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DETERMINATION OF BIOACTIVE COMPOUNDS IN LEAVES OF *UROSPERMUM PICROIDES* (L.) DESF

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Abstract

A total of thirty- three bioactive chemical compounds in the methanolic extract of *Urospermum picroides* (L.) Desf. leaves were identified, the identification was done using GC-MS technique, and based on Retentoin time, peak area, molecular Weight and exact mass. The compounds encompass. 1.6-Anhydro-2.4-dideoxy-β-D-arabo-hexopyranose, 2-(Benzylsulfanyl-fluoro-methylene) – malonic acid dir, Pyrido [2.3-d] pyrimidine -2.4.7(1H.3H.8H)-trione. 8-b, 3.6-Octadecadiynoic acid. methyl ester, 3-Isopropyl-2-phenyl-pent-4-en-2-ol, 2-Dodecenal. (E)-, 2-Dodecenoic acid, 5.7-Dodecadiyn-1.12-diol, d-Lyxo-d-manno-nonoic-1.4-lactone, Cyclopropaneacetic acid. 2-hexyl-, 10.12-Octade cadiynoic acid, 2H-Indeno [1.2-b] furan-2-one. 3.3.a.4.5.6.7.8.8b-oct, 3-Hydroxy-7.8-dihydro-β-ionol, 3-(N.N-Dimethyllaurylammonio) propanesulfonate, 3(N.N-Dimethylmyristylammonio) propanesulfonate, (7R.8R)-Ethyl8-hydroxy-trans-bicyclo [4.3.0]-3-none, Tetra decanoic acid, 9.10-Dimethyltricyclo [4.2. 1.1(2.5)] decane – 9.10-diol, 2.6.8-Trimethylbicyc lo [4.2.0] oct-2-ene-1.8-diol, Butyl 9-hexadecenoate, 3.6.9.12-Tetraoxatetradecan-1-ol.14 [4-(1.1.3.3-tet, Cinnamic acid. 4-hydroxy-3-methoxy-.{5-hydroxy-2-, trans -13-Octadecenoic acid, Octadecanoic acid,7-Methyl-Z-tetradecen-1-ol acetate, [1.1'-Bicyclopro pyl] -2-octanoic acid. 2'-hexyl-.meth, 14.15.16-Trinor-8 xi.-labdan-6β-ol. 8. 13-epoxy-, 2-(1-Butyl-2-nitroallyl)cyclohexanone, Benzeneethanamine, 2.5-difluoro-β.3.4-trihydroxy-,6-Octa decenoic acid. (Z)-, Hexadecanoicacid. 2-hyd roxy-1-(hydroxymethyl)eth, Diisooctyl phthalate, β-Tocopherol. Which fatty acids.,their derivatives and alchohols are the compounds most frequently isolated in the leaves of the species,in addition to alkaloids,sesquiterpene lactone and other known compounds.these compounds may be important as antioxidant, antimicrobial, antiinflammentory.

Key words : *Urospermum*, Hyphochaeridinae, Asteraceae, Sesquiterpene lactone.

Introduction

The genus *Urospermum picroides* (L.) Desf. Belongs to the family Asteraceae; tribe : Lactuceae ; sub tribe : Hyphochaeridinae (Enk. *et al*., 2012). It includes two wild species in the Mediterranean region (Thomb, 1977 ; Thompson, 2007), only one species for the genus was found in Iraq (Ridda & Daood, 1982). The genus has many chemical classes of secondary compounds include phenoics (Giner *et al*., 1992), (Enk. *et al*., 2012), indole-alkaloids (Ji *et al*., 2008) Glycosides (Amer *et al*., 1984), (Balboul *et al*., 1997), Saponin, tannin and flavonoids (Enk. *et al*., 2012), (El-Amier *et al*., 2016) and sesquiterpene lactone, (Balboul *et al*., 1997), (Killan *et al*., 2009). From the literature, no chemical studies on the genus *Urospermum* in Iraq. Thus, we have studied the occurrence of different chemical compounds in the leaves of the genus to obtain a better chemotaxanomic description for it.

Materials and Methods

Collection and preparation of plant materials

Urospermum picroides (L.) Desf. Leaves were collected through field trips from different localities in the central and south of Iraq. After cleaning and removal foreign materials the leaves were washed with tap water then with distilled water and dried under shed for ten days at room temperature. Dried leaves stored in airtight container at room temperature until further use. Eighteen gram of each methanolic extract of plants powdered were soaked in 40 ml methanol for ten hours in a rotator shaker (Huda *et al*., 2015a). Whatman No.1 filter paper was used to separate the extract of plant and again filtered through sodium sulphate in order to remove the moisture.

Gas chromatography – mass spectrum (GC/MS)

analysis.

The GC-MS analysis of the plants extract was made in a (QP 2010 Plus SHIMADZU) instrument under computer control at 70 eV. About 1µL of them ethanol extract was injected into the GC-MS using a micro syringe and the scanning was done for 45minutes. As the compounds were separated, they eluted from the column and entered a detector which was capable of creating an electronic signal whenever a compound was detected. The greater the concentration in the sample, bigger was the signal. obtained which was then processed by a computer. The time from when the injection was made (Initial time) to when elution occurred is referred to as the; Retention Time (RT) (Mohammed and Imad, 2013; Muhanned *et al*., 2015; Imad *et al*., 2014a). While the instrument was run, the computer generated a graph from the signal called a Chromatogram. Each peak in the chromatogram represents the signal created when a compound eluted from the Gas chromatography column into the detector. The X-axis showed the RT and the Y-axis measured the intensity of the signal to quantify the component in the sample injected. As individual compounds eluted from the Gas chromatographic column, they entered the electron ionization (mass spectroscopy) detector, where they were bombarded with a stream of electrons causing them to break apart into fragments. The fragments obtained were actually/ charged ions with a certain mass. The M/Z (Mass/Charge) ratio obtained was calibrated from the graph obtained, which was called as the Mass spectrum graph which is the fingerprint of a

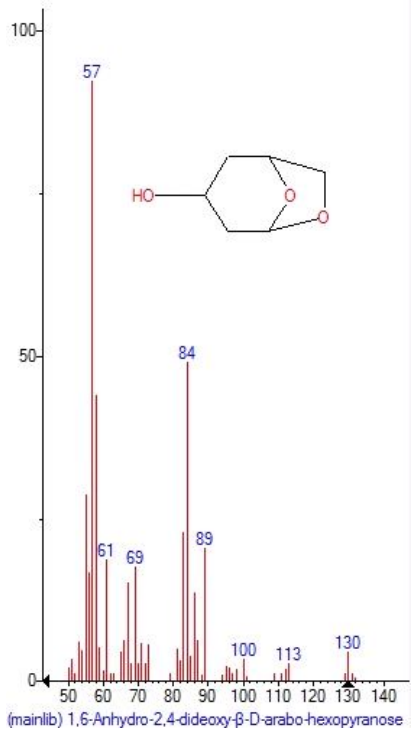
Table 1: Major Phytochemical compound identified in methanolic extract of *Urospermum picroides*

S. No.	Phytochemical compound	RT (min)	Exact mass	Nature of compound
1	1.6-Anhydro-2.4-dideoxy-β-D-arabo-hexopyranose	3.630	130.062994	Glycoside
2	2-(Benzylsulfanyl-fluoro-methylene) – malonic acid dir	3.825	284.051859	Alcohol
3	Pyrido[2.3-d]pyrimidine-2.4.7(1H.3H.8H)-trione. 8-b	3.836	313.106256	Alkaloid
4	3.6-Octadecadiynoic acid. methyl ester	4.174	290.22458	Fatty acid ester
5	3-Isopropyl-2-phenyl-pent-4-en-2-ol	4.638	204.151415	Alcohol
6	2-Dodecenal. (E)-	5.633	182.167066	Fatty acid ester
7	2-Dodecenoic acid	6.697	198.16198	Fatty acid
8	5.7-Dodecadiyn -1.12-diol	7.630	194.13068	Fatty acid
9	d-Lyxo-d-manno-nonoic-1.4- lactone	7.630	268.079432	Carbonyl compound
10	Cyclopropaneacetic acid. 2-hexyl-	7.659	184.14633	Propanoic acid
11	10.12-Octadecadiynoic acid	8.317	276.208931	Fatty acid
12	2H-Indeno[1.2-b]furan-2-one. 3.3a.4.5.6.7.8.8b-oct	8.488	206.13068	Hydrocarbon
13	3-Hydroxy-7.8-dihydro-β-ionol	10.503	208.14633	Alcohol
14	3-(N.N-Dimethyllaurylammonio) propanesulfonate	9.719	335.249414	Alkaloid
15	3(N.N-Dimethylmyristylammonio) propanesulfonate	12.025	363.280716	Alkaloid
16	(7R.8R)-Ethyl 8-hydroxy-trans-bicyclo[4.3.0]-3-none	12.242	210.125594	Sesquiterpene
17	Tetradecanoic acid	12.648	228.20893	Fatty acid
18	9.10-Dimethyltricyclo [4.2.1.1(2.5)]decane –9.10-diol	12.837	196.14633	Alcohol
19	2.6.8-Trimethylbicyclo [4.2.0]oct-2-ene-1.8-diol	13.060	182.13068	Alcohol
20	Butyl 9-hexadecenoate	14.096	310.28718	Butanoic acid
21	3.6.9.12-Tetraoxatetradecan-1-ol.14[4-(1.1.3.3-tet	14.096	426.29814	Alcohol
22	Cinnamic acid. 4-hydroxy-3-methoxy-.{5-hydroxy-2-	14.079	652.23672	Aromatic compound
23	trans -13-Octadecenoic acid	15.830	282.25588	Fatty acid
24	Octadecanoic acid	16.619	284.27153	Stearic acid
25	7-Methyl-Z-tetradecen-1-ol acetate	16.808	268.24023	Hydrocarbon
26	[1.1'-Bicyclopropyl]-2-octanoic acid. 2'-hexyl-.meth	17.034	322.28718	Hydrocarbon
27	14.15.16-Trinor-8 xi.-labdan-6β-ol. 8. 13-epoxy-	17.775	266.22458	Alcohol
28	2-(1-Butyl-2-nitroallyl) cyclohexanone	17.588	239.1521435	Alcohol
29	Benzeneethanamine. 2.5-difluoro-β.3.4-trihydroxy-	18.319	219.0707	Alcohol
30	6-Octadecenoic acid. (Z)-	19.246	282.25588	Fatty acid
31	Hexadecanoicacid. 2-hydroxy-1-(hydroxymethyl)eth	19.446	330.27701	Fatty acid
32	Diisooctyl phthalate	19.749	390.27701	Sesquiterpene
33	β-Tocopherol	23.938	416.36543	Sterol

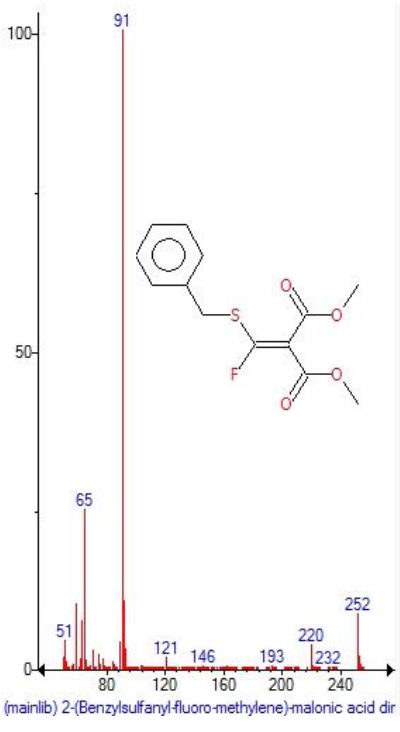
molecule. Before analyzing the extract using Gas Chromatography and Mass Spectroscopy, the temperature of the oven the flow rate of the gas used and the electron gun were programmed initially (Imad *et al*., 2014b). The temperature of the oven was maintained at. Helium gas was used as a carrier as well as 10^0C an eluent. The flow rate of helium was set to 1ml per minute. The electron gun of mass detector liberated electrons having energy of about 70eV. The column employed here for the separation of components was Elite 1 (100% dimethyl poly siloxane). The identity of the components in the extracts was assigned by the comparison of their retention indices and mass spectra fragmentation patterns with those stored on the computer library and also with published literatures. Compounds were identified by comparing their spectra to those of the Wiley and NIST/ EPA/NIH mass spectral libraries (Imad *et al*., 2015c).

Results & Discussion

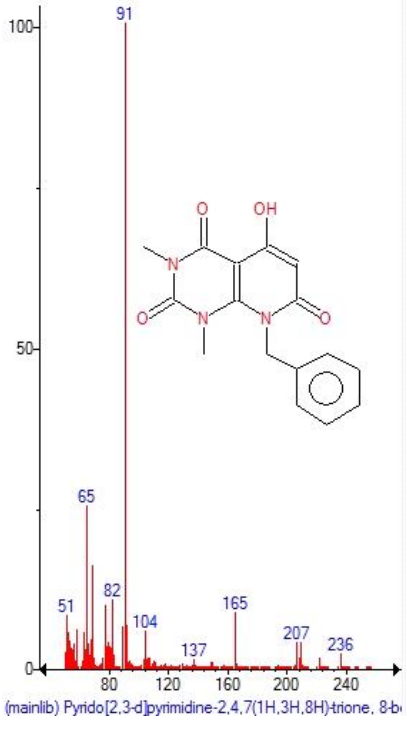
The phytochemical analysis of *Urospermum picroides* (L.) Desf. Leaves by using GC-MS mechanism indicated that the plant is rich different secondary compounds (El-Amier *et al*., 2016). Compounds 1-33 (Table 1) were identified as fatty acids, include, 3.6-Octadecadiynoic acid. methyl ester, 2-Dodecenal. (E)-, 2-Dodecenoic acid, 5.7-Dodecadiyn-1.12-diol, 10.12-Octade cadiynoic acid, Tetra decanoic acid, trans -13-Octadecenoic acid, Octadecanoic acid, 6-Octa decenoic acid. (Z)-, Hexadecanoicacid. 2-hyd roxy-1-(hydroxymethyl) eth. Alcohols include 2-(Benzylsulfanyl-fluoro-methylene) – malonic acid dir, 3-Isopropyl-2-phenyl-pent-4-en-2-ol, 3-Hydroxy-7.8-dihydro-β-ionol, 9.10-Dimethyltricyclo [4.2. 1.1(2.5)] decane – 9.10-diol, 2.6.8-Trimethylbicyc lo [4.2.0] oct-2-ene-1.8-diol, 3.6.9.12-Tetraoxatetradecan-1-ol.14 [4-(1.1.3.3-tet, 14.15.16-Trinor-8 xi.-labdan-6β-ol. 8. 13-epoxy-, 2-(1-Butyl-2-nitroallyl) cyclohexanone, Benzeneethanamine, 2.5-difluoro-β.3.4-trihydroxy- these compounds are the most common followed by alkaloids which include Pyrido [2.3- d]pyrimidine- 2.4.7 (1H.3H.8H) -trione. 8-b, 3(N.N-Dimethylmyristylammonio) propanesulfonate, Hydrocarbon include. 2H-Indeno[1.2-b] furan-2-one. 3.3.a.4.5.6.7.8.8b-oct,7-Methyl-Z-tetradecen-1-ol acetate, [1.1'-Bicyclopro pyl] -2-octanoic acid. 2'-hexyl-.meth,Organic acids include Cyclopropaneacetic acid. 2-hexyl-, Butyl 9-hexadecenoate, sesquterpene lactones include.(7R.8R)-Ethyl8-hydroxy-trans-bicyclo [4.3.0]-3-none, Diisooctyl phthalate, with other compounds. 1.6-Anhydro-2.4-dideoxy-β-D-arabo-hexopyranose,as glycoside, Cinnamic acid. 4-hydroxy-3-methoxy-.{5-hydroxy-2- as aromatic compounds and β-Tocopherol as



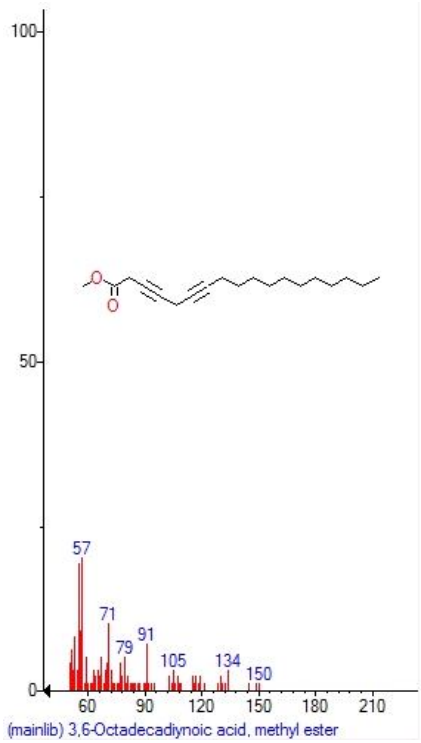
Phytochemical compound:1.6-Anhydro-2.4- dideoxy - β-D-arabo-hexopyranose RT (min): 3.630
Molecular Weight : 130.062994



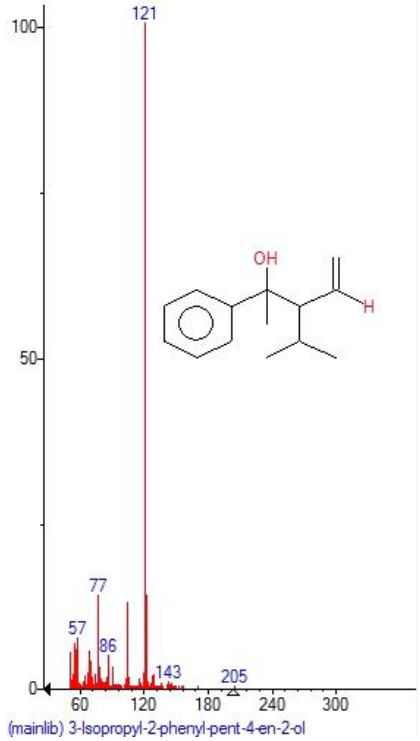
Phytochemical compound:2-(Benzylsulfanyl -fluoro-methylene) – malonic acid dir RT (min): 3.825
Molecular Weight : 284.051859



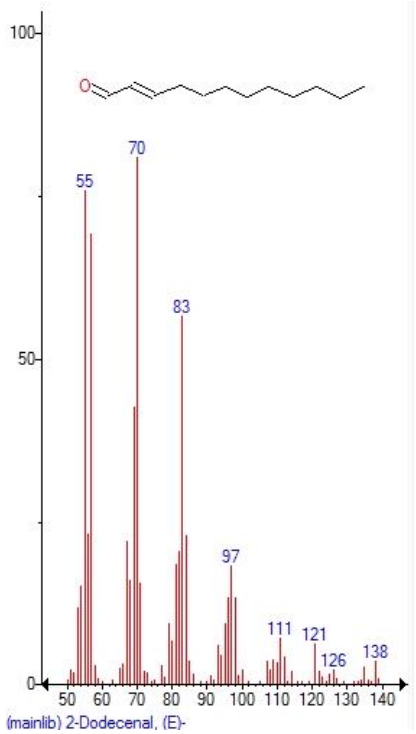
Phytochemical compound:Pyrido[2.3-D-] pyrimidine-2.4.7(1H.3H.8H)-trione. 8-b
RT (min): 3.836
Molecular Weight : 313.106256



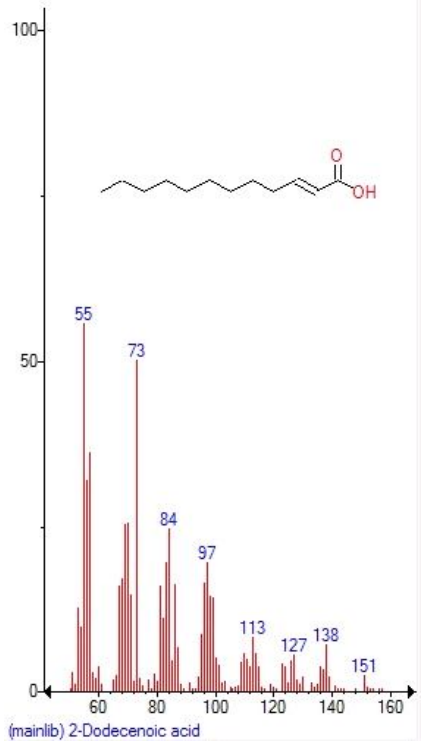
Phytochemical compound:3.6-Octadecadiynoic acid. methyl ester
RT (min): 4.174 RT
Molecular Weight : 290.22458



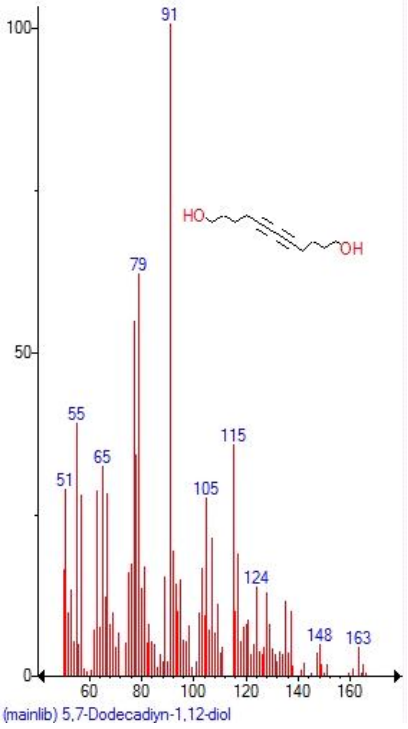
Phytochemical compound:3-Isopropyl-2-phenyl-pent-4-en-2-ol
RT (min): 4.638
Molecular Weight : 204.151415



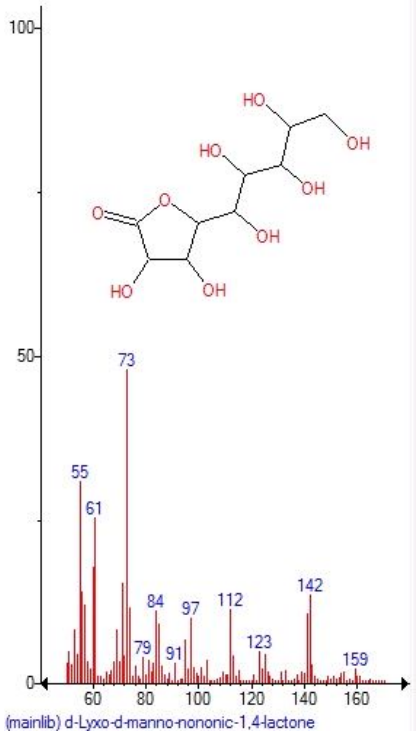
Phytochemical compound : 2-Dodecenal. (E)-
RT (min): 5.633
Molecular Weight : 182.167066



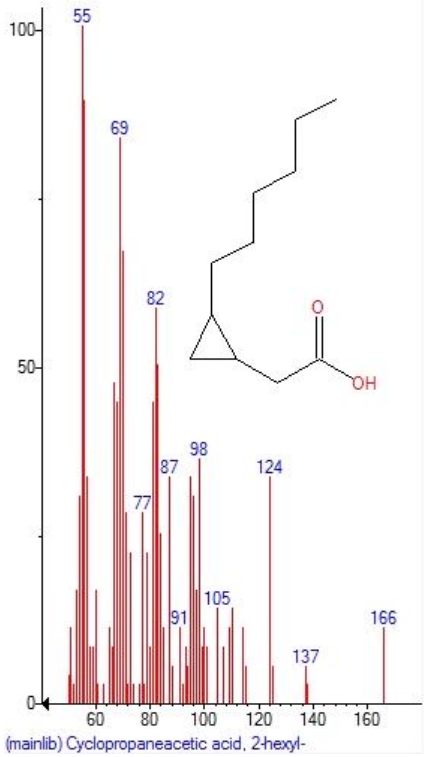
Phytochemical compound:2-Dodecenoic acid
RT (min): 6.697
Molecular Weight : 290.22458



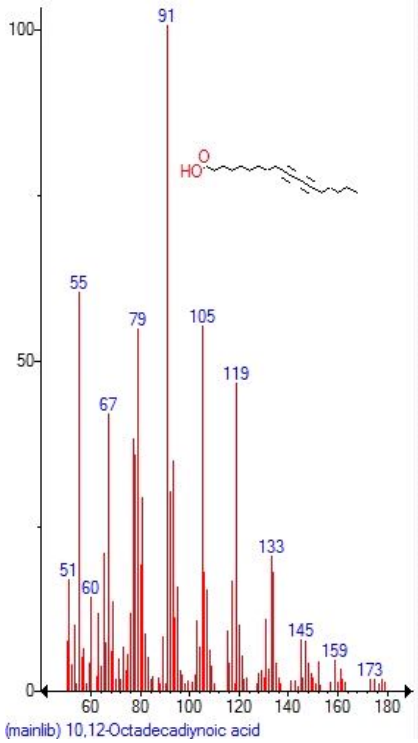
Phytochemical compound:5.7-Dodecadiyn -1.12-diol
RT (min): 7.630
Molecular Weight : 194.13068



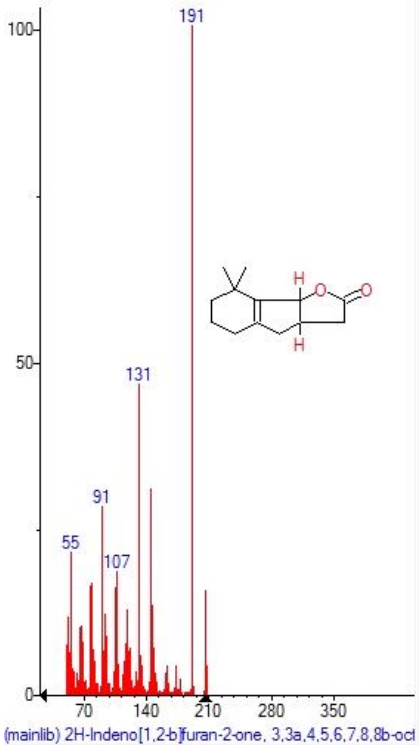
Phytochemical compound:d-Lyxo-d-manno-nonoic-1.4- lactone
RT (min): 7.630
Molecular Weight :268.079432



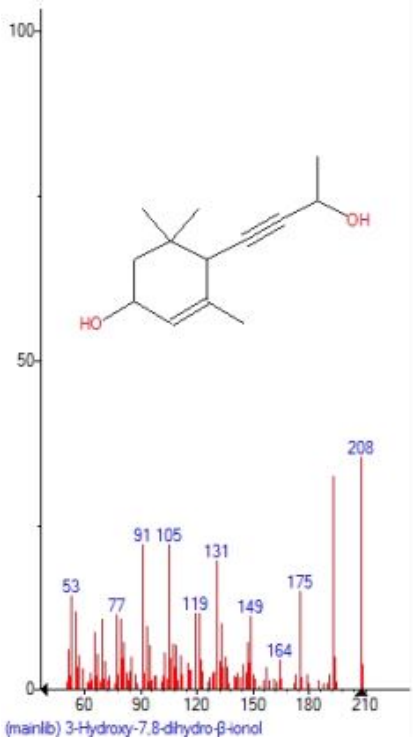
Phytochemical compound: Cyclopropaneacetic acid. 2-hexyl-RT (min): 7.659
Molecular Weight :184.14633



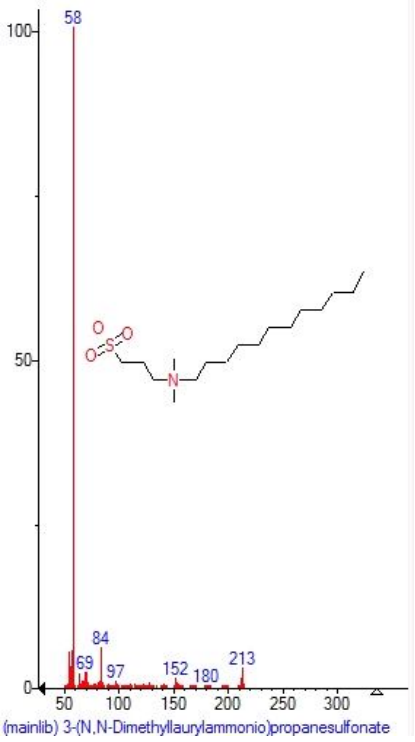
Phytochemical compound : 10.12-Octadec adiynoic
RT (min): 8.317
Molecular Weight : 276.208931



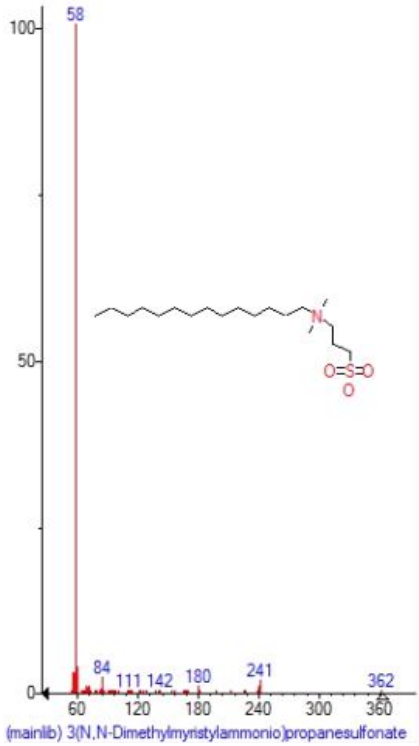
Phytochemical compound:2H-Indeno[1.2-b] furan-2-one. 3.3a. 4.5.6.7.8.8b- oct RT (min): 8.488
Molecular Weight : 206.13068



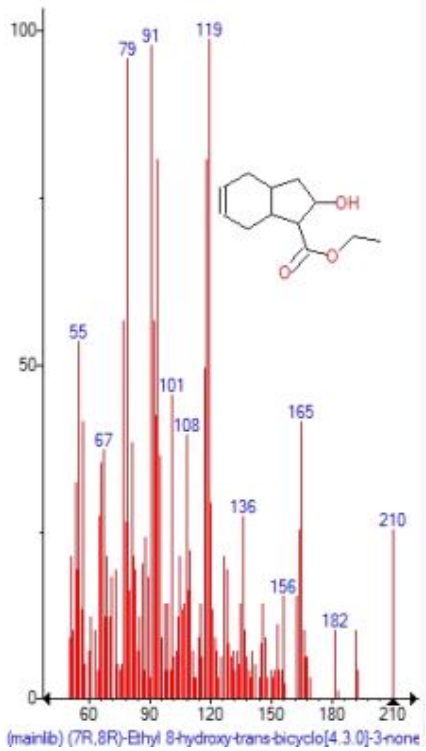
Phytochemical compound:3-Hydroxy-7.8- dihydro -β-ionol
RT (min): 10.503 RT
Molecular Weight : 208.14633



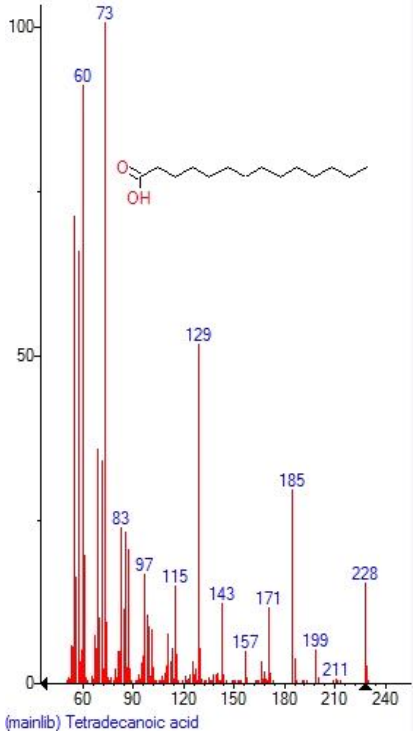
Phytochemical compound:3-(N.N-Dimethylla urylammonio) propanesulfonate RT (min): 9.719
Molecular Weight : 335.249414



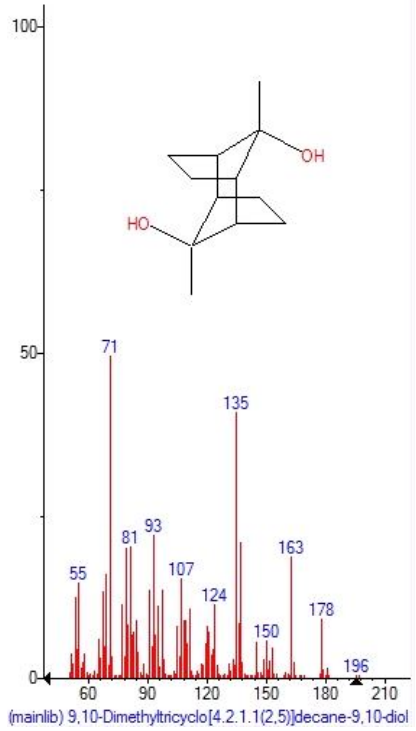
Phytochemical compound:3(N.N-Dimethylmyristylammonio) propanesulfonate RT (min): 12.025
Molecular Weight : 363.280716



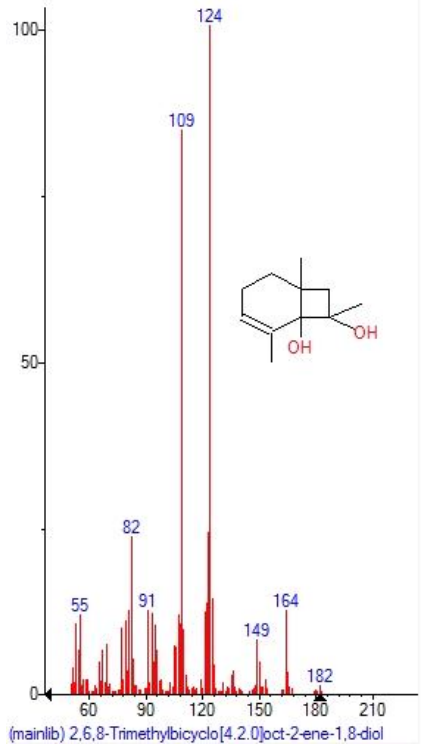
Phytochemical compound:(7R.8R)-Ethyl 8-hydroxy-trans-bicyclo[4.3.0]-3- None
RT (min): 12.242
Molecular Weight : 210.125594



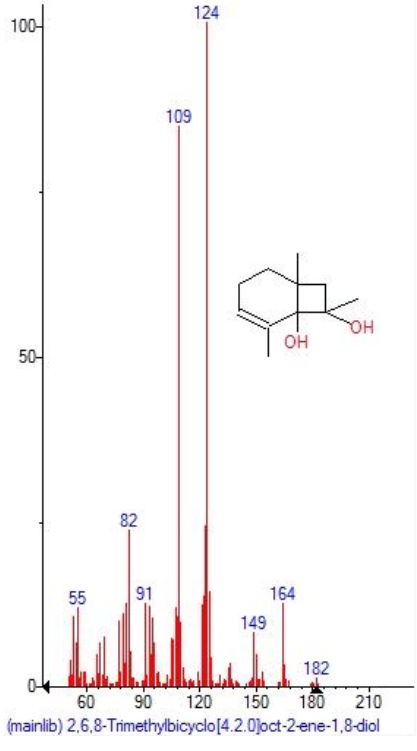
Phytochemical compound:
Tetradecanoic acid
RT (min): 12.648
Molecular Weight : 228.20893



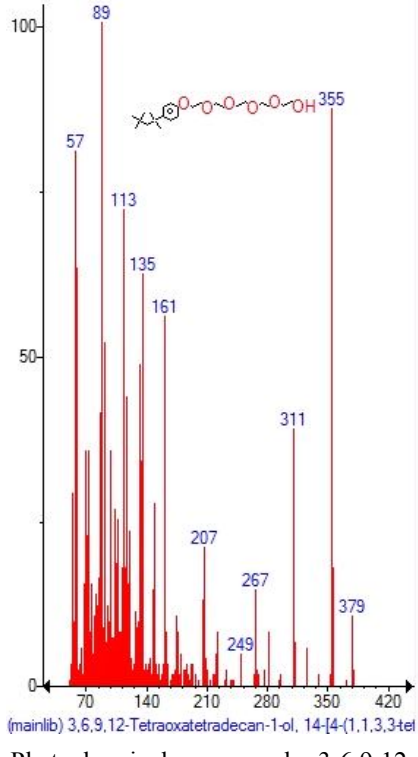
Phytochemical compound:9.10-Dimethyltricyclo [4.2.1.1(2.5)]decane – 9.10-diol RT (min): 12.837
Molecular Weight : 196.14633



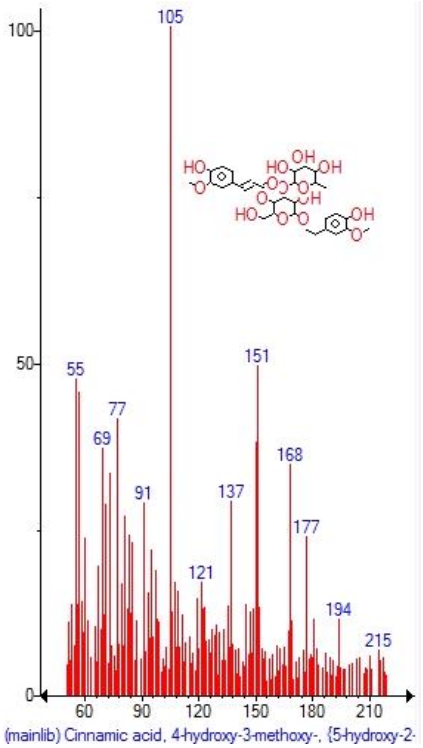
Phytochemical compound:2.6.8-Trimethylbicyclo [4.2.0]oct-2-ene-1.8-diol
RT (min): 13.060
Molecular Weight : 182.13068



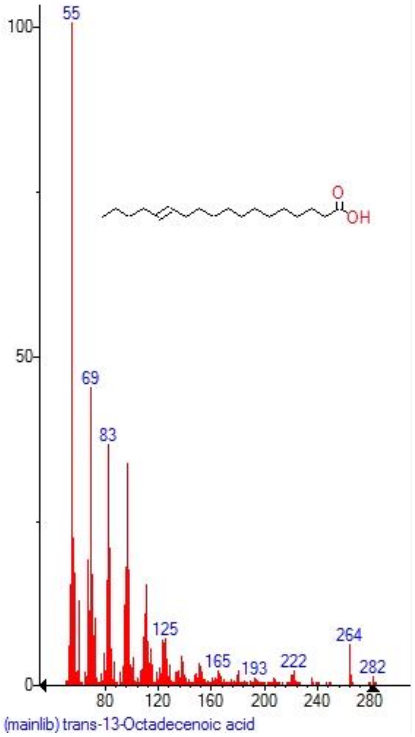
Phytochemical compound:Butyl 9-hexadecenoate
RT (min): 14.096
Molecular Weight :310.28718



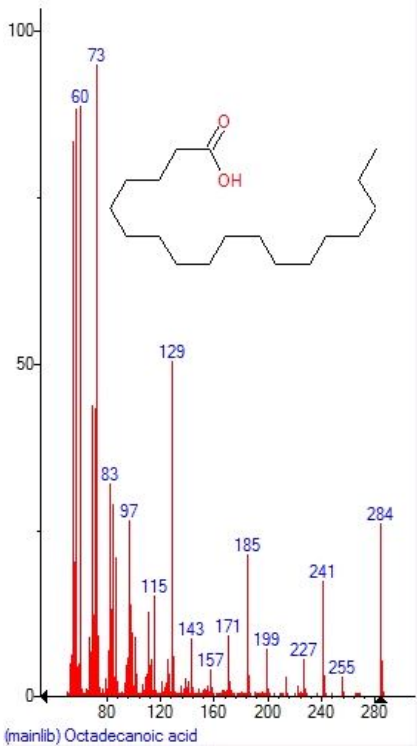
Phytochemical compound : 3.6.9.12-Tetraoxa tetradecan-1-ol.14[4-(1.1.3.3-tet
RT (min): 14.096
Molecular Weight :426.29814



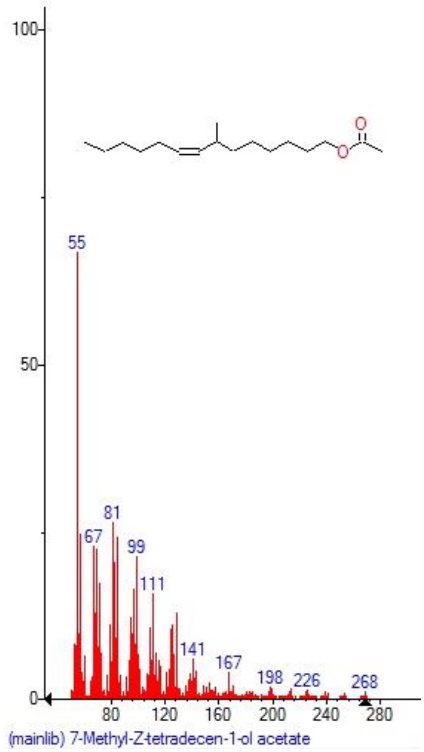
Phytochemical compound:Cinnamic acid.4-hydroxy-3-methoxy-.{5-hydroxy-2- RT (min): 14.079
Molecular Weight : 652.23672



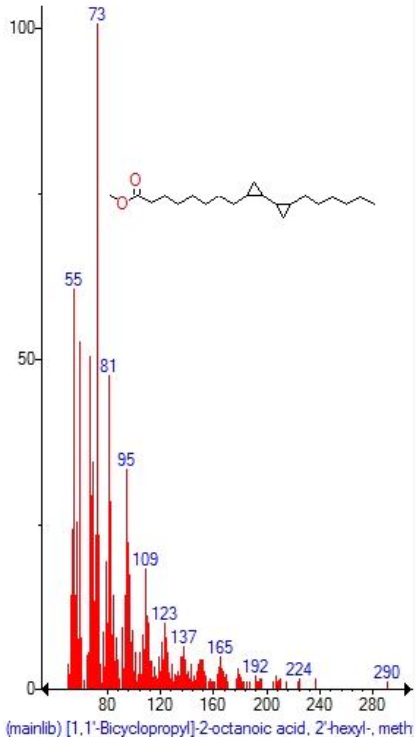
Phytochemical compound:trans -13-Octadecenoic acid
RT (min): 15.830
Molecular Weight : 282.25588



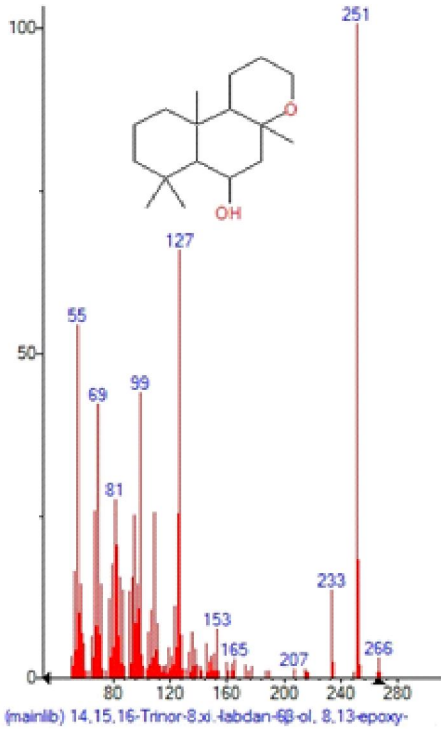
Phytochemical compound:Octa decanoic acid
RT (min): 16.619
Molecular Weight : 284.27153



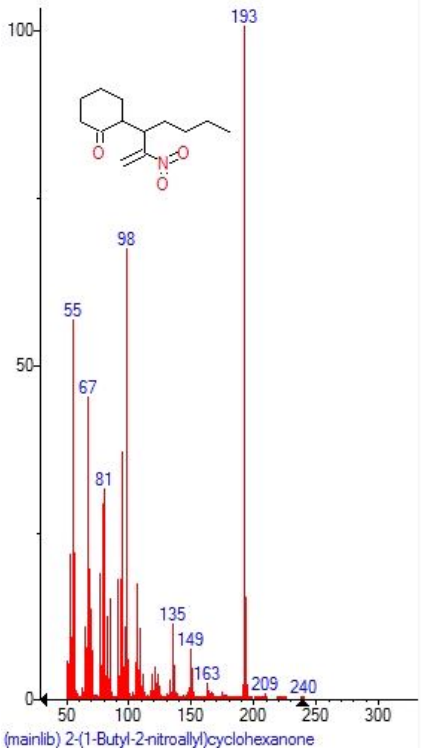
Phytochemical compound:7-Methyl-Z-tetr adecen-1-ol acetate
RT (min): 16.808
Molecular Weight : 268.24023



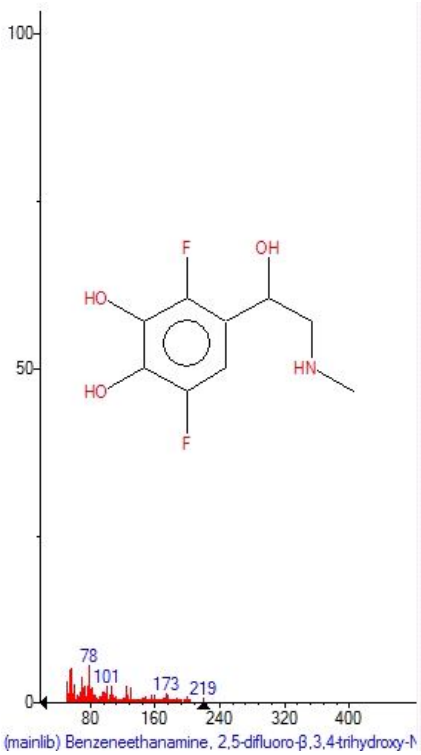
Phytochemical compound:[1.1'-Bicyclopropyl]-2- octanoic acid. 2'-hexyl-.meth RT (min): 17.034
Molecular Weight : 322.28718



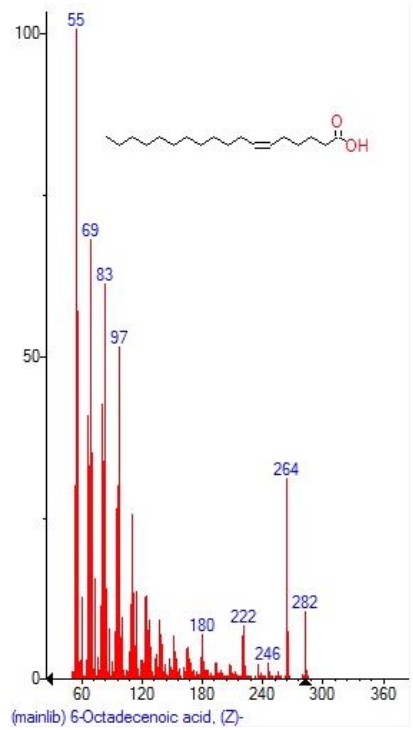
Phytochemical compound : 14.15.16-Trinor-8 xi. -labdan-6β-ol. 8. 13-epoxy-
RT (min): 17.775
Molecular Weight : 266.22458



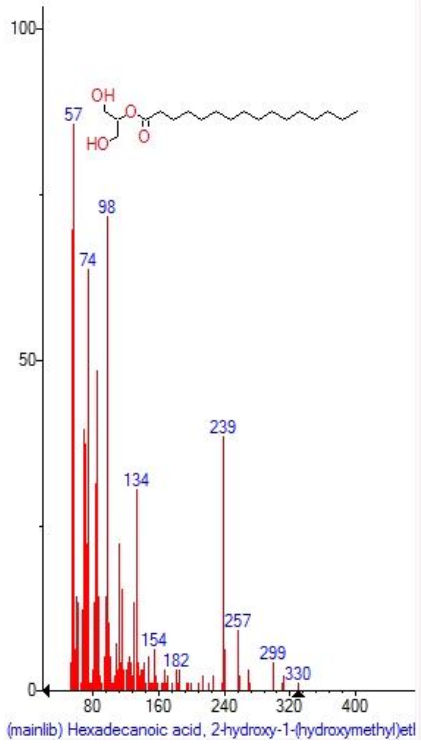
Phytochemical compound : 2-(1-Butyl-2-nitroallyl) cyclohexanone
RT (min): 17.588
Molecular Weight : 239.1521435



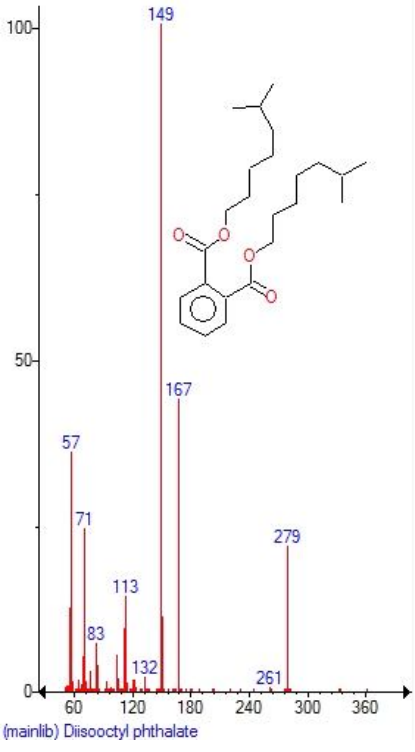
Phytochemical compound: Benzeneethan amine. 2.5-difluoro-β.3.4-trihydroxy- RT (min): 18.319
Molecular Weight : 219.0707



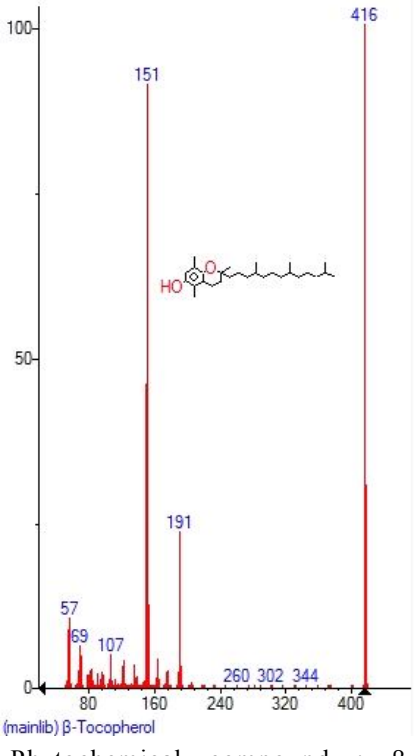
Phytochemical compound:6-Octa decenoic acid. (Z)-
RT (min): 19.246
Molecular Weight : 282.25588



Phytochemical compound:Hexadecanoic acid. 2-hydroxy-1-(hydroxymethyl)eth
RT (min): 19.446
Molecular Weight : 330.27701



Phytochemical compound:Diisooctyl phthalate
RT (min): 19.749
Molecular Weight : 390.27701



Phytochemical compound : β-Tocopherol
RT (min): 23.938
Molecular Weight : 416.36543

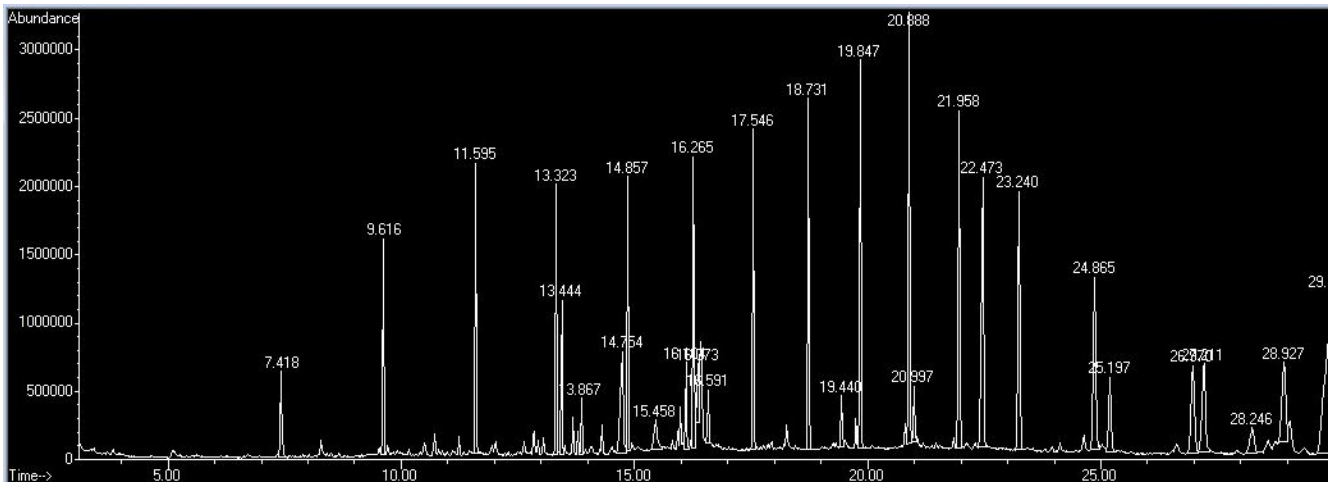


Fig. : GC-MS chromatogram of methanolic extract of *Urospermum picroides*.

sterol. some of these compounds have biological action as antimicrobial (El-Nabawy *et al*., 2015) anti-inflammatory (Strzeleeka *et al*., 2005), (El-Amier *et al*., 2016), antioxidant (El-Amier *et al*., 2016), also some of these compound consider as chemotaxonomic marker in tribe Lactuceae as flavonoids & sesquiterpene (Hegnauer, 1977; Enk *et al*., 2012).

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