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Table Of Content

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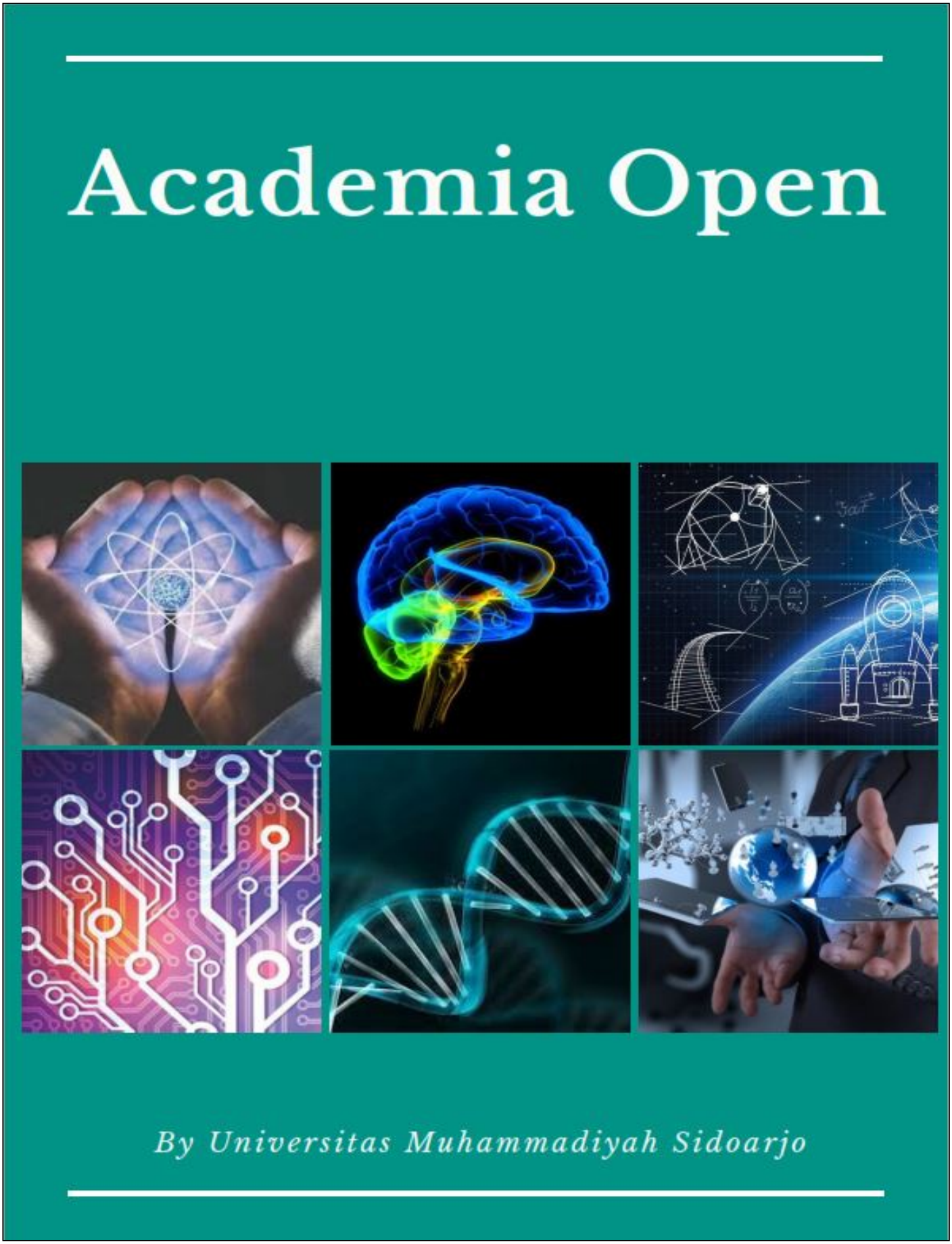

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Chemical Study of Iraqi Kassub Plant Eryngium creticum Lam and its Geographical Distribution in Diyala Province

Studi Kimiawi Tanaman Kassub Irak Eryngium creticum Lam dan Distribusi Geografisnya di Provinsi Diyala

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Abstract

General Background: The therapeutic potential of medicinal plants has garnered increasing interest, particularly in relation to their chemical compositions and geographical distributions. **Specific Background:** This study focuses on *Eryngium creticum Lam*, an Apiaceae family plant known as Iraqi Kassub, prevalent in the Diyala province of Iraq. **Knowledge Gap:** Despite its traditional use in treating various ailments, there is a lack of comprehensive chemical analysis and geographical distribution data for this plant. **Aims:** The objective of this research was to identify the chemical components of *Eryngium creticum Lam* through GC-MS analysis and to map its geographical distribution within the Diyala province. **Results:** The chemical study revealed 101 distinct compounds in the alcoholic extract of the plant, highlighting a significant presence of sitosterols and sugars. These compounds are associated with antioxidant properties and therapeutic applications, including the treatment of envenomations, leishmaniasis, and anemia. **Novelty:** This study is novel in its detailed chemical profiling and geographical mapping of *Eryngium creticum Lam*, providing new insights into its medicinal value and distribution. **Implications:** The findings underscore the plant's potential as a therapeutic resource and emphasize the need for further research. Future studies should aim to isolate and characterize bioactive compounds such as phenols and flavonoids and assess their efficacy and safety through in vivo models to validate their therapeutic potential.

Highlights:

1. GC-MS identified 101 compounds.
2. Bioactive compounds with therapeutic properties.
3. Mapped geographical distribution in Diyala.

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Keywords: *Eryngium creticum*, GC-MS, therapeutic potential, chemical profile, geographical distribution

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Introduction

The Apiaceae family is considered one of the important families with a global distribution,as its species are spread in high temperate regions,The number of its species worldwide reaches 3000 species belonging to 300 genera,and it is represented in Iraq by 143 species belonging to 60 genera,in addition to its cultivated species(AL-Moussawi,1987).The plants of the family have great economic importance ,as its plants are used as food, vegetables, herbs, spices, medicinal, drugs, resinous gums and some of them ornamental plant (AL-Kateb,2000),Among them is the Iraqi kassub plant, which is widespread in the Northern and central regions of Iraq in sanny and neglected places, as it tolerates drought and high temperatures,it has many localnames in the Arab countries of Lebanon, Syria, Palestine and Saudi Arabia ,including qarsaana, scorpion thorn, Ibrahim thorn and shindaab (Hors,2014),it is a food plant in the early stages of growth, as locals eat its fresh young leaves as vegetables and in salads, due to the richness in the many minerals and vitamins (Farhan et al.2012),Al-Dabbagh,2010,stated that the plant is widespread in vast areas in Greece and is used locally to treat snake and scorpion bites, have been conducted on it, showing its effectiveness in treating many diseases such as fungal and bacterial infection, toxins, anemia, cancer, diabetes, and others, there is still a need for more clinical studies to reveal the effectiveness of its therapeutic components (Kasbri et al,2012).

Methods

We work current survey of Plant Eryngium creticum Lam in region of Diyala province for the perpose geographical distribution study of this plant, then we selected plant samples (roots, stems, leaves),were collected to chemical study Eryngium creticum Lam from Mugdadia region Harunia location in the same province in aclear atomospher during the period between (March- June).After filming the fields were healthy and free of infections and fungal diseases and measured their parts Metric ruler for the perpose of describing the appearance and after shaking and wishing the dust,then the samples suspended in the shade for several days at room temperature until dry and conducted the chemical study of GC-MS in the laboratories of Ibn-al-Bitar Center-Industrial Research and Development Authority and was extracted based on the method(Alwan et al,2015),with some Modification, and maps drawn of geographical distribution of plant in Diyala region.

Chemical extraction:

Extract the plant with high purity ethyl alcohol for the analytical test by following these steps:

1-Dry the total vegetation (roots, stems and leaves) and granding with an electric mill.

2-Take 1g dry powder of the plant and add 20 ml of 100% pure ethanol .

3-After shaking in the shaking incubator for 8 hours and 30-37 C on the strength of 6-9 cycles and then depositing for 32 hours.

4-Apply the filtration with the filter paper and leave the filter to dry at room temperature.

5-Dry matter mixed with special alcohol for HPLC.

Analysis by gas chromatography device –GC-MS mass spectrometer:

Four microliters of ethanoic extract were injected using a precision silicone syring.Soon after the injection ,the temperature of the source of the device reaches 350 m while the sample is evaporated at a temperature of 150 m. Helium gas ,an inert gas, is used to carry the material to represent the mobile phase to drive material column Whose length varies from on device to another.in this study ,the length of column 60 m. Which contains different materials in the polar in the stationary phas, the materials with lowest molecular weight of the column first, followed by the materials with largest molecular weight ,then move all the materials to the detector after exposure to fixed voltage difference of 70 v to diagnose the compounds to their components, leaving an electronic singal to detect the compound, and the greater the concentration of the compound, the greater the signal. Then calculate the weight of the molecular weight through the mass-to-charge ratio (M\Z) where the constant Z (70 volts) is obtained from the graph .The diagram is then plotted by the GC-MS calculator, which is called diagram .The Y axis represents the signal intensity to determine the element in the injection sample and the X axis represents the retenation time. the identification of the compounds is compared with the compounds stored in the computer library GC-MS device.

Result and Discussion

Result

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Morphological description of Eryngium creticum Lam:

Plant attaining 1m ,but commonly about half this height .Oldest leaves undivided and crenate, but these are usually withered by flowering time and not present in most herbarium material ,Lower cauline leaves very deeply palmate partitein to narrow segments, closly and finely spinous,Upper stem-leaves and 4-6 involucral bracts very narrow ,very little lamina visible between the thickened margins and the vein, entire for the greater part of their length but with 1-several pairs of lateral spines especially at the base .Bracteolets broad and rigid ,all tricuspidate above exceeding the flower, Capitula small, up to 10 mm .sepals broad and obtuse, sometimes truncate or even emarginated, with avery short mucro, petals very narrow , oblong . Fruit more or less 3 mm ,the broad flat face smooth,the convex dorsal face with 3 prominent ribs. Scales very small and much less conspicuous than in species 5-7.(Gazanfar et al,2014).

Geographical distribution of plant Eryngium creticium L.in Diyala Governorate.

The Iraqi ksob plant Eryngium creticium Lam.is distributed in the following Iraqi provinces, the central sedimentary plains (LCA), Kirkuk District (FKI),Amadiya District (MAM),Roundos District (MRO), Sulaymaniyah District s(MSU) (Gazanfar et al,2014),The studied plant is distributed in Diyala Governorate,which is located within five geographical provinces according to the division (Guest,1966) of the Iraqi botanical provinces, namely the areas of Khanaqin,Jalawla,QaraTaba,,Saadiya and Balad Ruz within the eastern border highlands of Iraq (FPF),and in the areas of Muqdadiyah and Baqubah within the province of the eastern alluvial plains (LEA),the Khlis area within the province of the central alluvial plains (LCA),and AL-Azim area within the province AL-Gharfa-Al-Azim (DGA) AL-Mahdawi,2023).

Figure 1. *Geographical distribution of Eryngium creticium Lam.in Diyala Governorate*

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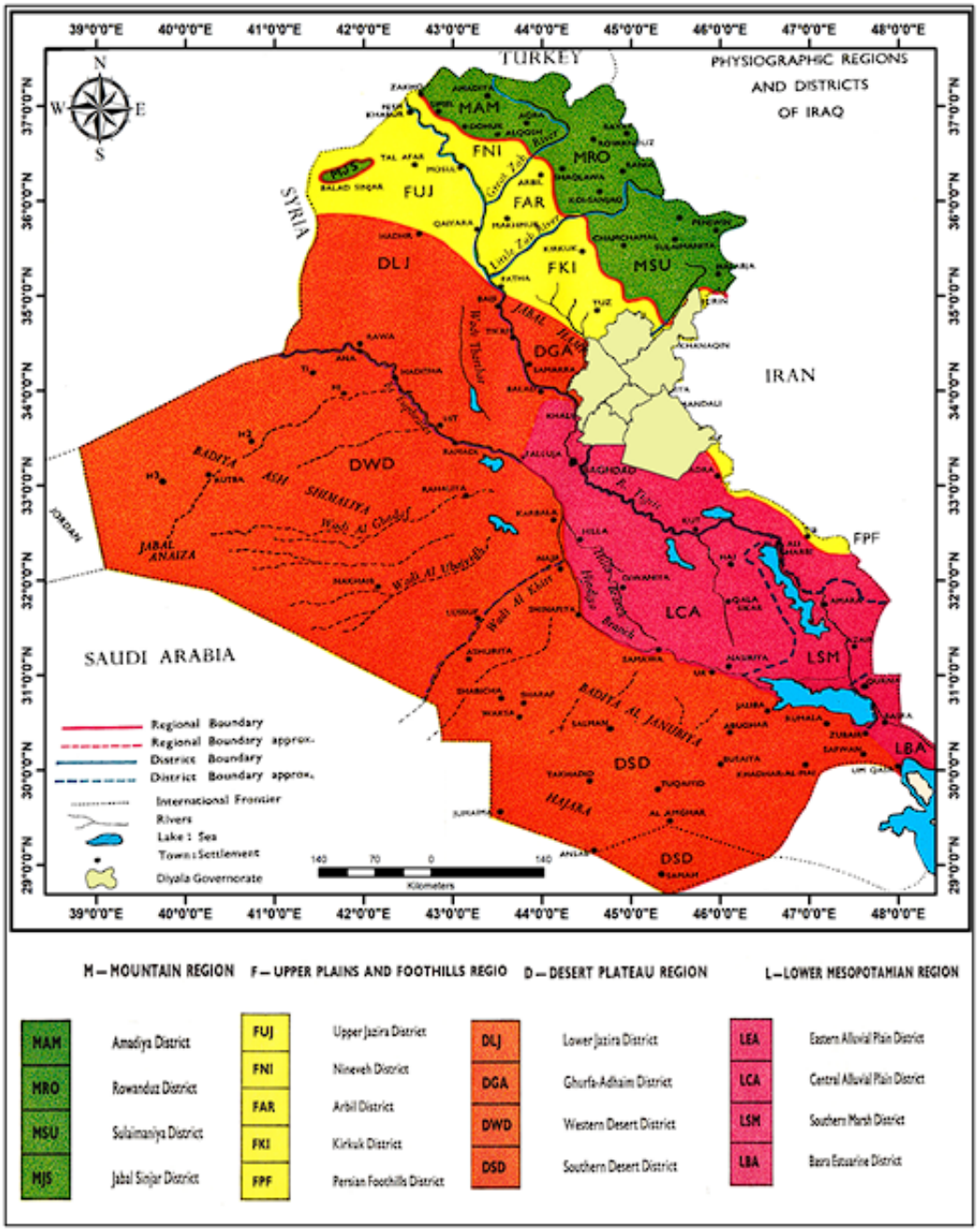

Figure 2. *Geographical distribution of Eryngium creticium Lam.in Diyala Governorate .(AL-Mahdawi-20223),Depending on (Guest,1966).*

Name	Area%	R.Time	Peak #
Silane,triethoxymethyl-	0.65	9.463	1

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Disiloxane,1,3-diethoxy-1,3,3-tetramethyl-	2.00	9.774	2
Adenosine,2-methyl-	0.64	10.406	3
Disiloxane,1,3-diethoxy-1,1,3,3-tetramethyl-	1.36	10.960	4
2-p-Tolylisoindole-1,3-dione	1.47	11.135	5
Ethanol	0.09	11.709	6
Cyclotetrasiloxane,octamethyl-	0.78	11.894	7
Ethanol	0.14	13.060	8
Ethanol	0.20	13.167	9
Ethanol	0.34	14.023	10
2-Hydrazino-4,6-dimethylpyrimidine ditms peak 1	0.88	14.101	11
Benzoic acide,4-{(trimethylsilyl)oxy}-,trimethylsilyl ester	0.21	14.742	12
Silicic acid,diethyl bis(trimethyl lsilyl) ester	0.67	14.820	13
Silicic acid,diethyl bis(trimethyl lsilyl) ester	0.49	15.044	14
Benzeneethanamine,N,butyl-beta.,4-bis[(trimethylsilyl)oxy]-	0.62	15.209	15
Ethanol	0.26	15.355	16
Benzaldehdes,2,5-bis[(trimethylsilyl)oxy]-	0.97	15.491	17
3,3-Diisopropoxy-1,1,1,5,5,5,-hexam ethyltrisiloxane	0.83	16.152	18
o,o -bis[Trimethylsilyl]n-butanep hosphonate	0.55	16.288	19
Ethanol	0.23	16.658	20
Ethanol	0.15	18.592	21
1-Butene,4-ethoxy-	0.25	20.099	22
5H-Naphtho [2,3-c]carbazole,5-methyl	0.58	20.439	23
Fluoren-9-ol,3,6-dimethoxy-9-(2-phenyl ethynyl)-	0.46	20.964	24
4-94-chlorophynyl)-2,6-diphenyl pyridine	0.34	21.217	25
Ethanol	0.16	21.771	26
1,1,3,3,5,5,7,7Octamethyl-7-(2-methylpropoxy)tetrasiloxan-1-ol	0.48	21.869	27
Ethanol,2,2-dichloro-	0.20	22.024	28
Cyclotetrasiloxane, octamethyl	0.49	22.141	29
3,3.5-Triethoxy-1,1,1,7,7,7-hexamethyl-5-(trimethylsilyloxy)tet	0.22	26.273	30
1(3H)-Isobensofuranone,6-(dimethyl amino)-3,3-bis[4-(dimeth-	0.16	26.555	31
Phosphoric acid,ethenyl dimethyl ester.	0.15	27.245	32
Butyramide,4,N-bis(4-methoxyphenyl)-2,4-dioxo-	0.20	27.313	33
Cyclopentasiloxane,decame	0.32	27.546	34

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thyl-			
1,3,5,7.9-pentaethylbicyclo[5.3.1]pentasiloxane.	0.15	28.373	35
Cholestan-6-one,oxime,(5.alpha.).	0.11	31.416	36
1,1,1,5,7,7,7-Heptamethyl-3,3-bis(trimethylsiloxy)tetrasiloxane	0.22	32.115	37
Cyclohexasiloxane,dodecamethyl-	0.24	32.339	38
1(3H)-Isobenzofuranone,6,7-dimethoxy-3-[2-(2-methoxyphenyl	0.19	35.343	39
Silanamin,N-[2,6-dimethyl-4-imethylsilyl)oxyphenyl]-1,1,1-tet-	0.18	36.665	40
Cyclopentane,1,2-dimethyl-3-(1-methylethenyl)-	2.14	37.132	41
Bicyclo[3.1.1]heptane,2,6,6-trimethyl-,(1.alpha.,2.beta.,5.alpha.	2.71	37.336	42
2-penten,2-cyano-3-(diethylborylamino)-	0.96	37.764	43
Benzothiazole,2-methyl-S	1.21	37.978	44
Phthalic acid ,monoethyl ester	0.50	38.201	45
3,7,11,15-Tetramethyl-2-hexadecenl-ol	1.48	38.435	46
1,3-propanediamine,N,N-diethyl-N,-methyl-	0.01	40.068	47
1-(4-Methoxy-phenyl)-5-5-dioxo-hexahydro-5.lambda.(6)-thien	0.13	40.593	48
2-Methoxyethylsemithiocarbazide	0.16	40.826	49
D-xylopyranose,5-C-(acetyloxy)-2,,3,4-tri-o-methyl-,acetate	0.23	41.274	50
1-(+)-Ascorbic acid 2,6-dihexadecanoate	1.54	42.382	51
n-Hexadecanoic acid	0.14	42.674	52
n-Hexadecanoic acid	0.19	42.722	53
n-Hexadecanoic acid	0.29	42.800	54
n-Hexadecanoic acid	0.36	43.218	55
Phytol	3.90	43.568	56
Fumaric acid,3-methylbut-2-yl tridecyl ester	0.51	43.918	57
Phytol	1.68	44.083	58
Stearic acid,3-(octadecyloxy)propyl ester	1.02	44.190	59
Oleic acid	0.10	45.794	60
Octasiloxane,1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamet	0.34	47.505	61
2-Myristynoyl-glycinamide	0.12	49.946	62
Hexahydroxyphenyl,1-meth	0.16	50.082	63

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yl-4-[4,5-dihydroxyphenyl]-			
Octasiloxane,1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecmeth	0.18	50.587	64
Diisooctyl phthalate	1.44	52.464	65
Bis(2-ethylhexyl)phathalate	1.55	52.950	66
Cyclohexane,1-(1,5-dimethylhexyl)-4-(4-methylpentyl)-	0.46	55.244	67
2H-3,9a-methano-1-benzoxepin,octahydro-2-2,5a,9-tetramethyl	0.11	55.438	68
2-Myristynoyl-glycinamide	0.17	55.526	69
2,2-Dimethylpropanoic acid, 2,6-dimethylnon-1-en-3-yn-5-yl est	0.30	55.798	70
2-Myristynolyl-glycinamide	0.11	56.148	71
3,7,11-Tridecatrienoicacid,4,8,1,2-trimethyl-,methyl ester,(Z,E)-	0.36	57.490	72
PYRID0[2,3-d]pyrimidine,4-phenyl-	0.15	57.723	73
1,3-Dioxolane,4-ethyl-5octyl-2-2-bis(triflouromethyl)-,trans-	0.41	57.898	74
Hexahydropyridine,1-methyl-4-[4,5-dihydroxyphenyl[-	0.27	58.316	75
Dodecahydropyrido[1,2-b]isoquinolin-6-one.	0.10	58.365	76
Fumaric acid ,2,4,6-trichlorophenyl tridecyl esters	0.89	58.773	77
2- Myristynoyl-glycinamide	o.11	59.016	78
Benzo[h]quinolone,2,4-dimethyl-	0.25	59.113	79
Hexahydropyridine,1-methyl-4-[4,5-dihydroxyphenyl]	0.66	59.279	80
Dodecahydropyrido[1,2-b]isoquinolin-6-one	0.13	59.833	81
Octasiloxane,1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15,-hexadecame	0.24	60.572	82
Pyrido[2,3-d]pyrimidine,4-phenyl-	0.20	61.038	83
Hexahydropyridine,1-methyl-4-[4,5-dihydrophenyl]-	1.54	62.069	84
Hexahydropyridine,1-methyl-4-[4,5-dihydroxyphenyl]-	0.74	62.205	85
Cyclopenteno[4,3-b]tetrahydrofuran3-[(4-methyl-5-oxo-3-phen	0.54	62.361	86
Cyclopentane,1,1-[3-(2-cyclopentylethyl)-1,5-pentanediyl]bis	1.46	62.545	87
Cyclopenteno[4,3-b]tetrahydrofuran3-[(4-methyl-5-oxo-3-phyn	0.80	62.730	88
5-Acetamido-4,7-dioxo-4,7-dihydrobenzofurazan	2.49	63.051	89
1,2,5-oxadiazol-3-amine,4-(4	2.31	63.333	90

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-methoxyphenoxy)-			
Propiophenone,2-(trimethyl siloxy)-	2.09	63.926	91
Benz[e]azulene-3,8-dione,5-[(acetyloxy)methyl]-3a,4,6a,7,9,10	7.05	64.412	92
Stigmasterol	10.70	64.898	93
Propiophenone,2-(trimethyl siloxy)-	6.53	65.277	94
Ethanon,2-(2-benzothiazolyl thio)-1-(3,5-dimethylpyrazol yl)-s	12,01	65.860	95
Propiophenone,2-(trimethyl siloxy)-	2.41	66.512	96
Propiophenone,2-(trimethyl siloxy)-	0.92	66.940	97
5-Methyl-2-phenylindolizine	0.73	67.183	98
Propiophenone,2-(trimethyl siloxy)-	0.70	68.349	99
No matches found	0.33	69.224	100
Propiophenone,2-(trimethyl siloxy)-	0.03	69.370	101

Table 1. *phytocomponents identified in the methanolic extracts of Iraqi Eryngium creticum Lam.*

Discussion

The results of GC-MC analysis led to the identification of number of compounds from the ethanolic extract of Iraqi Eryngium creticum Lam. Plant GC-MC chromatogram showed 101 peaks, indicating the presence of 101 compounds (table -1),many chemical studies ,both aqueous and ethanolic extracts have shown that the plant contains many chemical components, most of which are sitosterols and sugars with biologically active properties as antioxidants and in the treatment of snake and scorpion bite venoms and leishmaniasis especially the roots of the plant(Alkofahi et al,1997).the aqueous extract of the roots is used to treat bites rural areas in Jordan(Abujai,et al,2007).Spectroscopic analysis studies of the plant have shown that it is rich in minerals and vitamins (Dirani et al,2014).the plant enjoys great scientific due to its many uses traditional medicine in the treatment of many diseases, including stomach ulcers, bacterial ,fungal and viral infection, cleansing the liver of toxins, poisoning, infertility and anemia(Abu Rabia,2005;Abu Raji et al ,2007).There is a laboratory study on experimental anemia that showed that the extract of the plant enhances the proliferation of B cells in the pancreas and the secretion of insulin in them ,which may provide a safe treatment for diabetics in the future(kaspari,2012.,Tuwaij and AL-Dajili,2014).Therefore it requires further precise chemical analyses of the various parts of the plant to reveal the natural compounds responsible for the antioxidant biological activity ,including its components of phenols and flavonoids with high capacity to act as effective scavengers of free radicals, Eryngium creticum Lam is considered one of the promising plants in modern medicine, which requires conducting many laboratory studies on extracts of the plant to isolate and evaluate the them on components responsible for the biological activity from different types of the plant extracts ,and testing living body models to reach more accurate scientific results and explanation about its therapeutic and medical importance.

Conclusion

In conclusion, the chemical analysis of the Iraqi Kassub plant Eryngium creticum Lam from the Apiaceae family has demonstrated a rich profile of 101 distinct compounds identified through GC-MS, underscoring its significant therapeutic potential. The findings reveal a notable presence of sitosterols and sugars, which are linked to antioxidant properties and therapeutic uses, including the treatment of envenomations, leishmaniasis, and anemia. The plant's broad medicinal applications, supported by its traditional uses and reported benefits in treating various ailments, highlight its importance in modern medicine. However, to fully elucidate the plant's therapeutic potential, further detailed chemical analyses and biological evaluations are necessary. These studies should focus on isolating and characterizing the specific compounds responsible for its bioactivity, including phenols and flavonoids, and testing these components in vivo to validate their efficacy and safety.

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