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STUDIES ON THE MEDICINAL PLANT *JASMINUM GRANDOFLORUM* ETHANOL EXTRACT PHYTOCOMPONENTS BY GCMS ANALYSIS

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ABSTRACT

The present study aimed to investigate the phytochemical composition of *Jasminum grandiflorum* leaves using GC–MS analysis. Fresh leaves were collected, shade-dried, powdered, and subjected to ethanol extraction. The ethanolic extract was analyzed using a Shimadzu GC–MS system, resulting in the identification of twenty-six bioactive phytocompounds. Major constituents included 5-Hydroxymethylfurfural, Dodecanoic acid, Ricinoleic acid, Phytol, Squalene, Stigmasterol, γ-Sitosterol, and α-Tocopherol-β-D- mannoside. The identified compounds are known for diverse pharmacological activities, including antioxidant, anti-inflammatory, antimicrobial, wound healing, and cytoprotective effects. These findings highlight the potential of *Jasminum grandiflorum* leaves as a source of bioactive molecules for pharmaceutical and nutraceutical applications.

KEYWORDS: *Jasminum grandiflorum*, GC–MS, phytochemicals, bioactive compounds, medicinal plants, ethanol extract.

INTRODUCTION

India, recognized as one of the 12 global mega-biodiversity centers, possesses approximately 45,000 plant species, of which nearly 20,000 are identified for medicinal use. Traditional healthcare practices by over 500 indigenous communities employ about 800 of these species for disease management. Globally, nearly 80% of the population depends on plant-derived medicines, attributed to their minimal side effects. Herbal drugs are particularly valued for their simplicity, therapeutic efficacy, broad pharmacological spectrum, and preventive health potential.[1] Over the past century, nearly 121 pharmaceutical drugs have been developed from traditional knowledge sources. Extensive phytochemical investigations have been conducted worldwide, highlighting the importance of characterizing medicinal plant extracts, given their wide-ranging benefits for both scientific advancement and societal health.[2]

Jasminum grandiflorum L. (Family: Oleaceae) is widely distributed across India and thrives in diverse ecological conditions. Its leaves are traditionally employed in managing odontalgia, loose teeth, ulcerative stomatitis, leprosy, various skin disorders, otorrhoea, otalgia, strangury, dysmenorrhoea, ulcers, wounds, and corns.[3] *Jasminum grandiflorum Linn*. is a widely valued medicinal species native to regions of Asia, including Kashmir, Afghanistan, and Persia. In India, it is extensively cultivated and also grows naturally in the subtropical zones of the North-Western Himalayas, Western Ghats, and Nilgiris. Beyond India, its cultivation extends to several countries such as France, Italy, China, Japan, Morocco, and Egypt.[4] Pharmacological investigations have revealed that *J. grandiflorum* possesses diverse bioactivities, including spasmolytic, anti-inflammatory, antimicrobial, antioxidant, anti-ulcer, cytoprotective, chemopreventive, antidiabetic, wound-healing, and anti-acne effects.[5]

Hence, the present investigation was undertaken to characterize the phytochemical constituents of *Jasminum grandiflorum* leaves using GC–MS analysis.

MATERIALS AND METHODS

Collection and preparation of plant material

Fresh leaves of *Jasminum grandiflorum* were collected on January 7, 2025, from Mannuthy, Thrissur district, Kerala. The plant material was taxonomically identified and authenticated by Dr. Ranjusha A. P., Head, Department of Botany, N. S. S. College, Ottapalam. The leaves were detached from twigs, thoroughly washed, and shade-dried for 5–10 days. The dried material was then pulverized using a mechanical grinder and preserved in an airtight container for subsequent analysis.

Phytochemical Analysis

Approximately 25 g of dried, coarsely powdered leaf material was packed into a thimble and subjected to Soxhlet extraction using 500 mL of ethanol in a round-bottom flask attached to a reflux condenser. Upon heating, ethanol vapors condensed and percolated through the plant matrix, facilitating the extraction of soluble constituents. The process was continued for several hours until exhaustive extraction was achieved. The solvent was then evaporated to obtain a concentrated extract, and the dried residue obtain which was sent for GCMS analysis.

GCMS analysis of *jasminum grandiflorum*

A 1 µL portion of the ethanolic leaf extract was injected into a Shimadzu GC-2030/GCMS- QP2020 NX system using an AOC-20i autosampler in split mode (100:1). Helium was employed as the carrier gas under linear velocity control with a column flow of approximately 1.01 mL min^{-1}. Separation was achieved on a low-polarity fused-silica capillary column (5% phenyl/95% methylpolysiloxane, 30 m × 0.25 mm i.d., 0.25 µm film thickness). The oven program was set as follows: initial temperature 70 °C (held 2 min), ramped at 10 °C min^{-1} to 200 °C (held 5 min), then at 5 °C min^{-1} to 280 °C (held 15 min). Injector, interface, and ion source temperatures were maintained at 260 °C, 280 °C, and 230 °C, respectively. Mass spectra were recorded in electron ionization mode over m/z 35–500 with a solvent delay of 6.5 min. Compound identification was performed by comparing acquired spectra with the NIST library, considering both match and reverse- match factors, and further confirmed by calculating linear retention indices relative to a homologous series of n-alkanes (C7–C30) analyzed under identical conditions.[6]

Table No. 01: GC programme [GC-2030].

GC-MS parametrs	Programme
Column Oven Temp	70.0 °C
Injection Temp.	260.00 °C
injection mode	split
flow control mode	linear velocity
prsessure	62.1 kPa
total flow	14.1 mL/min
coloumn flow	1.01 mL/min
linear velocity	36.8 cm/sec
purge flow	3.0 mL/min
split ratio	10.0
splitter hold	OFF

Table No. 02: Oven temperature programme.

Rate	Temperature (°C)	Hold Time (min)
-	70.0	2.00
10.00	200.0	5.00
5.00	280.0	15.00

Table no. 03: GC-MS programme [GCMS-QP2020].

GC-MS Parameters	Programme
IonSourceTemp	230.00 °C
Interface Temp.	280.00 °C
Solvent Cut Time	6.50 min
Detector Gain Mode	Relative to the Tuning Result
Detector Gain	0.90 kV +0.00 kV
Threshold	0

Table no. 04: MS table.

Mass spectroscopy Parameters	Programme
Start Time	7.00min
End Time	51.00min
ACQ Mode	Scan
Event Time	0.30sec
Scan Speed	1666
Start m/z	35.00
End m/z	500.00
Sample Inlet Unit	GC

RESULTS AND DISCUSSION

The GC–MS chromatogram of the ethanolic extract of *Jasminum grandiflorum* Figure 1 revealed twenty-six distinct peaks, corresponding to twenty-six phytochemical constituents. The representative mass spectra are presented in Figure 2. Details including retention time (RT), peak area (%), peak height (%), molecular weight, molecular formula, identified compounds are summarized in Table 5.

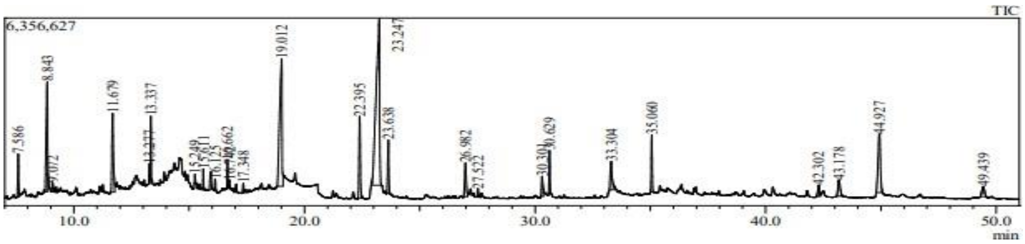
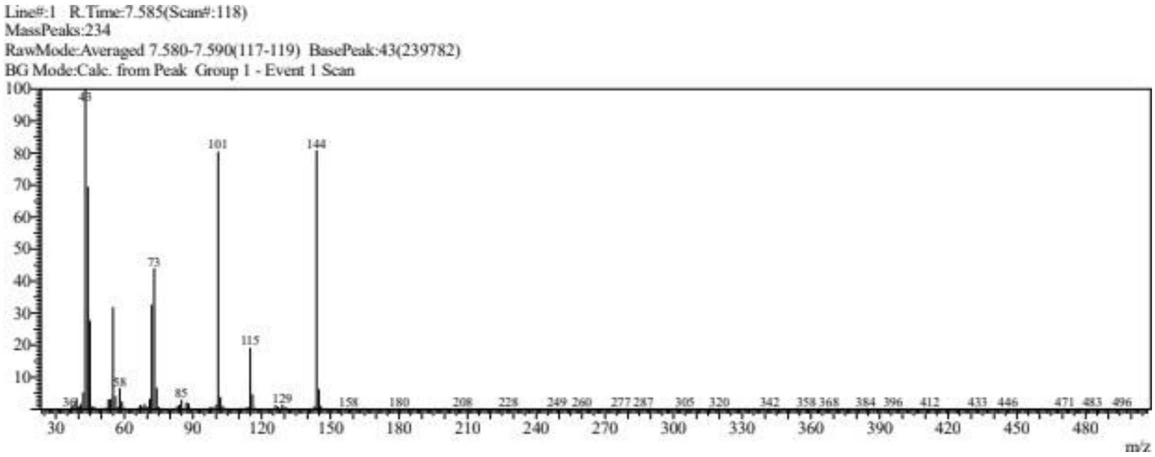
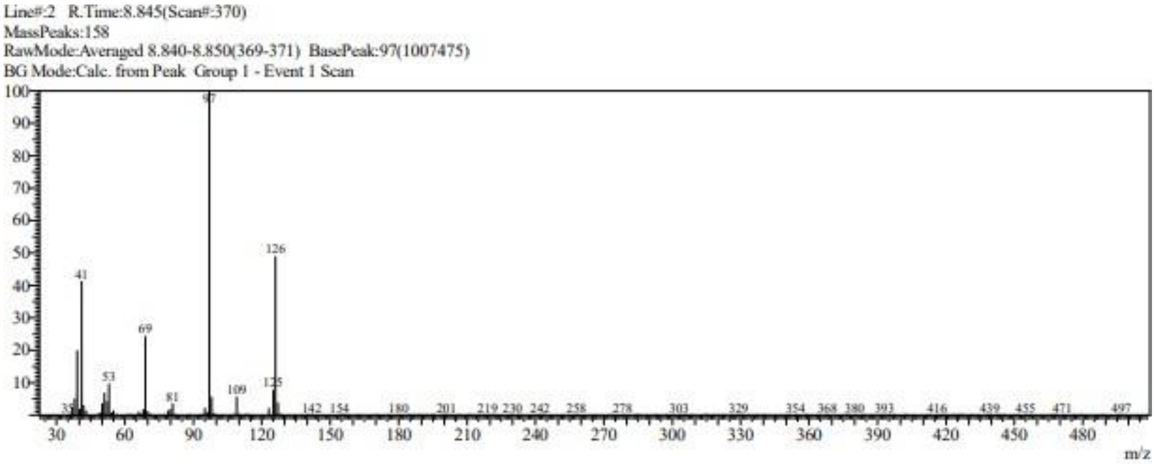
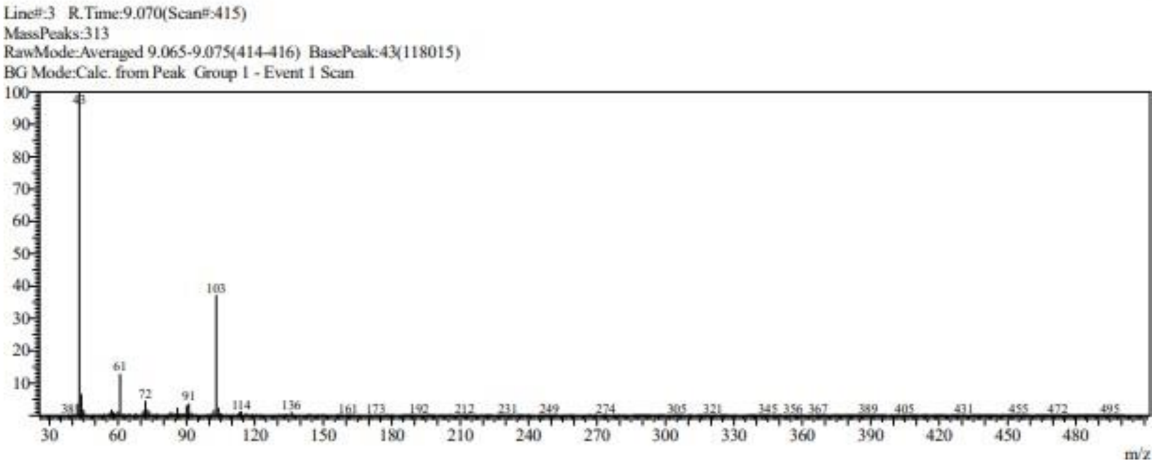
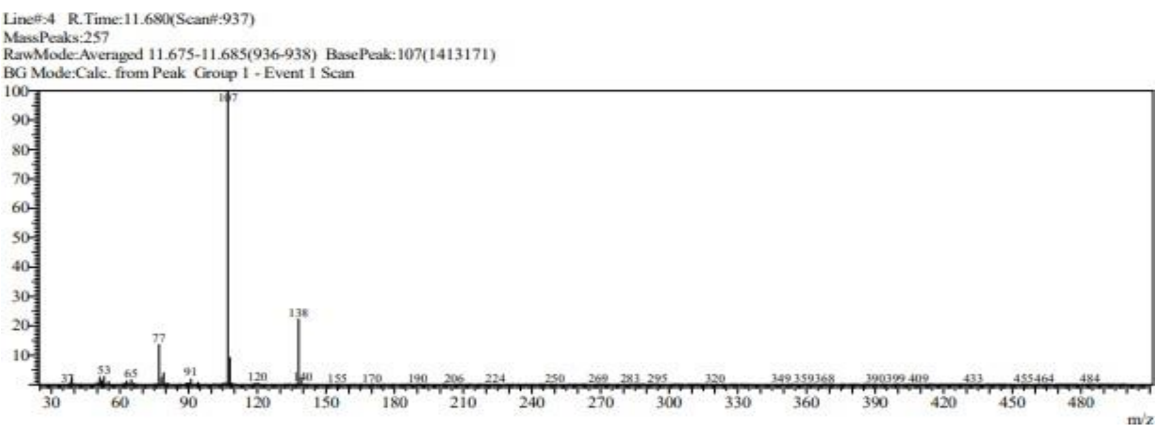


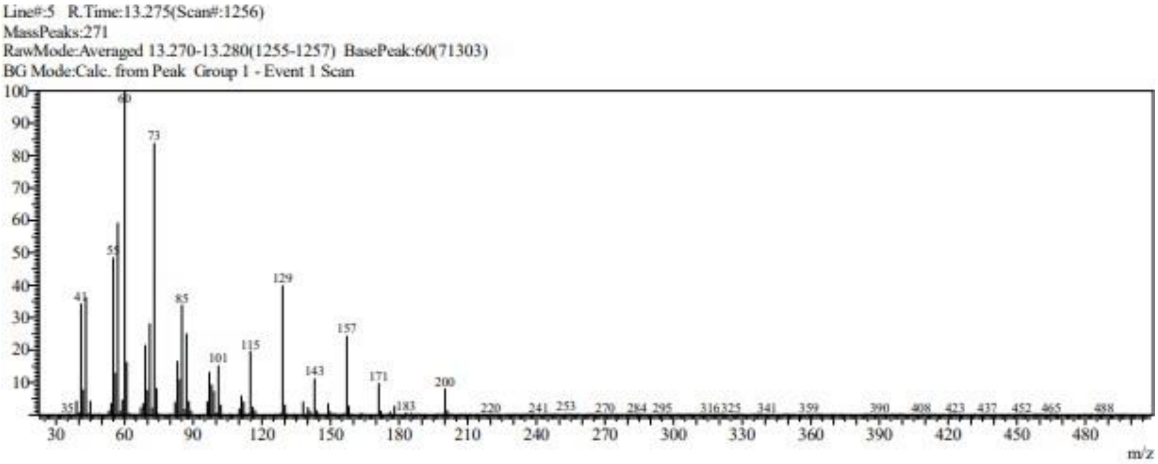
Figure No. 01: Chromatogram of *jasminum grandiflorum*.

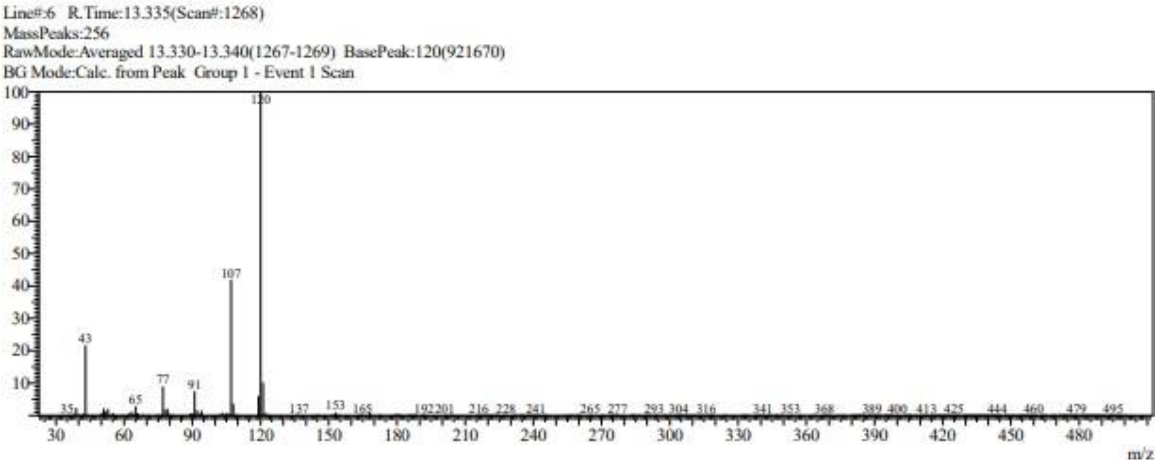

Line#:1 R.Time:7.585(Scan#:118)
MassPeaks:234
RawMode:Averaged 7.580-7.590(117-119) BasePeak:43(239782)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
101
144
73
115
m/z


Line#:2 R.Time:8.845(Scan#:370)
MassPeaks:158
RawMode:Averaged 8.840-8.850(369-371) BasePeak:97(1007475)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
97
126
41
69
53
109
m/z


Line#:3 R.Time:9.070(Scan#:415)
MassPeaks:313
RawMode:Averaged 9.065-9.075(414-416) BasePeak:43(118015)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
43
103
61
72
91
m/z


Line#:4 R.Time:11.680(Scan#:937)
MassPeaks:257
RawMode:Averaged 11.675-11.685(936-938) BasePeak:107(1413171)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
107
138
77
m/z


Line#:5 R.Time:13.275(Scan#:1256)
MassPeaks:271
RawMode:Averaged 13.270-13.280(1255-1257) BasePeak:60(71303)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:6 R.Time:13.335(Scan#:1268)
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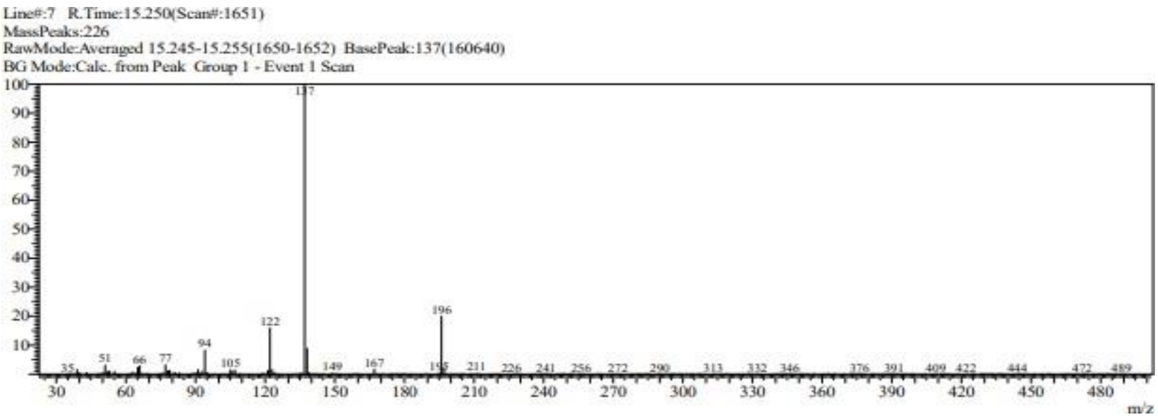
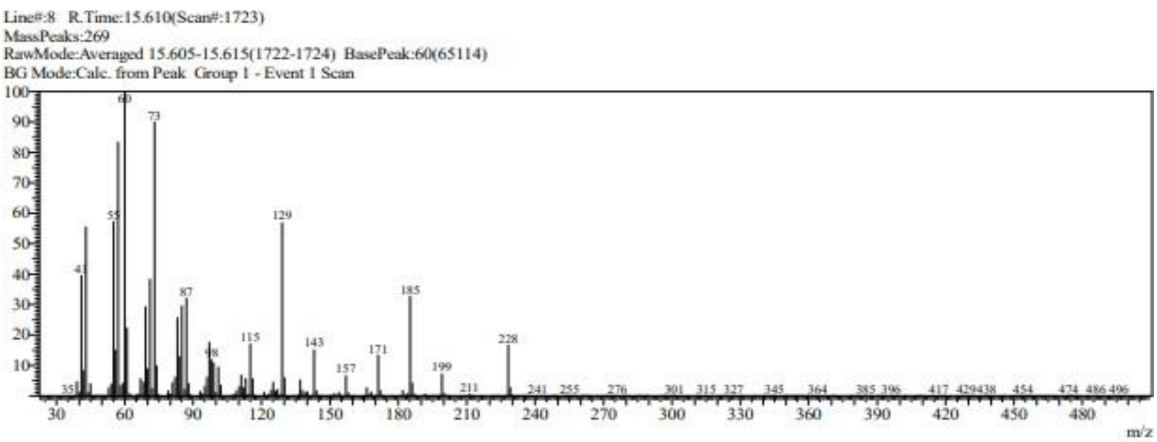
RawMode:Averaged 13.330-13.340(1267-1269) BasePeak:120(921670)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:7 R.Time:15.250(Scan#:1651)
MassPeaks:226
RawMode:Averaged 15.245-15.255(1650-1652) BasePeak:137(160640)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:8 R.Time:15.610(Scan#:1723)
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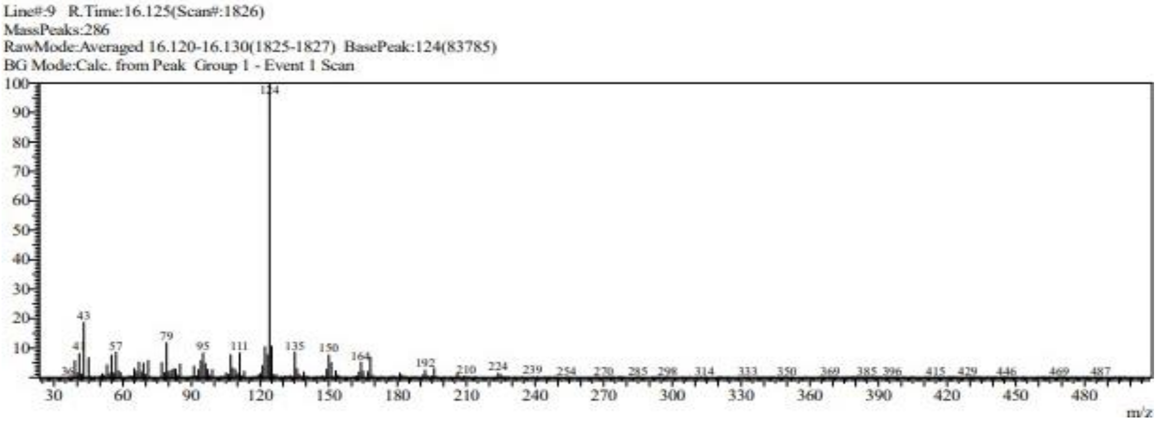
RawMode:Averaged 15.605-15.615(1722-1724) BasePeak:60(65114)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z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MassPeaks:286
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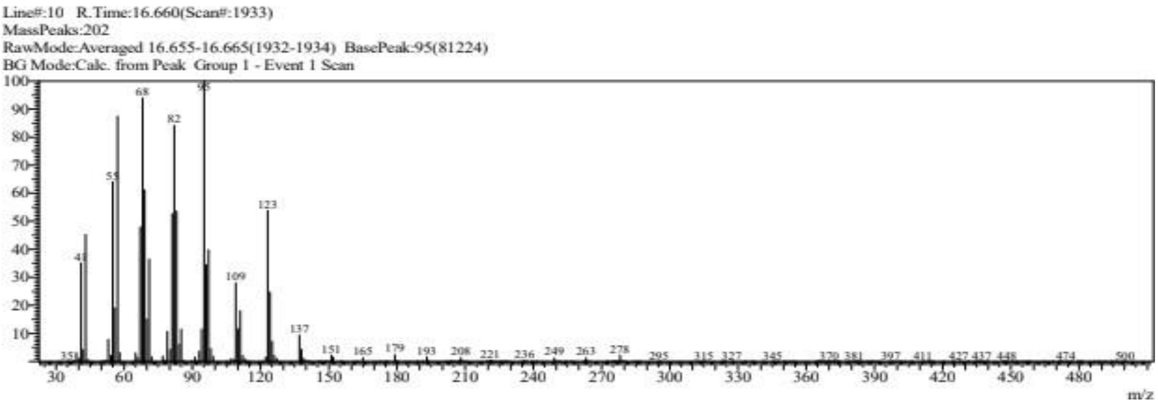
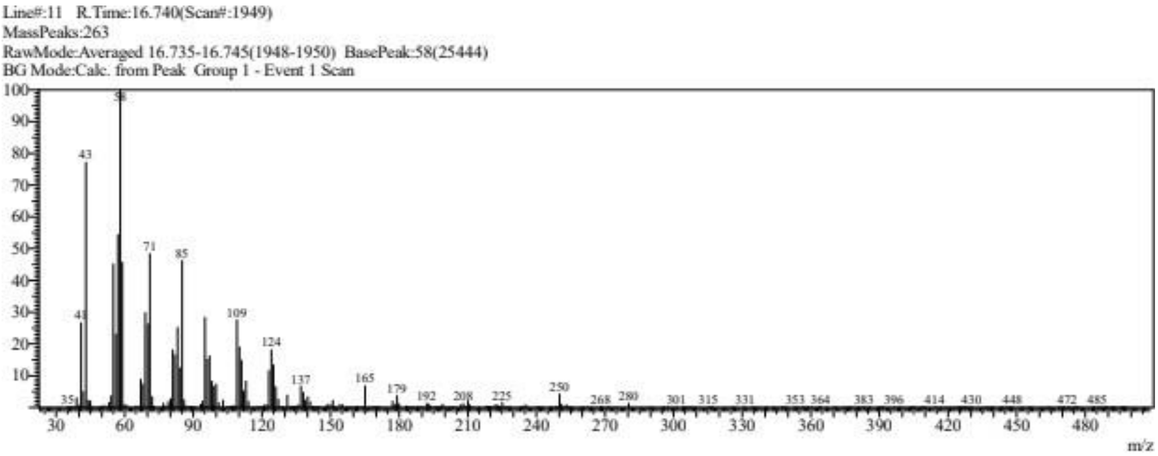
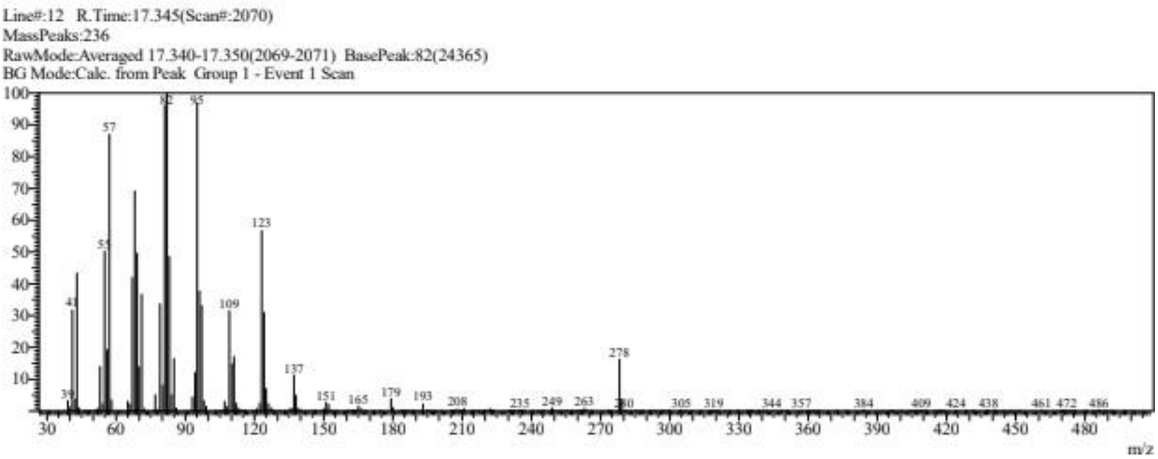
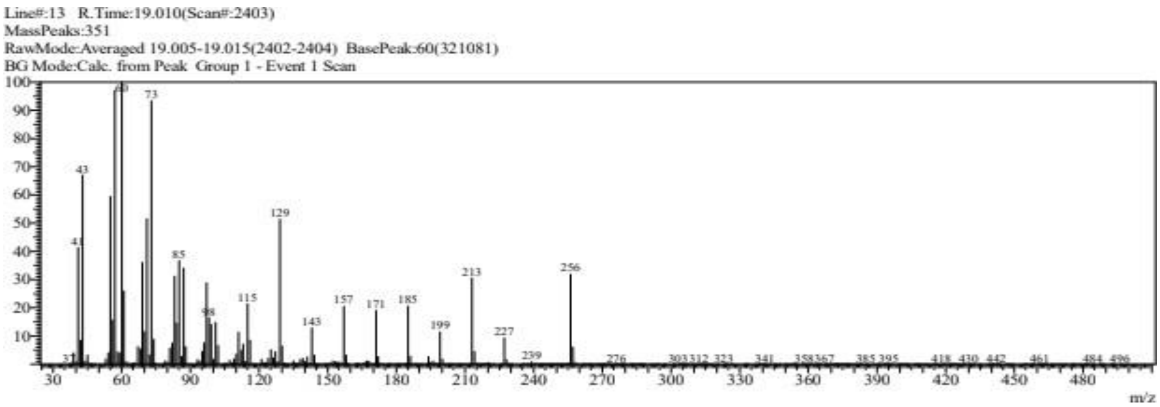
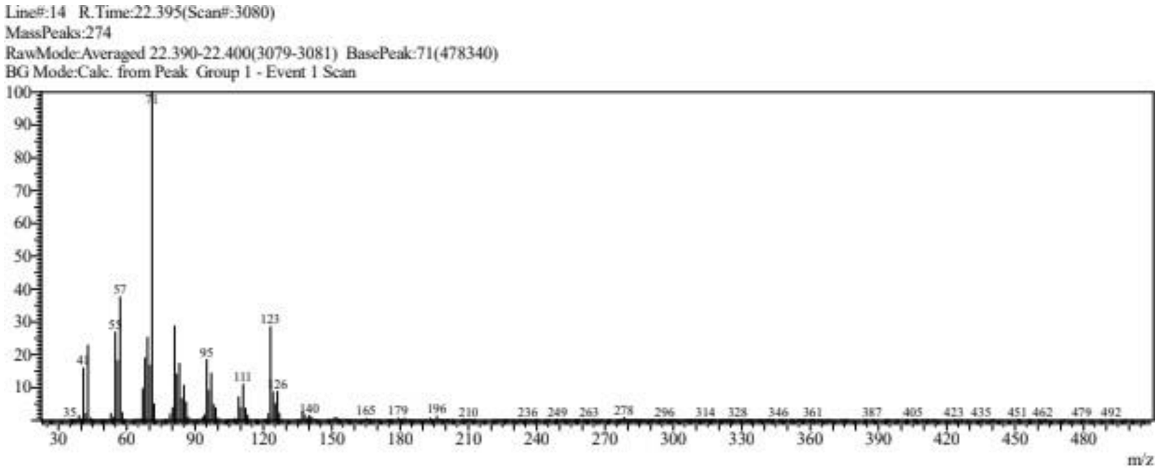
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z

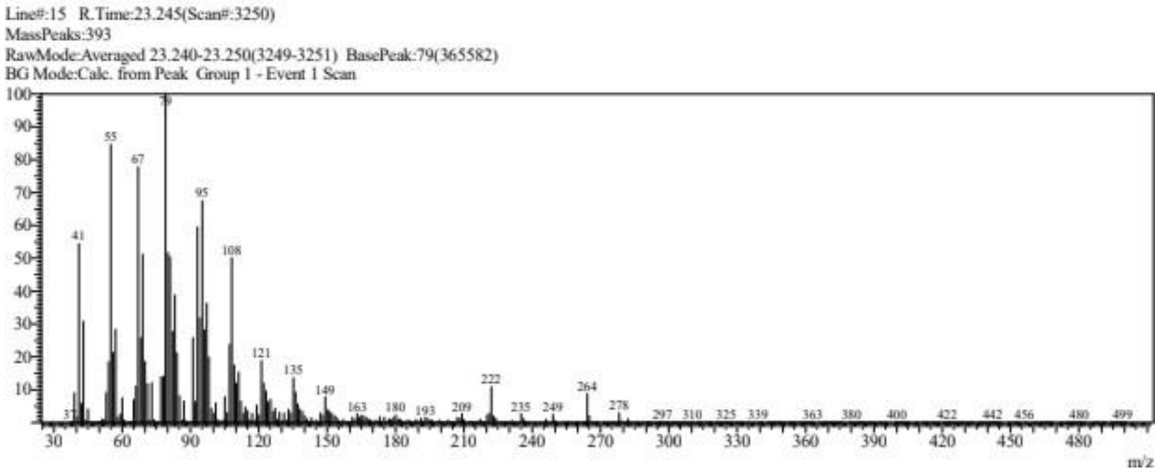

Line#:10 R.Time:16.660(Scan#:1933)
MassPeaks:202
RawMode:Averaged 16.655-16.665(1932-1934) BasePeak:95(81224)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z

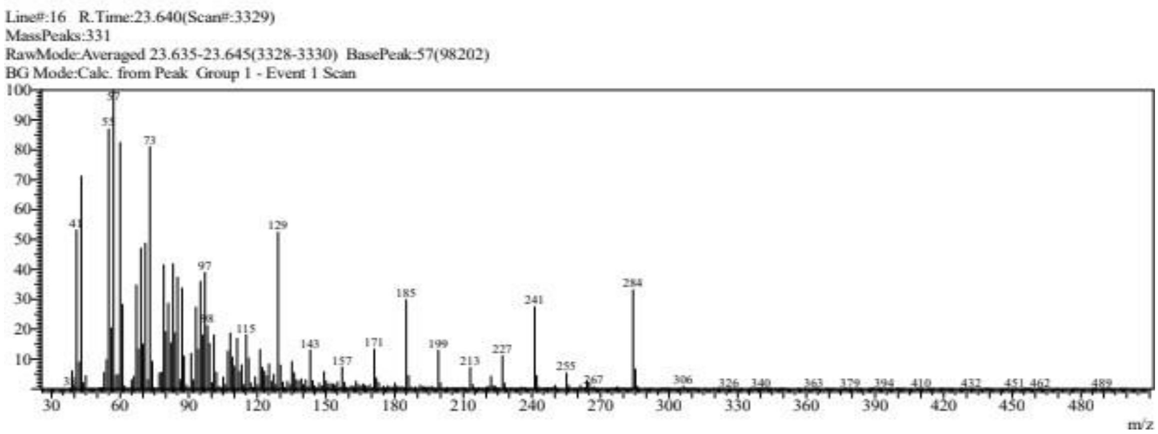

Line#:11 R.Time:16.740(Scan#:1949)
MassPeaks:263
RawMode:Averaged 16.735-16.745(1948-1950) BasePeak:58(25444)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:12 R.Time:17.345(Scan#:2070)
MassPeaks:236
RawMode:Averaged 17.340-17.350(2069-2071) BasePeak:82(24365)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z

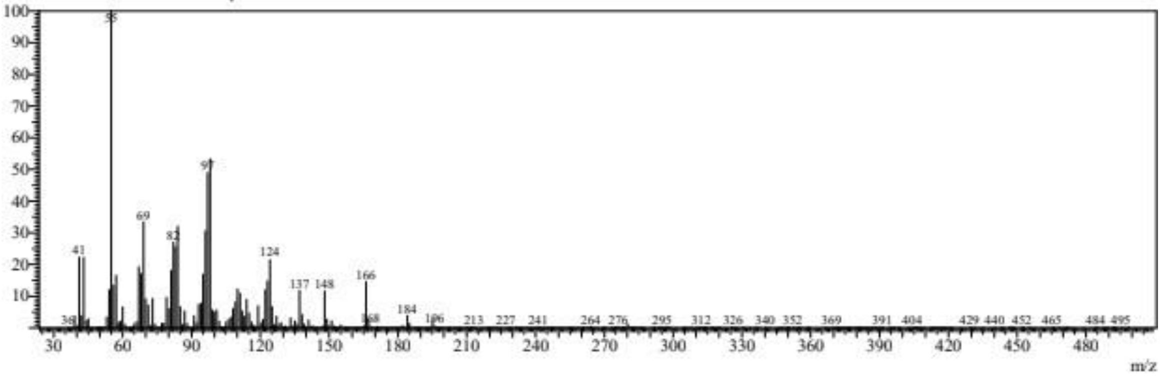

Line#:13 R.Time:19.010(Scan#:2403)
MassPeaks:351
RawMode:Averaged 19.005-19.015(2402-2404) BasePeak:60(321081)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:14 R.Time:22.395(Scan#:3080)
MassPeaks:274
RawMode:Averaged 22.390-22.400(3079-3081) BasePeak:71(478340)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z

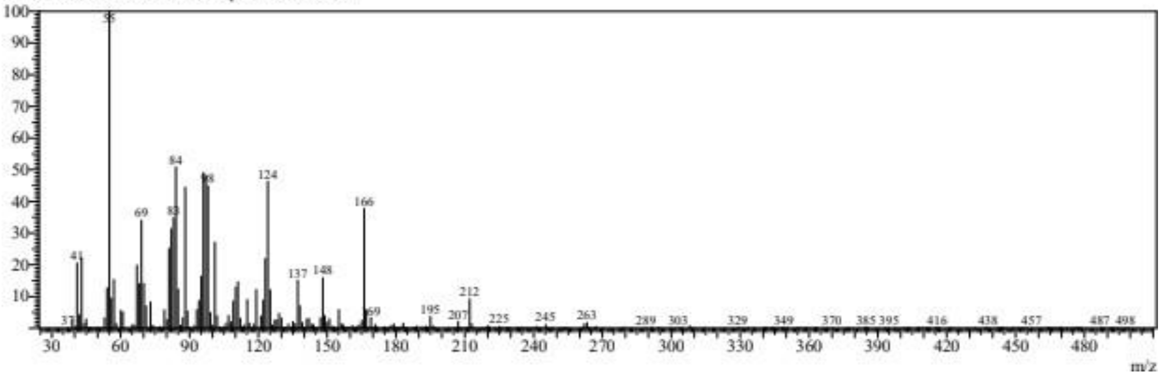

Line#:15 R.Time:23.245(Scan#:3250)
MassPeaks:393
RawMode:Averaged 23.240-23.250(3249-3251) BasePeak:79(365582)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z


Line#:16 R.Time:23.640(Scan#:3329)
MassPeaks:331
RawMode:Averaged 23.635-23.645(3328-3330) BasePeak:57(98202)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan
m/z

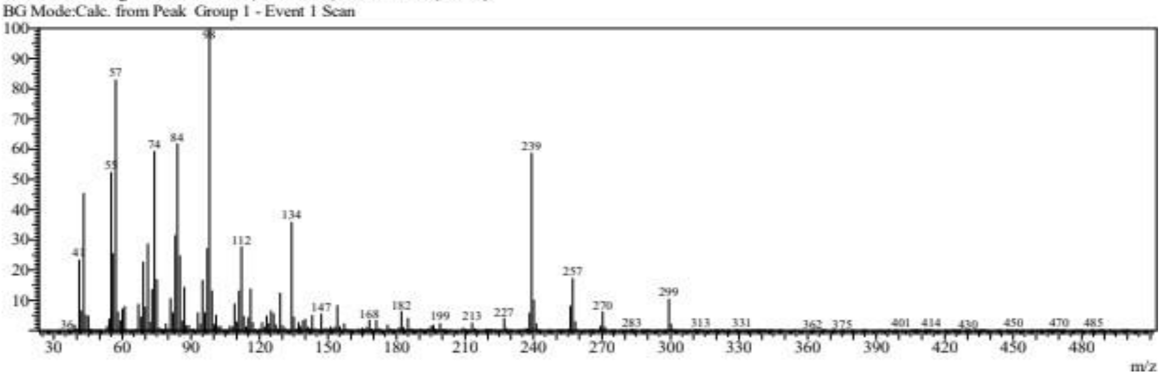
Line#:17 R.Time:26.980(Scan#:3997)
MassPeaks:336
RawMode:Averaged 26.975-26.985(3996-3998) BasePeak:55(122452)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:18 R.Time:27.520(Scan#:4105)
MassPeaks:280
RawMode:Averaged 27.515-27.525(4104-4106) BasePeak:55(22688)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:19 R.Time:30.300(Scan#:4661)
MassPeaks:318
RawMode:Averaged 30.295-30.305(4660-4662) BasePeak:98(48082)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:20 R.Time:30.630(Scan#:4727)
MassPeaks:189
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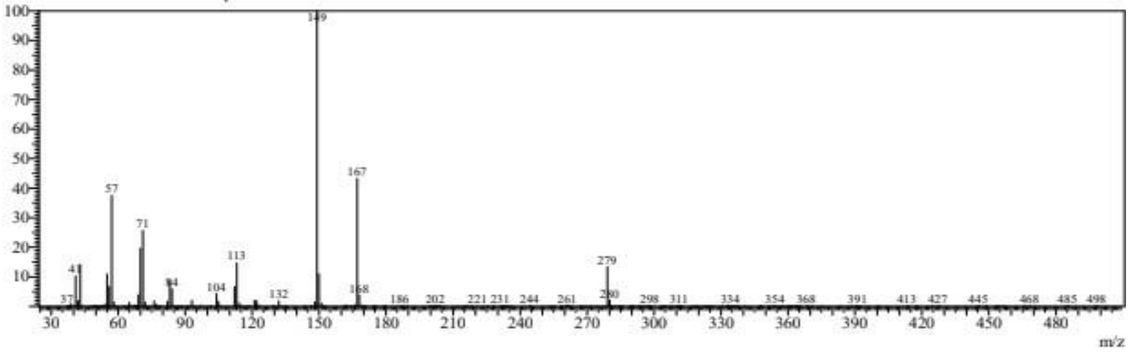
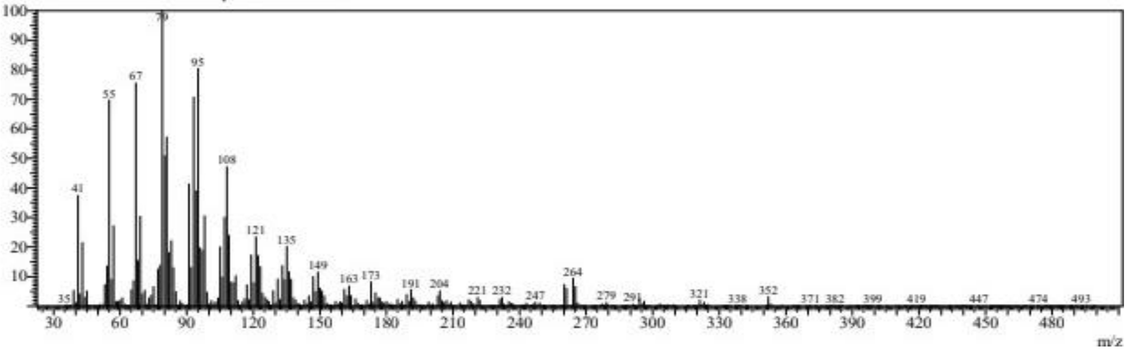
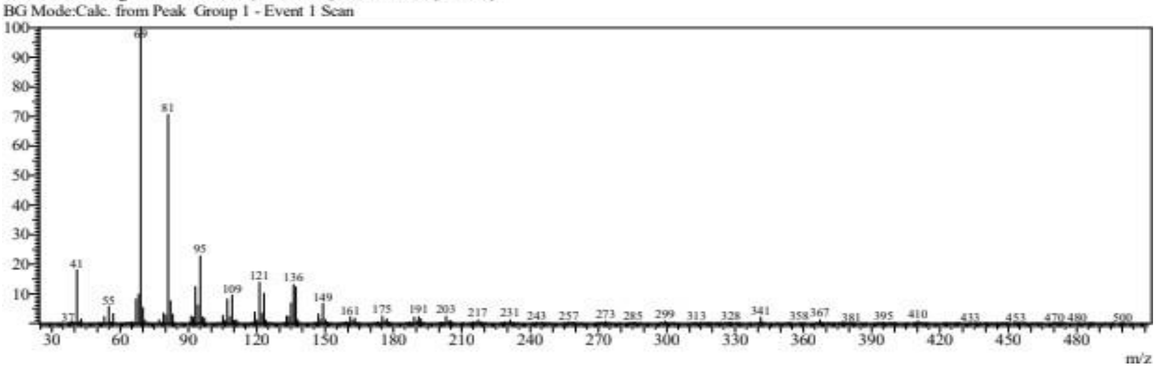


Line#:21 R.Time:33.305(Scan#:5262)
MassPeaks:385
RawMode:Averaged 33.300-33.310(5261-5263) BasePeak:79(53847)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:22 R.Time:35.060(Scan#:5613)
MassPeaks:277
RawMode:Averaged 35.055-35.065(5612-5614) BasePeak:69(417374)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:23 R.Time:42.300(Scan#:7061)
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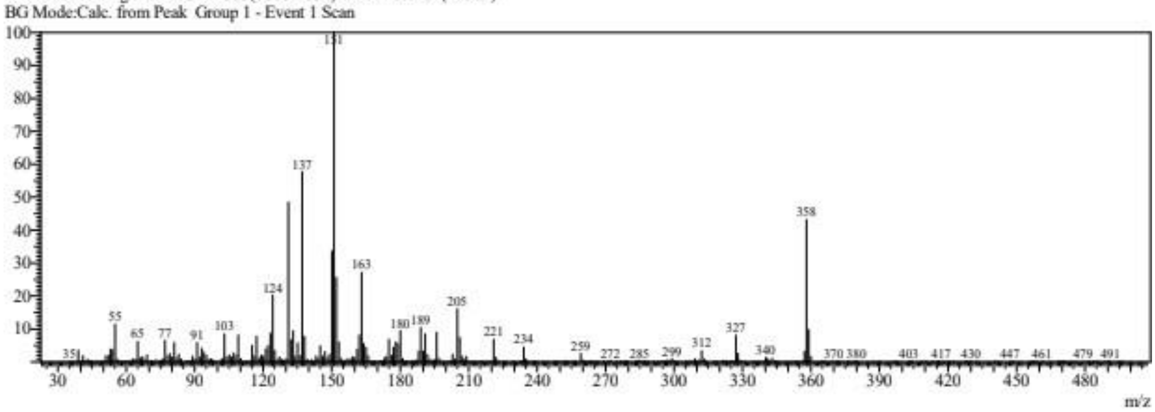
RawMode:Averaged 42.295-42.305(7060-7062) BasePeak:151(42379)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan



Line#:24 R.Time:43.180(Scan#:7237)
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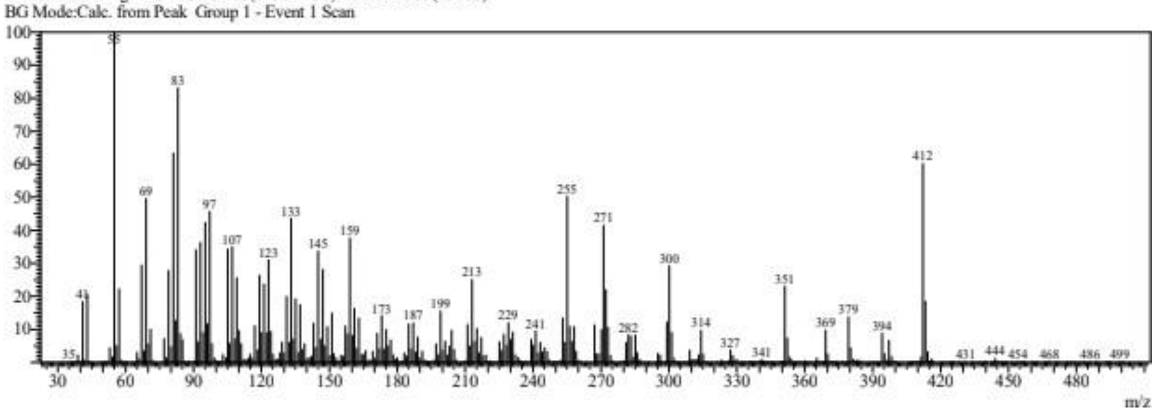
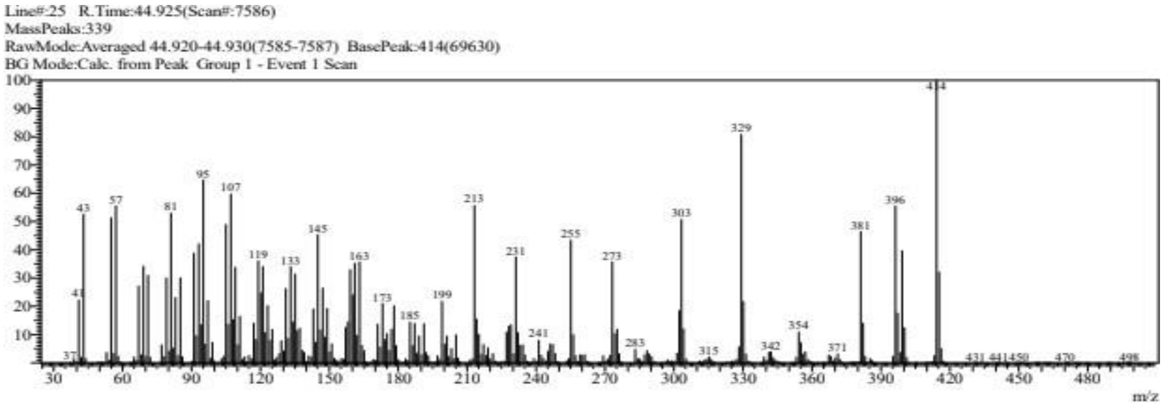
RawMode:Averaged 43.175-43.185(7236-7238) BasePeak:55(23668)
BG Mode:Calc. from Peak Group 1 - Event 1 Scan





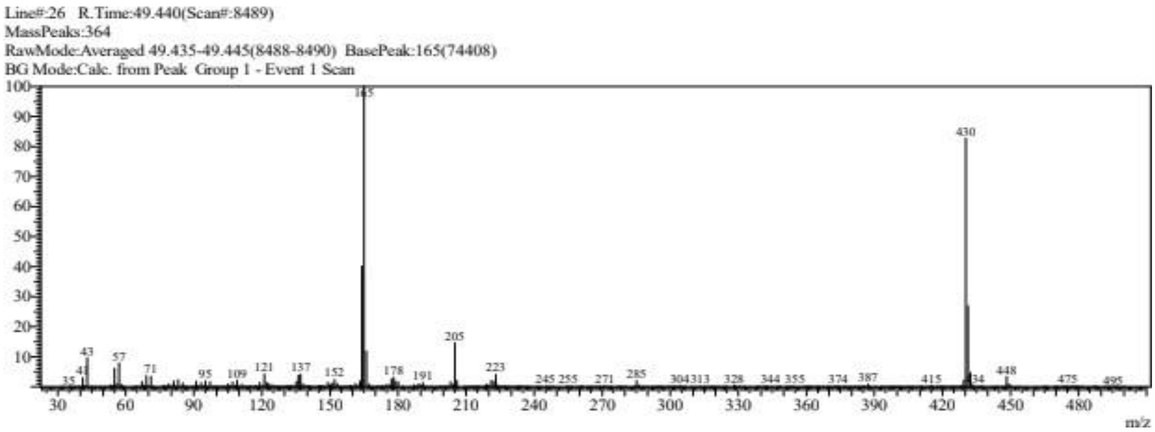


Figure no. 02: Shows the mass spectra of the twenty six phytocompounds identified by GCMS analysis.

Table no. 05: Shows the retention time, molecular weight, molecular formula and name of the compound identified in *jasminum grandiflorum* by GCMS analysis.

Peak	R.Time	Mol wt	Molecular formula	Compound Name
1	7.586	144	C6H8O4	4H-Pyran-4-one, 2,3-dihydro-3,5- dihydroxy-6-methyl-
2	8.843	126.11	$C_6H_6O_3$	5-Hydroxymethylfurfural
3	9.072	134.13	$C_5H_{10}O_4$	1,2,3-Propanetriol, 1-acetate
4	11.679	138	$C_8H_{10}O_2$	Benzeneethanol, 4-hydroxy-
5	13.277	200	$C_{12}H_{24}O_2$	Dodecanoic acid
6	13.337	180	$C_{10}H_{12}O_3$	Tyrosol, acetate
7	15.249	196	$C_{10}H_{12}O_4$	2-Propanone, 1-hydroxy-3-(4-hydroxy-3-methoxyphenyl)-
8	15.611	228.37	$C_{14}H_{28}O_2$	Tetradecanoic acid
9	16.125	222	$C_{13}H_{18}O_3$	(+)-(S)-Dehydrovomifoliol
10	16.662	278.52	$C_{20}H_{38}$	Neophytadiene
11	16.742	268	$C_{18}H_{36}O$	2-Pentadecanone, 6,10,14-trimethyl-
12	17.348	128.13	$C_6H_8O_3$	2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one
13	19.012	256.42	$C_{16}H_{32}O_2$	n-Hexadecanoic acid
14	22.395	296	$C_{20}H_{40}O$	Phytol
15	23.247	288.26	$C_{15}H_{25}Cl_2O_2$	Dichloroacetic acid, tridec-2-ynyl ester
16	23.638	284	$C_{18}H_{36}O_2$	Octadecanoic acid
17	26.982	298	$C_{18}H_{34}O_3$	Ricinoleic acid
18	27.522	330.52	$C_{20}H_{38}O_3$	9-Octadecenoic acid, 12-hydroxy-, ethyl ester, [R-(Z)]-
19	30.301	330	$C_{19}H_{38}O_4$	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester
20	30.629	390.56	$C_{24}H_{38}O_4$	Bis(2-ethylhexyl) phthalate
21	33.304	278.43	$C_{57}H_{90}O_6$	9,12,15-Octadecatrienoic acid, 2,3-dihydroxypropyl ester, (Z,Z,Z)-
22	35.060	410	$C_{30}H_{50}$	Squalene

23	42.302	322	$C_{17}H_{22}O_6$	Phenol, 4,4'-(tetrahydro-1H,3H- furo[3,4-c]furan-1,4-diyl)bis[2-methoxy-
24	43.178	412.69	$C_{29}H_{48}O$	Stigmasterol
25	44.927	414	$C_{29}H_{50}O$	.gamma.-Sitosterol
26	49.439	546.77	$C_{31}H_{54}O_8$	.alpha.-Tocopherol-.beta.-D-mannoside

CONCLUSION

GC–MS analysis of the ethanolic extract of *Jasminum grandiflorum* leaves revealed the presence of twenty-six phytochemical constituents, including fatty acids, terpenoids, sterols, phenolics, and glycosides. Notable bioactive compounds identified were 5-Hydroxymethylfurfural, Dodecanoic acid, Ricinoleic acid, Phytol, Squalene, Stigmasterol, γ-Sitosterol, and α-Tocopherol-β-D-mannoside, which are known for their antioxidant, anti-inflammatory, antimicrobial, wound-healing, and cytoprotective activities. The presence of these compounds scientifically validates the traditional medicinal uses of *J. grandiflorum* and highlights its potential as a source of bioactive molecules for pharmaceutical, nutraceutical, and therapeutic applications. Further pharmacological and clinical studies are warranted to explore the full potential of these bioactive constituents.

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