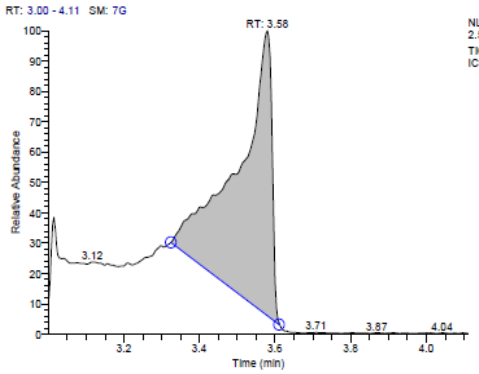
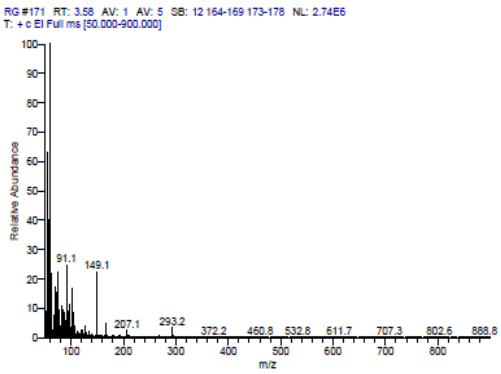
Library Search Results Table

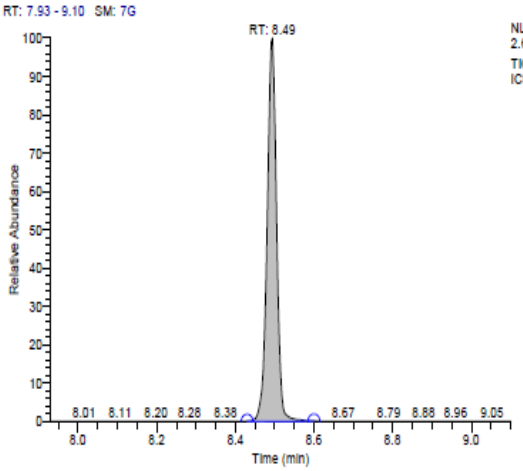
Compound Name	RT	Molecular Formula	Cas #
4H-Cyclopropa[5',6']benz[1',2':7,8]azuleno[5,6-b]oxiren-4-one, 8,8a-bis(acetyloxy)-2a-[(acetyloxy)methyl]-1,1a,1b,1c,2a,3,3a,6a,6b,7,8,8a-dodecahydro-6b-hydroxy-3a-methoxy-1,1,5,7-tetramethyl-, [1aR-(1aà,1bá,1cà,2aà,3aá,6aà,6bà,7à,8á,8aà)]-	3.01	C27H36O10	64807-01-8
Hexadecanoic acid, 1a,2,5,5a,6,9,10,10a-octahydro-5,5a-dihydroxy-4-(hydroxymethyl)-1,1,7,9-tetramethyl-11-oxo-1H-2,8a-methanocyclopenta[a]cyclopropa[e]cyclodecen-6-yl ester, [1aR-(1aà,2à,5á,5aá,6á,8aà,9à,10aà)]-	3.01	C36H58O6	52557-26-3
7aH-Cyclopenta[a]cyclopropa[f]cycloundecene-2,4,7,7a,10,11-hexol, 1,1a,2,3,4,4a,5,6,7,10,11,11a-dodecahydro-1,1,3,6,9-pentamethyl-, 2,4,7,10,11-pentaacetate	3.01	C30H44O11	51906-08-2

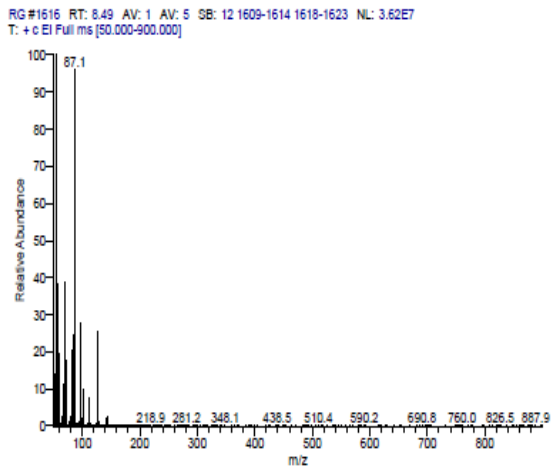




Library Search Results Table

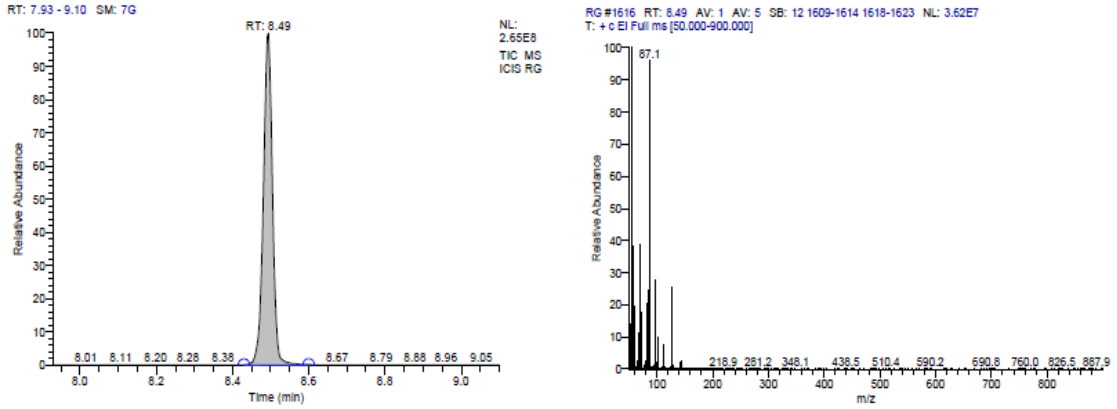
Compound Name	RT	Molecular Formula	Cas #
d-Mannose	3.58	C6H12O6	3458-28-4
Desulphosinigrin	3.58	C10H17NO6S	5115-81-1
L-Glucose	3.58	C6H12O6	921-60-8





Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
d-Mannose	3.58	C6H12O6	3458-28-4
Desulphosinigrin	3.58	C10H17NO6S	5115-81-1
L-Glucose	3.58	C6H12O6	921-60-8



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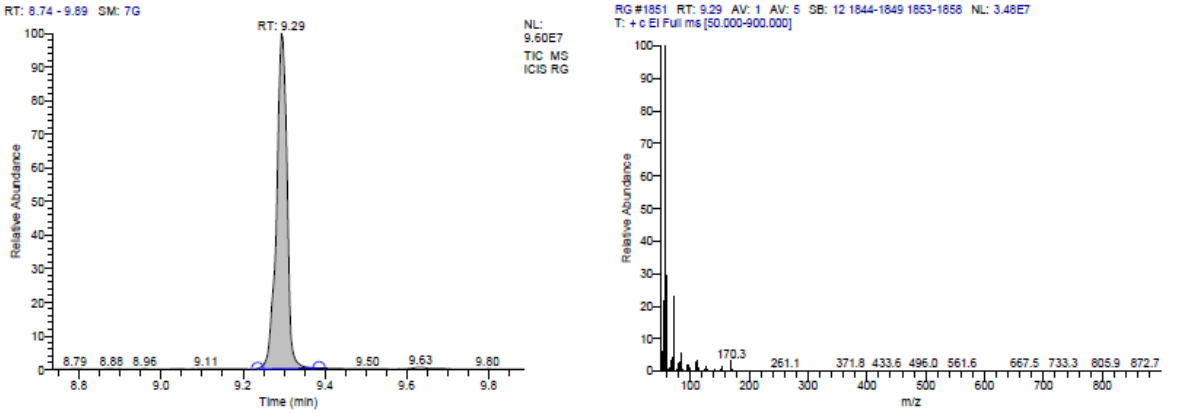
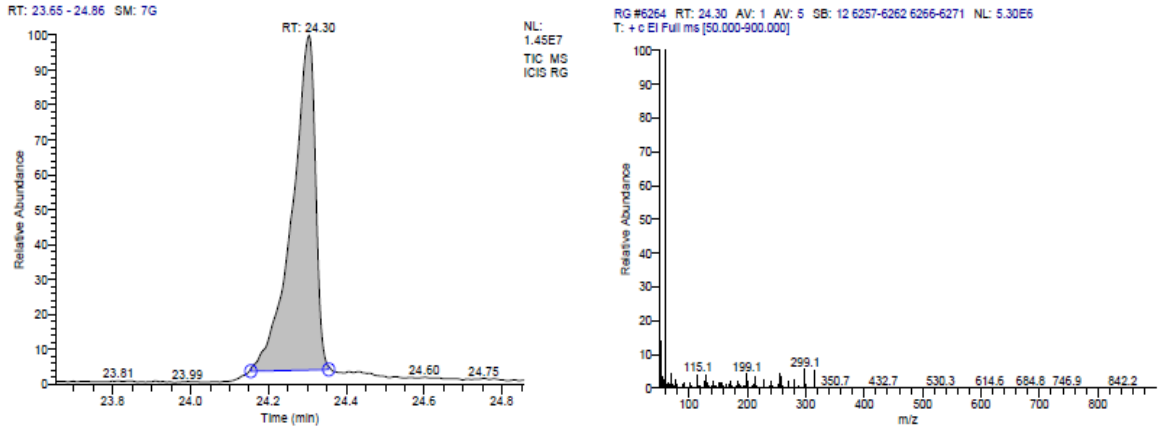
Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
Cyclopropanecarboxylic acid, nonyl ester	8.49	C13H24O2	60128-06-5
2-Nonene	8.49	C9H18	2216-38-8
Methyl nonyl ether	8.49	C10H22O	7289-51-2



Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
2-Undecanone	9.29	C11H22O	112-12-9
2-Dodecanone	9.29	C12H24O	6175-49-1
2-Decanone	9.29	C10H20O	693-54-9



Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
Stigmasta-5,24(28)-dien-3-ol, (3á,24Z)-	24.30	C29H48O	481-14-1
7-Methoxy-1,4a-dimethyl-9-oxo-1,2,3,4,4a,9-hexah ydrophenanthrene-1-carboxylic acid, methyl ester	24.30	C19H22O4	NA
Retinoic acid, methyl ester	24.30	C21H30O2	339-16-2

Fig 2:- GC-MS chromatogram analysis of the Methanol extract of *Ruta Graveolens* leaves with five peaks which indicate the presence of various phytochemical constituents.

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Sample Header

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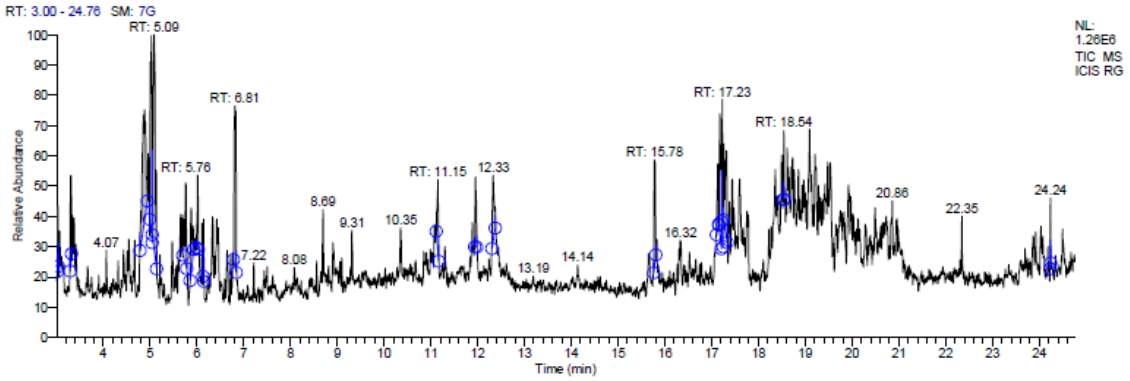

Fig 3:- Gas Chromatogram of Ethanol extract of *Ruta Graveolens* leaves

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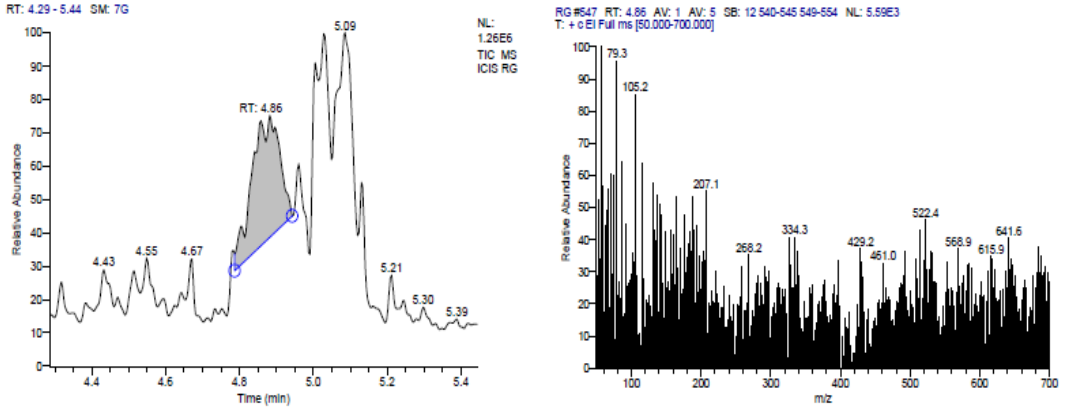
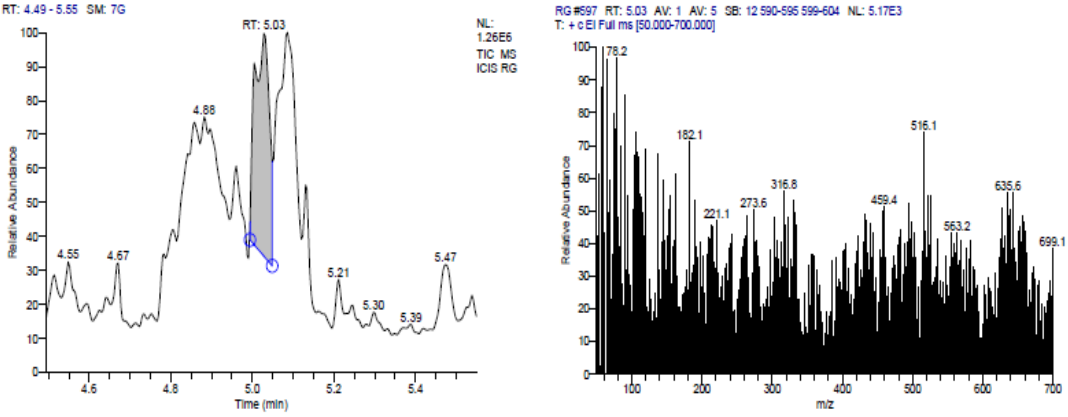


Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
2,2-Bis[4-[[4-chloro-6-(3-ethynylphenoxy)-1,3,5-triazin-2-yl]oxy]phenyl]propane	4.86	C37H24Cl2N6O4	NA
9-Octadecenoic acid (Z)-, 3-[(1-oxohexadecyl)oxy]-2-[(1-oxooctadecyl)oxy] propyl ester	4.86	C55H104O6	2190-28-5
Lycoxanthin	4.86	C40H56O	19891-74-8



Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
Pregn-5-en-20-one, 3,16,17,21-tetrakis[(trimethylsilyl)oxy]-, O-(phenylmethyl)oxime, (3á,16à)-	5.03	C40H71NO5Si4	57326-04-2
L-Proline, 1-[O-(1-oxohexyl)-N-[N-[N6-(1-oxohexyl)-N2-[N-(1-oxohexyl)-L-valyl]-L-lysyl]-L-valyl]-L-tyrosyl]-, methyl ester	5.03	C49H80N6O10	56272-43-6
Tungsten, pentacarbonyl(4,5-diethyl-2,2,3-trimethyl-1-phenyl-1-phospha-2-sila-5-boracyclohex-3-ene-P1)-, (oc-6-22)-	5.03	C21H26BO5PSiW	118772-51-3

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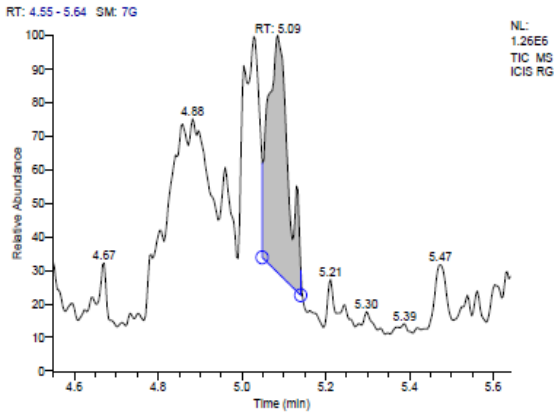
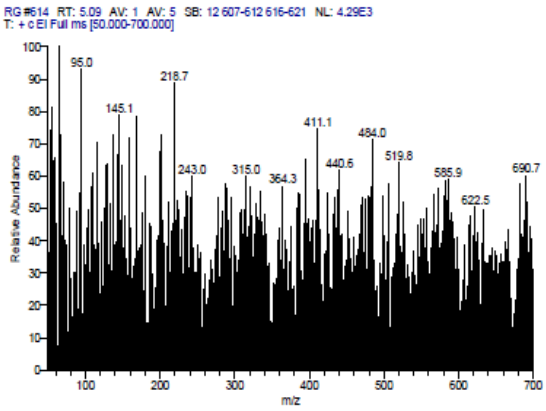
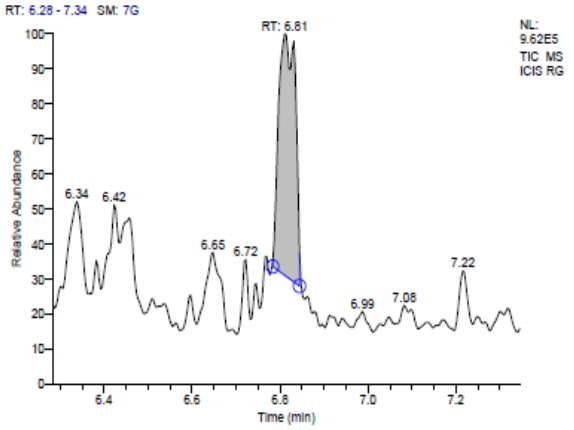
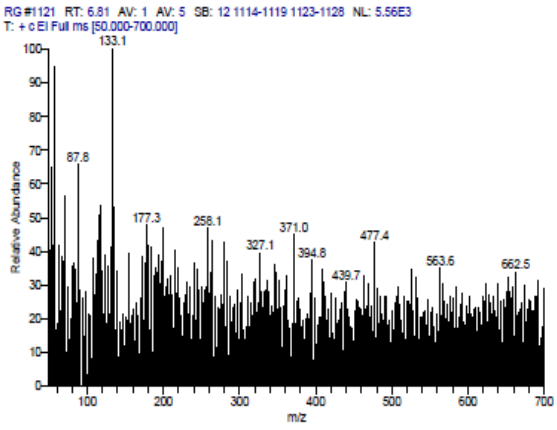




Library Search Results Table

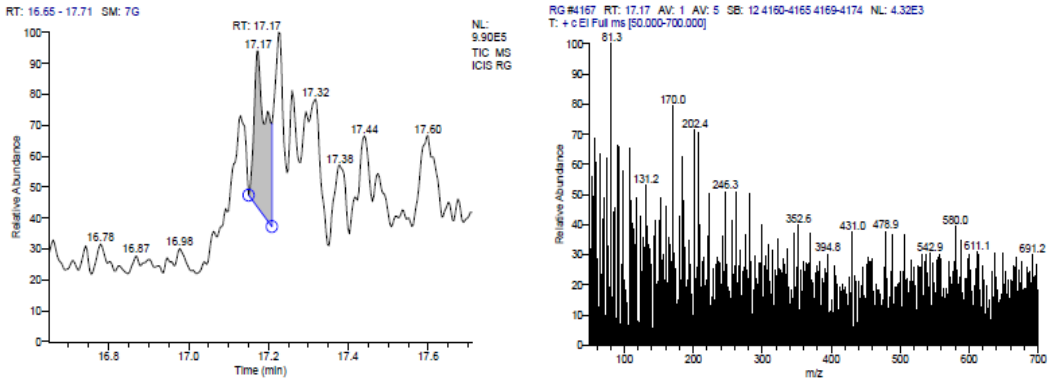
Compound Name	RT	Molecular Formula	Cas #
Tris(cyclopentadienyl-cobalt)-hexapropenylbenzene	5.09	C39H45Co3	NA
Pregn-5-en-20-one, 3,16,17,21-tetrakis[(trimethylsilyl)oxy]-, O-(phenylmethyl)oxime, (3á,16à)-	5.09	C40H71NO5Si4	57326-04-2
Pregn-4-ene-3,11,20-trione, 6,17,21-tris[(trimethylsilyl)oxy]-, 3,20-bis(O-methyloxime), (6á)-	5.09	C32H58N2O6Si3	57326-06-4





Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
Pregn-5-en-20-one, 3,16,17,21-tetrakis[(trimethylsilyl)oxy]-, O-(phenylmethyl)oxime, (3á,16à)-	6.81	C40H71NO5Si4	57326-04-2
5H-Cyclopropa(3,4)benz(1,2-e)azulen-5-one, 1,1a-à,1b-á,4,4a,7a-à,7b,8,9,9a-decahydro-7b-à,9-á,9a-à-trihydroxy-3-hydroxymethyl-1,1,6,8-à-tetramethyl-4a-methoxy-, 9,9a-didecanoate	6.81	C41H66O8	54870-24-5



Library Search Results Table

Compound Name	RT	Molecular Formula	Cas #
Molybdenum, bis[(1,2,3,4,5-ü)-1,3-bis(1,1-dimethylethyl)-2,4-cyclopentadien-1-yl]di-æ-carbonyldicarbonyldi-, (mo-mo)	17.17	C30H42Mo2O4	137680-72-9

Fig 4

Sr. No	RentionTime	Name of chemical constituent	Molecular Formula	PeakArea%
1	4.86	2,2Bis[4[[4chloro6(3ethynylphenoxy)1,3,5triazin2yl]oxy]phenyl]propane 9Octadecenoicacid (Z), 3[(1oxohexadecyl)oxy]2[(1oxooctadecyl)oxy]propyl ester Lycoxanthin	$C_{37}H_{24}C_{l2}N_6O_4$ $C_{55}H_{104}O_6$ $C_{40}H_{56}O$	13.35
2	5.03	Pregn5en20one,3,16,17,21tetrakis[(imethylsilyl)oxy], O(phenylmethyl)oxime,(3á,16à)5.0 C40H71NO5Si4 57326042 LProline, 1[O(1oxohexyl)N[N[N6(1oxohexyl)N2[N(1oxohexyl)Lvalyl]Llysyl]Lvalyl]Ltyrosyl],methyl ester Tungsten, pentacarbonyl(4,5diethyl2,2,3trimethyl1phenyl1phospha2sila5boracyclohex3eneP1),(oc622)	$C_{40}H_{71}NO_5Si_4$ $C_{49}H_{80}N_6O_{10}$ $C_{21}H_{26}BO_5PSiW$	10.88
3	5.09	Tris(cyclopentadienylcobalt) hexapropenylbenzene Pregn5en20one,3,16,17,21tetrakis[(trimethylsilyl)oxy],O(phenylmethyl) oxime, (3á,16à) Pregn4ene3,11,20trione,6,17,21tris[(trimethylsilyl)oxy],3,20bis(Omethyl oxime),(6á)	$C_{39}H_{45}Co_3$ $C_{40}H_{71}NO_5Si_4$ $C_{32}H_{58}N_2O_6Si_3$	16.02
4	6.81	Pregn5en20one,3,16,17,21tetrakis[(trimethylsilyl)oxy],O(phenylmethyl) oxime, (3á,16à) 5HCyclopropa(3,4)benz(1,2e) azulen5one,1,1aà,1bá,4,4a,7aà, 7b,8,9,9adecahydro7bà,9á, 9aàtrihydroxy3hydroxymethyl1,1,6,8àtetra methyl4amethoxy,9,9adidecanoate Acetic acid,1,1',4'triacetoxy5, 5'diisopropyl6,7,6',7'tetramethoxy3,3dimethyl [2,2']binaphthalenyl4ylester	$C_{40}H_{71}NO_5Si_4$ $C_{41}H_{66}O_8$ $C_{40}H_{46}O_{12}$	9.46
5	17.17	Molybdenum, bis[(1,2,3,4,5ü)1,3bis(1,1dimethylethyl)2,4cy clopentadien1yl]diæcarbonyldicarbonyldi momo	$C_{30}H_{42}Mo_2O_4$	5.72

Table 2:- Chemical Composition by Methanolic Extract of *Ruta graveolens* leaves

III. RESULT AND DISCUSION

The methanol & ethanol extract of Ruta Graveolens leaves by GC-MS chromatogram analysis isolate various phytochemical constituents. In Figure-1,2;Table1,2 each showed five major peaks of chemicals composition contribute medicinal activities like antimicrobial, antifungal, antiviral and antioxidants.On comparison of mass spectra of constituents with NIST library. The mass spectra identified of all phytochemicals in plant leaves extract are most prevailing compounds were Cyclopropanecarboxylic acid ester of 3-coumaranol and substituted 3-coumaranols possess useful insecticidal properties and potential prodrugs14,D-Mannose is natural source with remarkable benefits for urinary infection in woman, breast cancer survival and inflame the prostate & chronic prostate in man15,16.The 2-Undecanone use for lungs tumorigenesis17. Stigma5,24(28)dien3ol(3a,24Z)is treat for antioxidant,antimicrobial,anti-inflammatory,anticancer,antiasthama.anti-fungal18.
Lycoxanthin use in antimicrobial. anti-inflammatory, anticancer19.L-Proline is beneficial as Nutrient20and antagonist as a microbial product as nourseimyin by some amino acid21.

IV. CONCLUSION

The results of this study given information on the chemical composition of *Ruta graveolens*. Our investigation revealed that methanolic and ethanolic extract isolate individual bioactive chemicals for different therapeutic activity will certainly give some rewarding result. Finally, we can conclude that, leaves contain various valuable bioactive compounds.Therefore, *Ruta Graveolens* is recommended in the types of phytopharmaceutical important plant. However, further studies are needed to be carrying for its bioactivity.

ACKNOWLEDGEMENT

The authors are thankful to the Principal Arts, Science & Commerce College, Chikhaldara; Dist-Amravati(M.S.)for providing financial assistance & laboratory facilities for the present investigation.

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