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Analysis of bioactive phytochemical compound of (*Cyperus alternifolius* L.) By using gas chromatography –mass spectrometry .

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Abstract. Thirty four bioactive phytochemical compound were identified of *Cyperus alternifolius* L. The identification of phytochemical compounds is based on the retention time, peak area, MS Fragmentation and molecular weight. GC-MS analysis of *Cyperus alternifolius* Showed the presence of the : Thiodiglycol, Erythritol, 3-Methoxy-2,2-dimethyloxirane, 12,15-Octadecadiynoic acid, methyl ester, 2-(Benzyloxymethyl)-5-methylfuran, Dimethyl(chloromethyl)silyloxymethylbenzene, N-[5-(1-Cyano-2-furan-2-yl-vinyl)-[1.3.4]thiadiazol-2-yl]-benzamide, 9,10-Secocholesta-5,7,10(19)-triene-3,24,25-triol, (3 β ,5Z,7E)-, 1-Propyl-3,6-diazahomoadamantan-9-ol, 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazin, 4-Hexenal, 6-hydroxy-4-methyl-, dimethyl acetal, acetate, (Z)-, Methyl 6-oxoheptanoate, B-Hydroxyquebrachamine, Bicyclo[3.2.1]oct-6-ene-6,8-dimethanol, 1,7-dimethyl-4-isopropyl, Ascaridole epoxide, α -D-Glucopyranoside, O- α -D-glucopyranosyl-(1.fwdarw.3)- β -D-f, Ergosta-5,22-dien-3-ol, acetate, (3 β ,22E)-, Octahydrobenzo[b]pyran, 4a-acetoxy-5,5,8a-trimethyl-, Neocurdione, Ethyl iso-allocholate, Benzeneethanamine, 2-isothiocyanato-N-methyl-N-[2.trans-[1-te, Stearyltrimethylammonium chloride, Pregn-4-ene-3,20-dione, 17,21-dihydroxy-, bis(O-methyloxime), 1b,4a-Epoxy-2H-cyclopenta[3,4]cyclopropa[8,9]cycloundec[1,2], 13-heptadecyn-1-ol, 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazin, Phthalic acid, butyl undecyl ester, Estra-1,3,5(10)-trien-17 β -ol, 6-Methyl-11-propenyl-5-(toluene-4-sulfonyloxy)-12,13-dioxatricyclic, Diquitoxin, Phytol, 9,12,15-Octadecatrienoic acid, (Z,Z,Z)-, 9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester, (Z,Z,Z), Dascarpidan-1-methanol, acetate (ester) .

The plant contain chemical constitutions which useful for many herbal formulation as Antioxidant, Anticancer, Antigenotoxic activity, Antimicrobial Activity, anti-inflammatory, Anthelmintic, Nematicide, Antihistaminic, Antieczemic, Insectifuge, Treat asthma, Stomach ach, Arthritis, dysentery, Malaria, nervous disease, Antitumor, Decreased risk of Breast cancer, Antidiarrheal, antifungal activity.

Keywords : *Cyperus alternifolius* L., gas chromatography –mass spectrometry, bioactive phytochemical compounds .

1.Introduction

The family Cyperaceae are Predominantly monoecious herbs, often of seasonally or permanently wet habitats. A cosmopolitan family of about 90 genera and 4000 species. The species *Cyperus alternifolius* L. is Tropical and S. Africa, Madagascar [1]. The genus *Cyperus* has about 550 species, it's widely distributed in many place of the world [2]. One of the species is *Cyperus alternifolius* L. (umbrella sedge). It's perennial, the height 1.5 meters. Stems are cylindrical, green and smooth. Leaves are linear, the longes are up to 20 centimeters. Flowers are green, small, and clustered (2 French faux papyrus (Berhaut). plant Medicines: generally healing root Medicines: stomach troubles leaf root Phytochemistry: alkaloids Agri-horticulture: ornamental: fodder Social: religion, superstitions, magic Social: sayings, aphorisms [3]

There have been few publications on the chemical composition of *Cyperus alternifolius* L. , Ahmed has isolated Forty compounds representing in the flowers 98 % of the oil were characterized. Sesquiterpenes constituted the bulk of the oil (ca. 62 %); the major components of the oil were α -cyperone 19.6 %, β -selinene 9.8 %, caryophyllene oxide 7.2 % and cyperene 5.2 % [4], then Awaad *et al* were isolate Eight phenolic compounds from *C. alternifolius* that useful as Hepatoprotective activity [5], Usharani and Vasudevan was designed to determine the phytocomponents in the root exudates of *C. alternifolius* under heavy metal stress [6]. but There have no publications on the aerial part of *Cyperus alternifolius* L. in Iraq that determinate the bioactive phytochemical compounds identified by GC-MS. The aim of this paper was to determine the composition of the bioactive phytochemical compounds from *Cyperus alternifolius* L. A literature survey revealed that the bioactive phytochemical compounds of *Cyperus alternifolius* L. from Iraq has not been previously studied. So we decided to examine this compound.

2.Materials and Methods

2.1.Collection and preparation of plant materials



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Cyperus alternifolius L. Leaves were collected from different localities in the central and south of Iraq. Then the leaves were cleaning and washed with tap water then with distilled water and dried under shade for two weeks at room temperature. Eighteen gram of plants powdered were taken in forty ml methanol and then filtered.

2.2. Gas chromatography – mass spectrum (GC/MS) analysis.


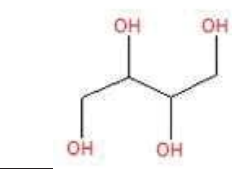
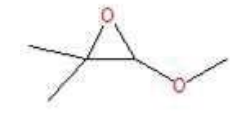

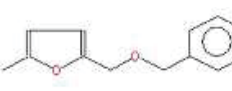
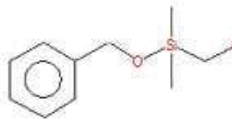
Cyperus alternifolius L. GC-MS analysis were carried out in a (QP 2010 Plus SHIMADZU) instrument under computer control at 70 eV. About 1 µL of the ethanol extract was injected into the GC-MS for 45 minutes. The temperature of the oven was 100 °C an eluent. The column type: Elite 1 (100% dimethyl poly siloxane) for separation of the components. Compounds were identified by comparing their spectra to those of the Wiley and NIST/EPA/NIH mass spectral libraries. Imad *et al.* Method was followed in (GC/MS) analysis(7).

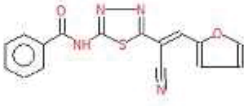
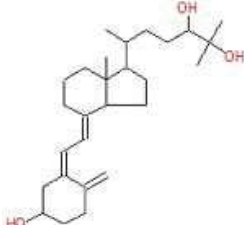
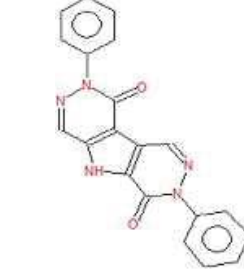
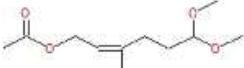

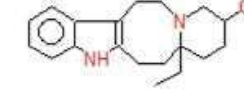
3. Results and Discussion

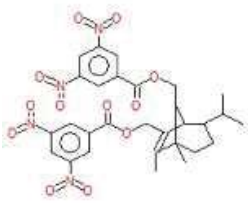
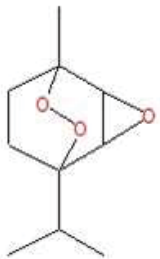
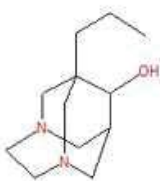
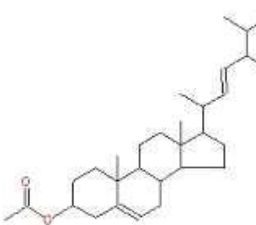
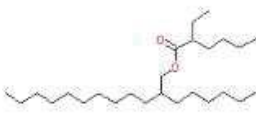
The methanol extract of *Cyperus alternifolius* L. by Chromatogram GC-MS analysis showed the presence of thirty four bioactive phytochemical compounds are listed in (Table 1), compounds were identified in the leaves of plants, such as Thiodiglycol, Erythritol, 3-Methoxy-2,2-dimethyloxirane, 12,15-Octadecadienoic acid, methyl ester, 2-(Benzyloxymethyl)-5-methylfuran, Dimethyl(chloromethyl)silyloxymethylbenzene, N-[5-(1-Cyano-2-furan-2-yl-vinyl)-[1,3,4]thiadiazol-2-yl]-benzamide, 9,10-Secocholesta-5,7,10(19)-triene-3,24,25-triol, (3β,5Z,7E)-, 1-Propyl-3,6-diazahomoadamantan-9-ol, 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazin, 4-Hexenal, 6-hydroxy-4-methyl-, dimethyl acetal, acetate, (Z)-, Methyl 6-oxoheptanoate, B-Hydroxyquebrachamine, Bicyclo[3.2.1]oct-6-ene-6,8-dimethanol, 1,7-dimethyl-4-isopropyl, Ascaridole epoxide, α-D-Glucopyranoside, O-α-D-glucopyranosyl-(1-fwdarw.3)-β-D-f, Ergosta-5,22-dien-3-ol, acetate, (3β,22E)-, Octahydrobenzo[b]pyran, 4a-acetoxy-5,5,8a-trimethyl-, Neocurdione, Ethyl iso-allocholate, Benzeneethanamine, 2-isothiocyanato-N-methyl-N-[2.trans-[1-te, Stearyltrimethylammonium chloride, Pregn-4-ene-3,20-dione, 17,21-dihydroxy-, bis(O-methyloxime), 1b,4a-Epoxy-2H- cyclopenta[3,4]cyclopropano[8,9]cycloundec[1,2], 13-heptadecyn-1-ol, 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazin, Phthalic acid, butyl undecyl ester, Estra-1,3,5(10)-trien-17β-ol, 6-Methyl-11-propenyl-5-(toluene-4-sulfonyloxy)-12,13-dioxatricyclic, Diqitoxin, Phytol, 9,12,15-Octadecatrienoic acid, (Z,Z,Z)-, 9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester, (Z,Z,Z), Dasycarpidan-1-methanol, acetate (ester) (figure 1-35).


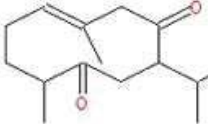
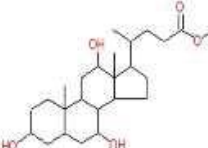
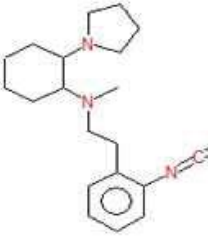

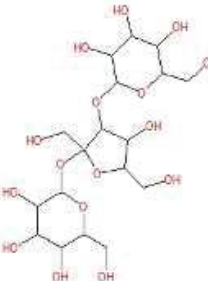
In the present study so there are various bioactive compounds which useful as antioxidant as in compounds Thiodiglycol, Erythritol, 2-(Benzyloxymethyl)-5-methylfuran, 13-heptadecyn-1-ol, Phytol, 9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester, (Z,Z,Z) and others [8] [9] [10], antimicrobial (Anti-viral, Anti-bacteria and Anti-fungal) as in compounds: Ethyl iso-allocholate, 13-heptadecyn-1-ol, Phthalic acid, butyl undecyl ester, Diqitoxin, 9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester, (Z,Z,Z), Dasycarpidan-1-methanol, acetate (ester) and others [11] [12] [13], anticancer activity as the compounds; 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazin, Methyl 6-oxoheptanoate, and others [9] [13] [14] [15]. anti-inflammatory as in compounds; 12,15-Octadecadienoic acid, methyl ester, Ascaridole epoxide and others [12] [13] [14] [16] [17] [18]. Nematicide, insecticides, antischistosomal as in compounds; 9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester, (Z,Z,Z) [19], treatment heart disease as in: Diqitoxin. [20] [21]. Antituberculosis [22], anti-angiogenic effects, Oxygenated-Compound and others, Treat asthma, Stomach ache, Arthritis, dysentery, Malaria, nervous disease, cardioprotective, neuroprotective, antidiabetic and anti-osteoporotic.....in (Table 1)

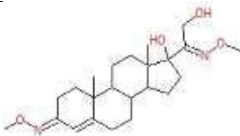
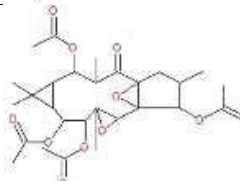

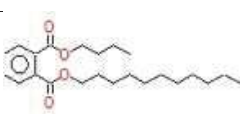
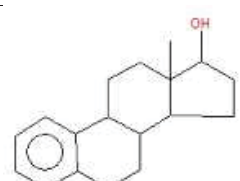
Table1.Major phytochemical compounds identified in methanolic extract of *Cyperus alternifolius* L.

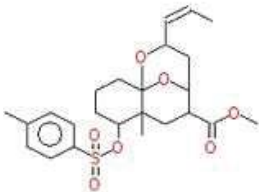
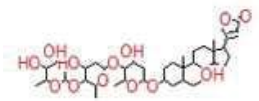

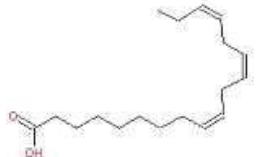
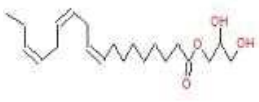
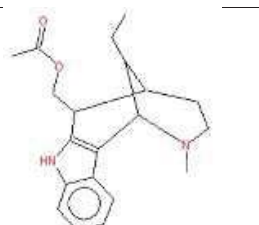
No.	Chemical name	R T (min)	Exact Mass	Chemical structure	MS Fragment - ions	Pharmacologi
1.	Thiodiglycol	3.144	122.0401506		61,104,122	increased urine output ,decreased urine pH, Antioxidant , increased kidney weight, and reduced body weight
2.	Erythritol	3.195	122.057909		61,91	Antioxidant
3.	3-Methoxy-2,2-dimethyloxirane	3.253	102.0680795		59,73, 87,102	Unknown
4.	12,15-Octadecadiynoic acid , methyl ester	3.356	290.22485		55,74, 91,106,133 ,205,259, 290	Anti-inflammatory[16]
5.	2-(Benzyloxymethyl)-5-methylfuran	3.487	194.13068		51,77, 95,111,129 ,202	Antioxidant[8]
6.	Dimethyl(chloromethyl)silyloxymethylbenzene	3.648	214.058069		75,91, 109,135,16 5	Unknown

7.	N-[5-(1-Cyano-2-furan-2-yl-vinyl)-[1.3.4]thiadiazol-2-yl]-benzamide	4.254	322.052446		51,77,105,121,136,164,188,253,281,294,322	Unknown
8.	9,10-Secocholesta-5,7,10(19)-triene-3,24,25-triol,(3 β ,5Z,7E)-	4.677	416.329044		55,69,91,118,136,158,176,189,207,221,253,383,398	Unknown
9.	2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazi	5.049	355.106924		51,77,93,105,119,149,165,187,211,224,238,267,281,327,355	anti-angiogenic effects and anti-tumor efficacy[14]
10.	4-Hexenal,6-hydroxy-4-methyl-,dimethyl acetal,acetate , (Z)-	5.204	216.136159		58,75,84,93,110,52,184,215	Unknown
11.	Methyl 6-oxoheptanoate	5.627	158.094295		55,84,111,126,143	Anti-cancer[15]
12.	B-Hydroxyquebrachamine	5.999	298.204514		55,77,124,172,185,281,298	

13.	Bicyclo[3.2.1]oct-6-ene-6,8-dimethanol,1,7-dimethyl-4-isopropyl	6.337	626.186024		55,75,120,159,212	Unknown
14.	Ascaridole epoxide	7.104	184.109944		55,69,91,107,135,150,168	Anti-inflammatory[17] [13] Oxygenated-Compound Treat asthma,- Stomach ach , Arthritis, dysentery, Malaria, nervous disease
15.	1-Propyl-3,6-diazahomoadamantan-9-ol	4.861	210.173213		58,72,82,136,181,193,210	Unknown
16.	Ergosta-5,22-dien-3-ol , acetate,(3 β ,22E)-	7.527	440.36543		55,67,91,145,213,255,281,327,365,380	Antituberculosis[22]
17.	2-Hexyldodecyl 2-ethylhexanoate	7.767	396.39673		57,69,111,145,167,224,252,297,322,368	Un known

18.	Octahydrobenzo[b]pyran , 4a-acetoxy-5,5,8a-trimethyl	9.455	240.1725445		55,69, 97,111,124 ,165,180, 197,240	Anti-Candida and anti-inflammatory[18]
19.	Neocurdione	9.719	236.17763		55,69, 82,109,137 ,167,180, 236	Anti-Tumor activity Anti-viral, Anti-bacteria and [11]
20.	Ethyl iso-allocholate	10.090	436.318874		55,69, 81,95, 145,253, 400, 418	Antimicrobial Activity ,anti – inflammatory,
21.	Benzeneethanamine , 2-isothiocyanato-N-methyl-N-[2.trans-[1-te	10.983	343.20822		58,70, 84,97, 126,150, 181, 195,226, 244, 280,310, 343	Un known
22.	Stearyltrimethylammonium chloride	11.172	347.331879		58,69, 97,149,182 ,240,268, 297	un known
23.	α -D-Glucopyranoside , O- α -D-glucopyranosyl-(1.fwdarw.3)- β -D-f	11.435	504.169035		60,73, 85,97, 126,145, 199	cardioprotective , neuroprotective, antidiabetic and anti-osteoporotic Activity Anti-inflammatory[14] Antistress

24.	Pregn-4-ene-3,20-dione, 17,21-dihydroxy-,bis(O-methyloxime)	12.545	404.267508		55,67,91,105,125,172,207,240,264,315,373,404	Anti-inflammatory [12]
25.	1b,4a-Epoxy-2H-cyclopenta[3,4]cyclopropa[8,9]cycloundec[1,2]	12.568	550.241413		55,69,85,95,181,207,223,282,329,362,391,422	Un known
26.	13-heptadecyn-1-ol	12.700	252.245316		55,67,82,96,123,219	Antimicrobial anti-inflammatory, antifungal[12] Anticancer , Antioxidant and Cytotoxic Activities[9]
27.	Phthalic acid , butyl undecyl ester	13.255	376.26136		57,69,104,149,167,205,223,321	antimicrobial activity[13] Antibacterial Activity , Anti-inflammatory
28.	Estra-1,3,5(10)-trien-17β-ol	13.970	256.182714		57,73,85,97,185,213,256	anti-arrhythmic activities

29.	6-Methyl-11-propenyl-5-(toluene-4-sulfonyloxy)-12,13-dioxatricyclic	14.657	464.186874		55,67,81,93,119,137,152,193,242,260,292,368,464	Un known
30.	Digitoxin	14.920	764.434692		55,69,95,113,131,203,221,246,339,357,401	antimicrobial anti-cancer effects anti-inflammatory,[13] Treatment of heart disease [20] [21]
31.	Phytol	15.080	296.307917		57,71,95,123,196,235,278	produce sedative and anxiolytic effects. Antischistosomal [19] antioxidant effects[10], Antimicrobial activity[15] component of chlorophyll and vitamin E and K.
32.	9,12,15-Octadecatrienoic acid,(Z,Z,Z)-	15.395	278.22458		55,67,79,93,108,121,135,222,249,278	antimicrobial
33.	9,12,15-Octadecatrienoic acid 2,3-dihydroxypropyl ester , (Z,Z,Z)	15.498	352.26136		57,67,79,95,135,155,173,261,296,352	Antioxidant, Antimicrobial Activity ,anti-inflammatory, Nematicide, Antihistaminic Antieczemic, Insectifuge
34.	Dasycarpidan-1-methanol , acetate (ester)	17.535	326.199429		69,83,97,124,180,222,256,326	Greatest antimicrobial activity

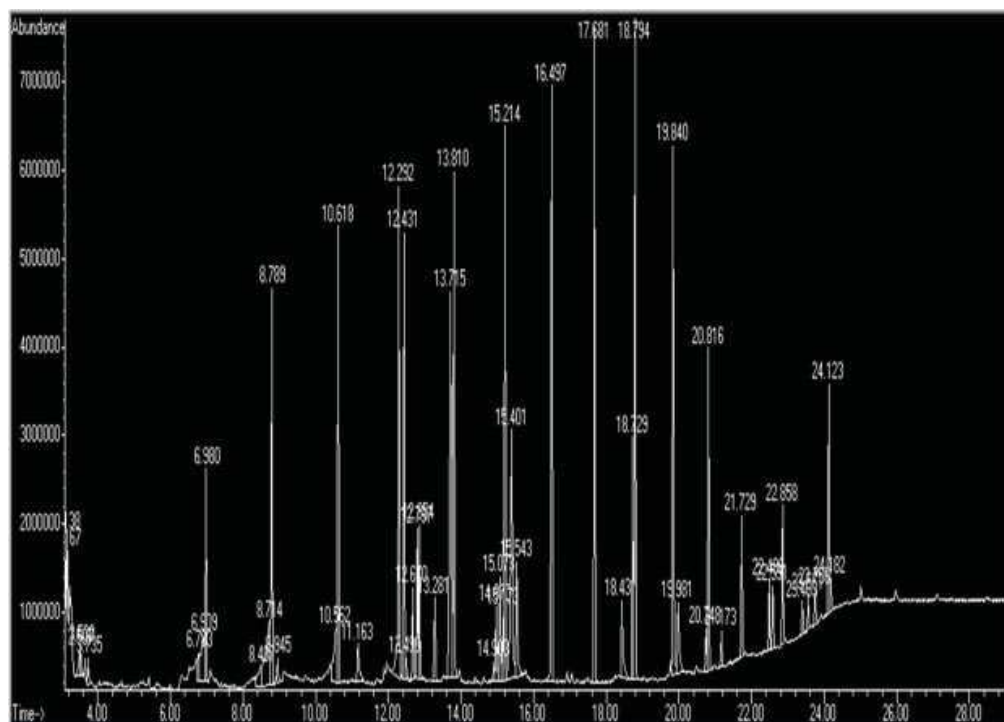


Figure 1. GC-MS chromatogram of methanolic extract of *Cyperus alternifolius* L.

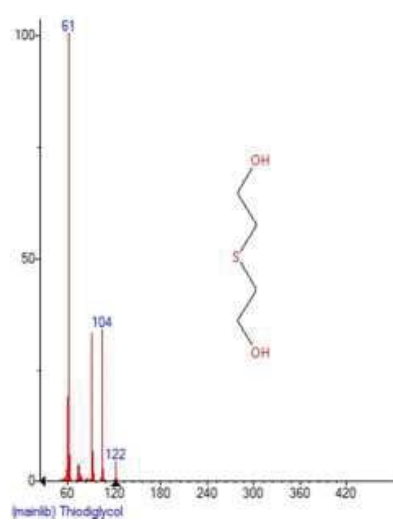


Figure 2

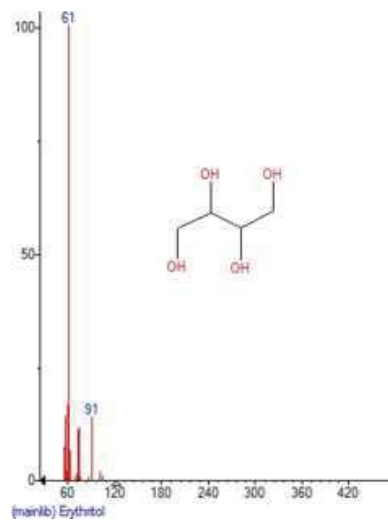


Figure 3

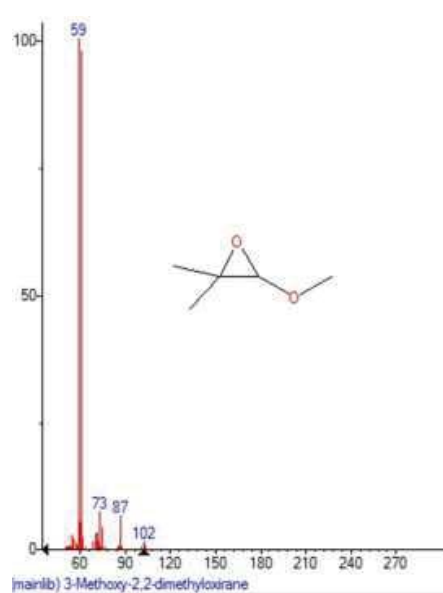


Figure 4

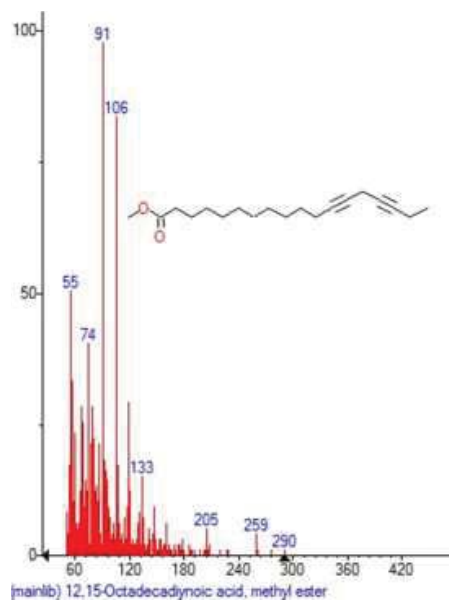


Figure 5

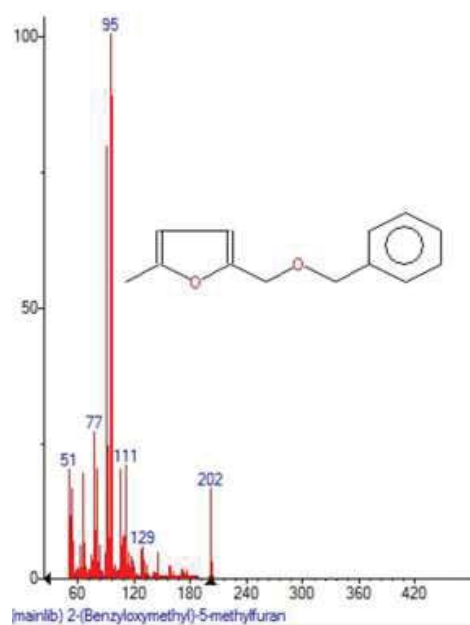


Figure 6

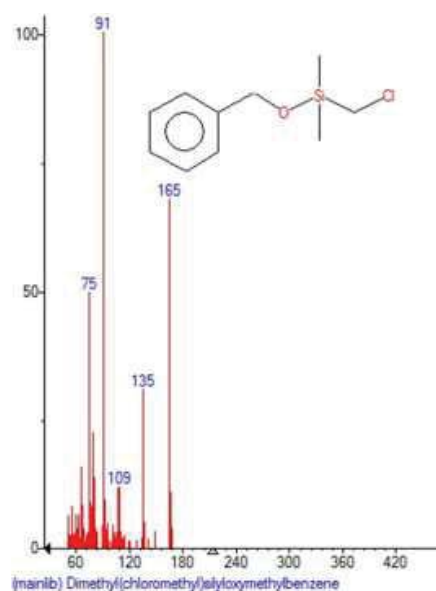


Figure 7

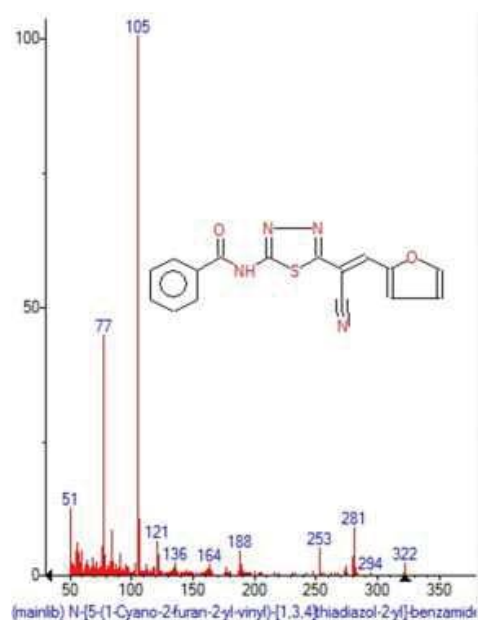


Figure 8

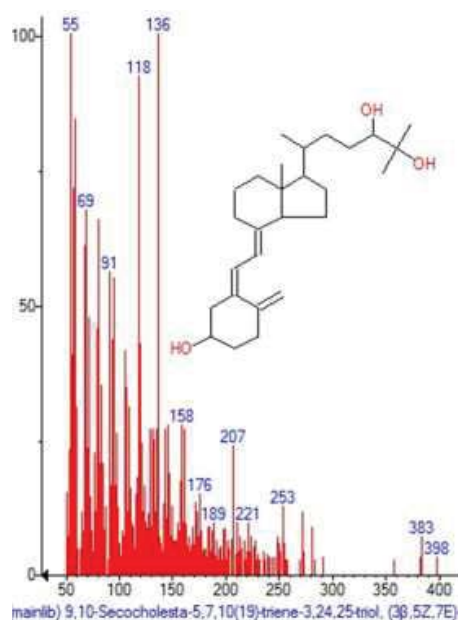


Figure 9

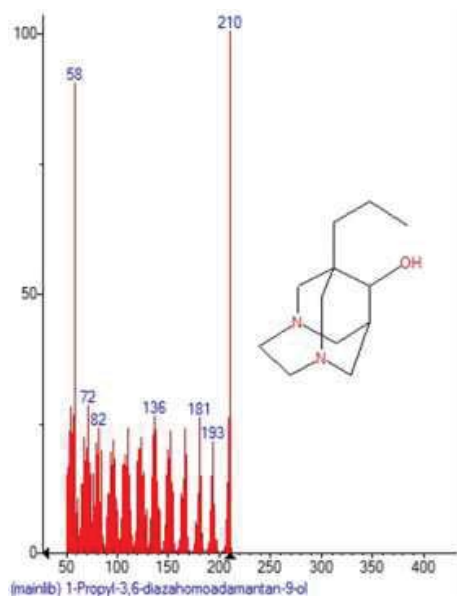


Figure 10

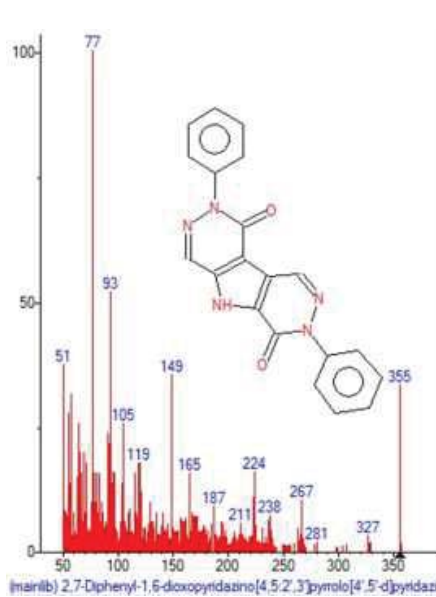


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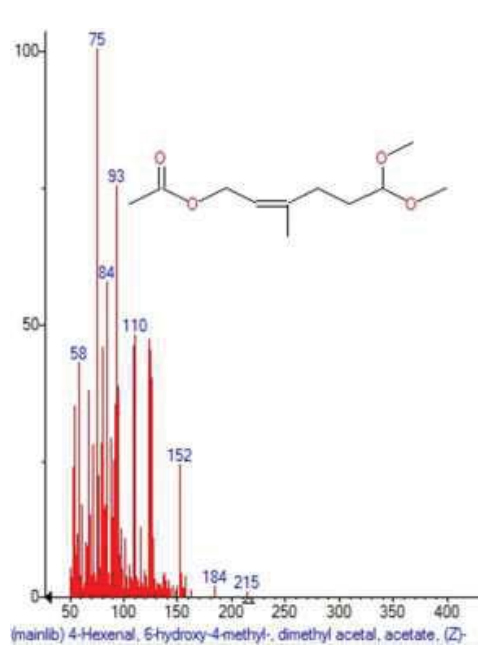


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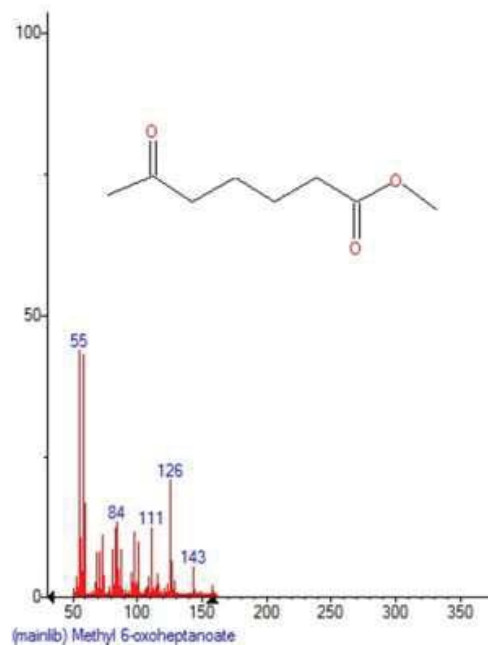


Figure 13

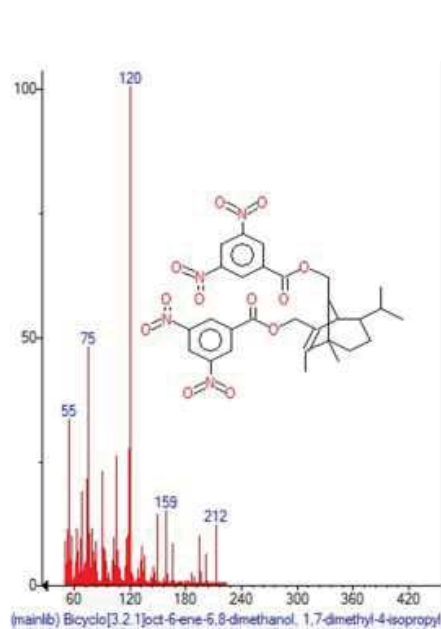


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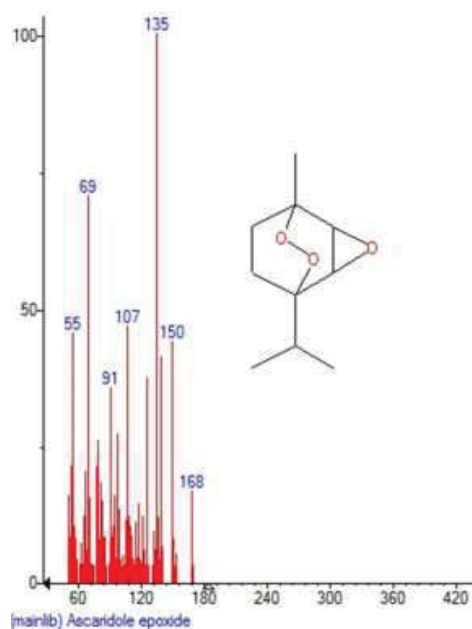


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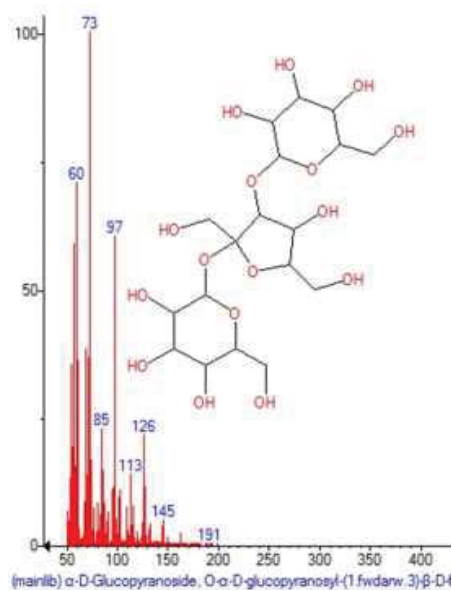


Figure 16

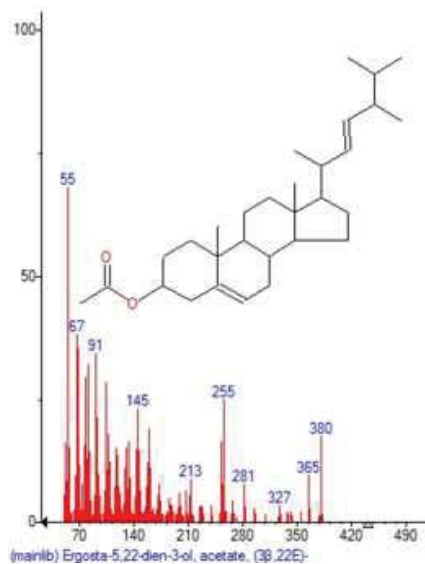


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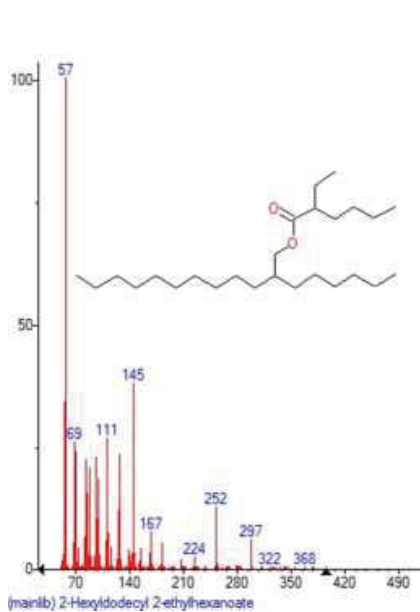


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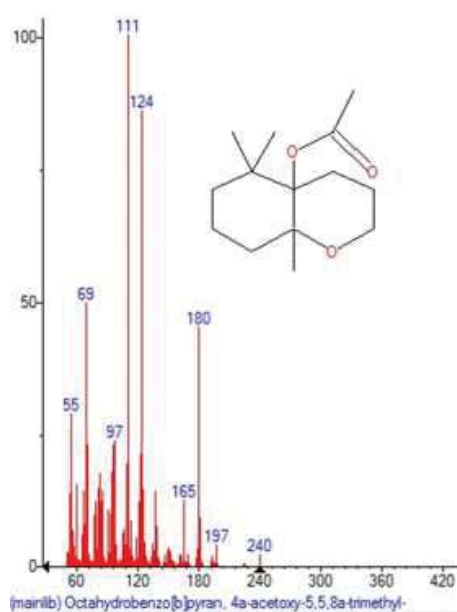


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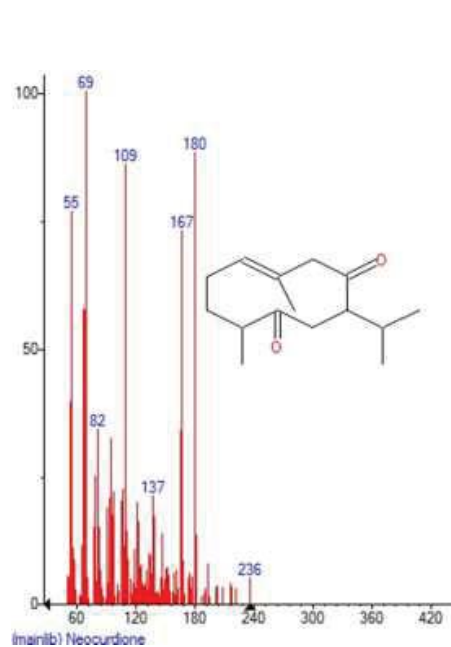


Figure 20

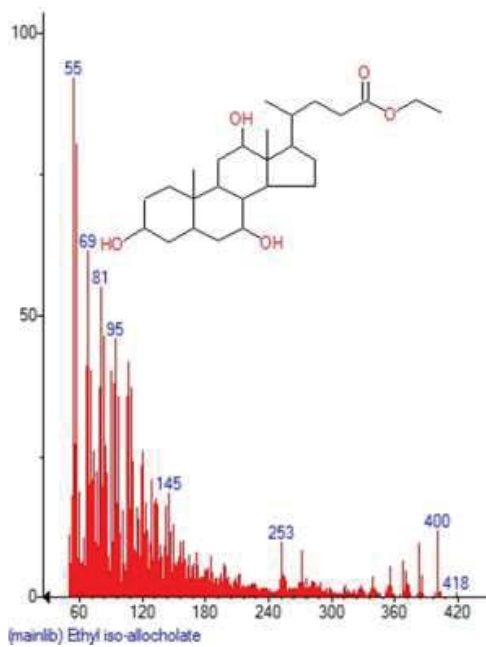


Figure 21

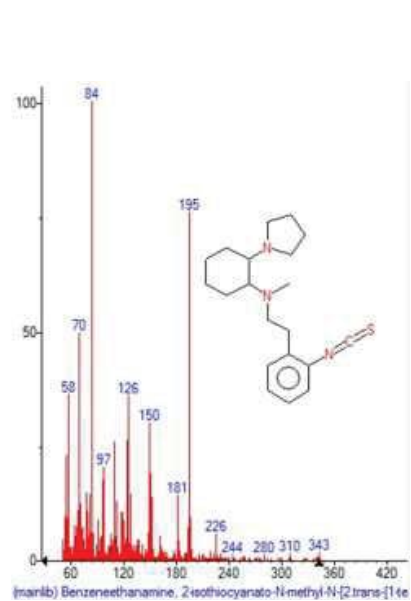


Figure 22

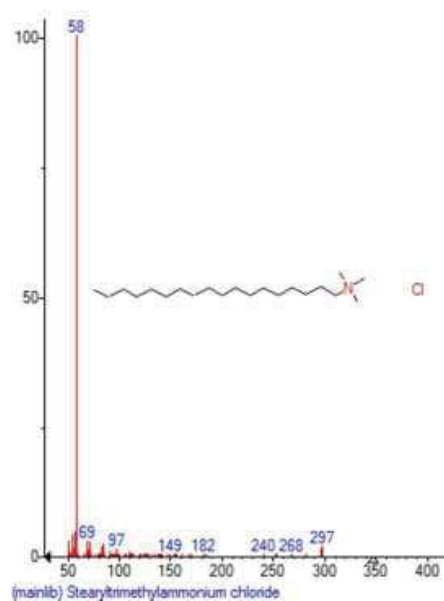


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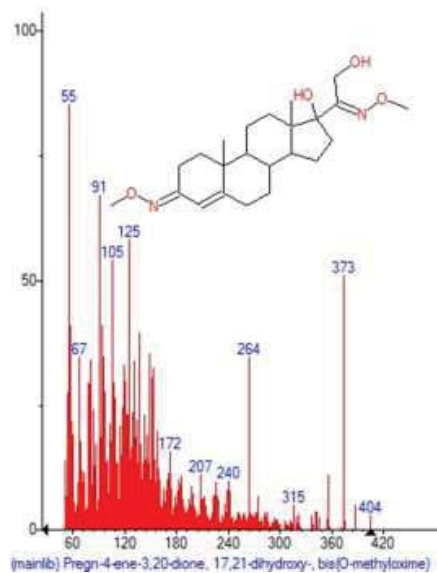


Figure 24

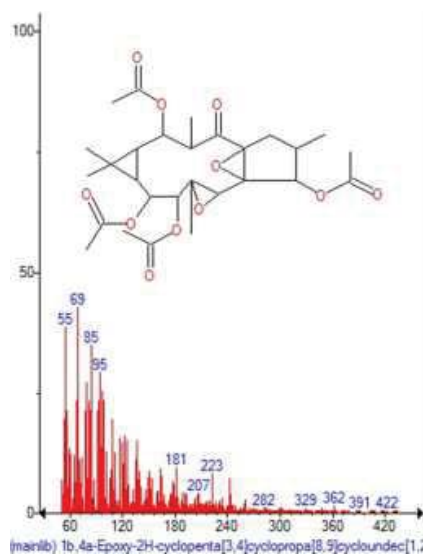


Figure 25

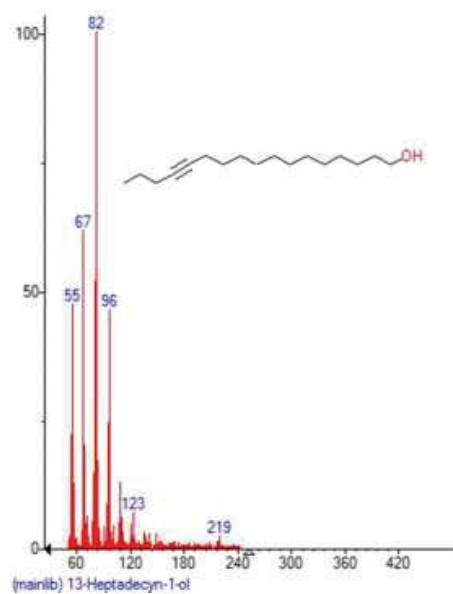


Figure 26

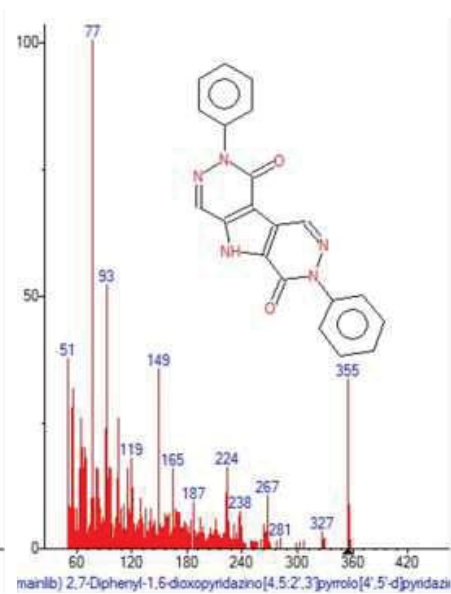


Figure 27

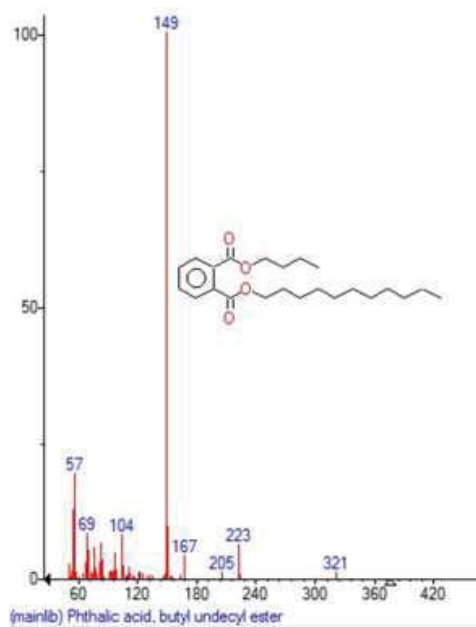


Figure 28

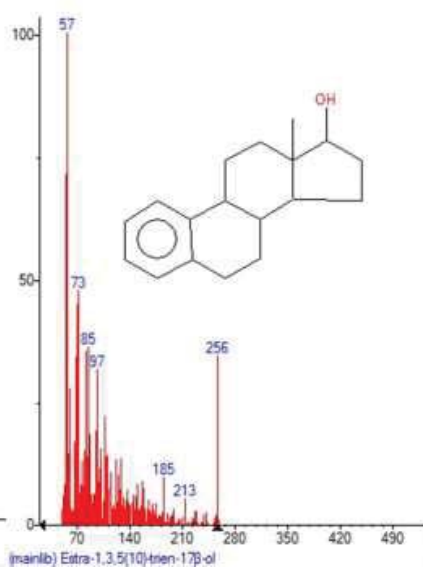


Figure 29

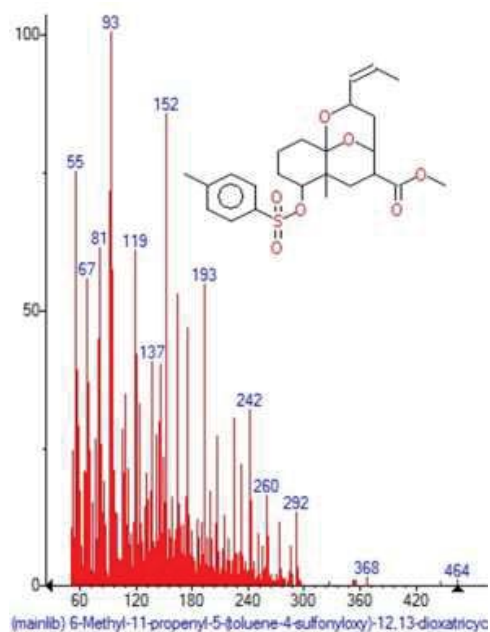


Figure 30

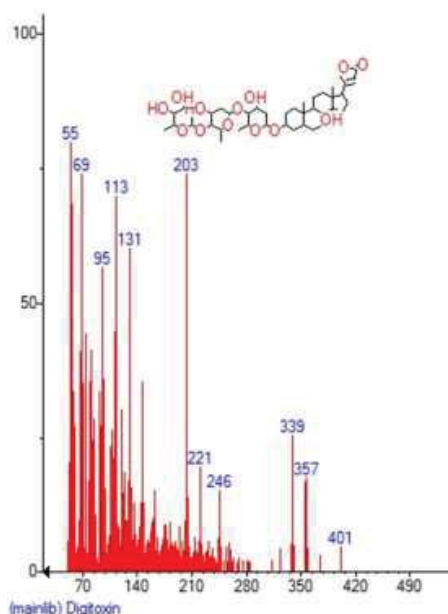


Figure 31

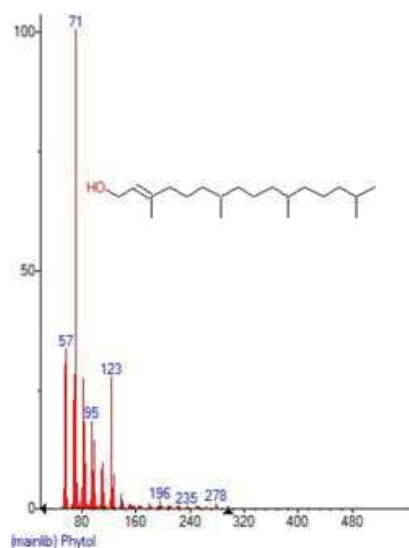


Figure 32

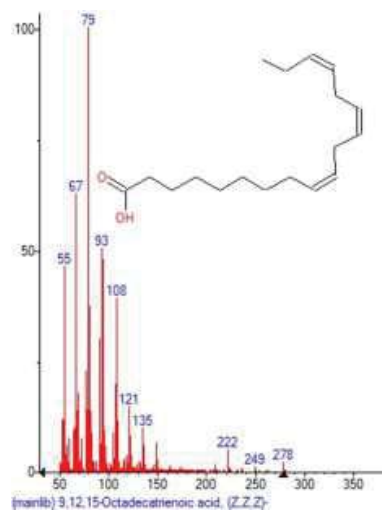


Figure 33

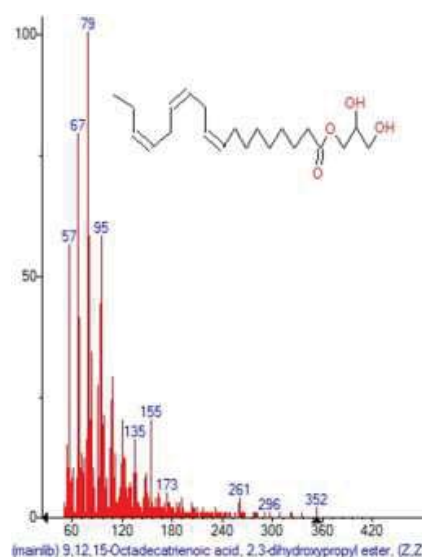


Figure 34

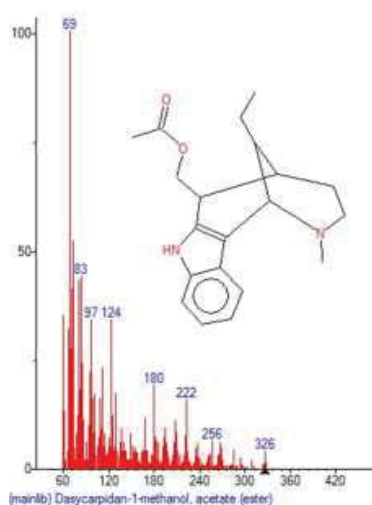


Figure 35

4. Conclusion

In the present study, 34 compounds from leaves of *Cyperus alternifolius*, the native plant of Iraq, were identified by (GC-MS) analysis. This plant showed a highly complex profile which may be useful for many herbal formulations as antioxidant, antimicrobial, anticancer activity, anti-inflammatory, Anthelmintic and others. So it is recommended as a plant of phytopharmaceutical importance. However, some studies are needed to undertake its chemotaxonomy properties, bioactivity, and profile of toxicity.

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