Study of allelopathic interaction of alkaloid extracts of Peganum harmala plant on seed germination Ocimium basilicum

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Abstract

Effect of alkaloid extract of Peganum harmala seeds on Ocimium basilicum germination was investigated at different concentrations viz., 0, 10, 50, 250 and 500 µ g/L, The effect of glycoside chemical compounds varied between the control and treatment groups. The number of Alkaloid compounds of Peganum harmala revealed 78 chemical compounds, The main compounds in control treatment were 71 whereas the treatment recorded63, 49, 41, and42 chemical compounds in10, 50, 250and500 µ g/L, respectively. The main compounds in control Treatment were beta.-Carboline, 5-methoxy- (15.07422) was recorded, and the compound the lowest percentage of Dodecanoic acid 0.166245, the main compound in10 Concentration Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester (19.09388646) ,and the compound the lowest percentage Phytyl, 2-methylbutanoate (0.194346544) , the main compound in50 Concentration Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester(23.70323231) and the compound the lowest percentage Neophytadiene(0.291812048)the main compound in250 Concentration Octadecanoic acid, 2,3-dihydroxypropyl ester(12.89648812), 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-(0.298995853) the main compound in500 Concentration Harmine(29.0666794) dl-.alpha.-Tocopherol(0.349489537).

Keywords: *chemical compound, Peganum harmala, Ocimuim basilicium , GC-MS analysis.*

1-INTRODUCTION

Allelopathy is a biological phenomenon that occurs when chemical substances generated by live or dead plants affect the growth and development of other organisms (Cheng & Cheng 2016) Allelopathy can have a direct or indirect effect, which can be beneficial or harmful (Rice 1984). Whittaker(1971) referred to these substances as allelochemicals, and the vast majority of them are secondary products (Gross2009) allelopathy is determined by the type of chemical substance (Einhelling 2004), which can be released by any part of the plant, including the root, stem, or flower, through leaching, volatilization, residue breakdown, or other processes (Mishyna et al. 2015). Allelopathy is significant in several aspects, including pesticide (Xuan et al. 2004), weed management (Kong et al. 2008), and pollution elimination (MA 2005).as well as plant growth induction and suppression (Duke 2004)

Plants release these by-products for biological reasons or Environmental (Cheng and Cheng, 2016) In recent years, interest has increased in the use of phytochemicals as a

resource for the development of pharmaceutical products, so medicinal plants have been and are still an important part in the treatment of diseases due to their content of by-products (Shokouhian et al., 2016).

The phenomenon of chemical antagonism has become important in many aspects. It has been used in agricultural applications by controlling pests and insects (Devakumar and Parmar, 1993) and its environmental importance was noted through its impact on the sovereignty of plant communities (Hierro and Callaway, 2003) as well as its stimulating or inhibiting effects on growth(Patterson, 2017) as well as bush control, and this reduces the use of chemical pesticides that cause environmental pollution (Al-Samari et al., 2018).Due to the possession of many types of plants, including medicinal plants, the ability to produce and release toxic chemical compounds to other types of plants, so researchers have tended to extract the active compounds in those plants (Amini et al., 2014).

The plant Peganum harmala, which was used in the current study to show its antagonistic effect on plants, is due to its chemical compounds. Peganum harmala. is a medicinal herb that has a great influence on pharmacognosy and traditional medicine due to its potent therapeutic activities, such as anticancer, analgesic, hypothermic,antinociceptive, anti-inflammatory, antibacterial, antiviral and hallucinogen effects (Li et al., 2017; Zhang et al., 2020). As a perennialspecies, P. harmala is distributed mainly in Africa, central Asia, the Middle East, South America, and the southern United States (Kartal et al., 2003; Abbott et al., 2008; Zhao et al., 2011; Zhang et al., 2020). In some areas of North America, South Australia, and South Africa, P. harmala is considered to be an alien invasive species that has caused not only a decline in biodiversity but also great economic losses in invaded regions (Abbott et al., 2008).

The rue plant was used in this study to know the antagonistic effects caused in the laboratory and the greenhouse on the growth and germination of the basil plant.

2-Materials and methods

2-1 Collection of plant samples for diagnosis

The seeds plants samples were obtained from a market in Al-Nasiriyah City-Thi-Qar Governorate, Iraq- in January 2022 and brought to the laboratory. Plants were stored in polyethelene until they were used.

2-2 preparing plants for study

The seeds plants have been cleaned and ground into powder using an electric grinder the powder was maintained at 4°C in a sealed container until it was used.

2-3 Alkaloids preparation of plant extracts

2-3-1 Hexane extraction

followed the method (B o b b y et a l.,2 0 1 2) where 20 g of the ground plant part was placed in a thumble and then placed in a soxhlet device using 200 ml of hexane for 24 hours and then the extract was filtered using filter papers w h a t m a n _ n o_ 13 and left to dry in Petri dish at room temperature. The process was repeated several times to obtain a sufficient amount of the plant extract, then it was collected and kept in the refrigerator at a temperature of 4°C until use.

2-3-2 Extraction of alkaloids

Followed his method (B o bb y et al., 2012), which is as follows:

1- 20 g of dried plant matter was taken in a thimble at room temperature and finely ground with an electric grinder.

2-The samples were extracted by adding hexane 200 ml to extract the fat for 24 hours, using the soxhlet extraction device, and the fat extracted from the ground plant was concentrated to conduct the analysis for fatty acids. As for the vegetable powder, it was dried at room temperature for the purpose of extracting the alkaloids from it.

3- The extraction process was repeated using a soxolite sample extraction device by adding 10% of acetic acid in 95% ethyl alcohol at an amount of 250 ml for 24 hours.

4- Concentrate the solution to 10 ml using a condenser, a rotary evaporator, at a temperature of 50 °C

5- The concentrated ammonium hydroxide solution was added in the form of drops to the acidic solution until the pH was equal to 9 using pH measuring paper and a PH METER

6- Filter the solution and put the filtrate in a separating funnel and add to it 100 ml of chloroform, shake several times, then leave to settle and separate into two layers.

7- Concentrate the solution using the condenser to 5 or 10 ml

8- The Mayer test and Dragendroff test were conducted for the above-mentioned sweetener by adding several drops of the reagent to 1 ml of the extract to check the presence of alkaloids.

9- Methods of preparing reagents, namely:

A- Dragendorff reagent which is composed of bismuth and potassium iodide by adding 1 ml of the reagent to 1 ml of the extract, and their interaction with the alkaloid results in the appearance of an orange precipitate (positive detection) evidence of the presence of alkaloids (Harborne, 1984)

b - Mayer's reagent this reagent is prepared as follows:

Dissolve 1.58 g of mercuric chloride Hgcl2 in 60 ml of distilled water, then add 5 g of potassium iodide (kI) to it in 10 ml of distilled water, and immediately before detection, they are mixed to complete the total volume to 100 ml with distilled water, and when it interacts with the alkaloid, 1 ml of this reagent is mixed. With 1 of the plant extract in a glass tube, this reaction results in the appearance of a white

10-precipitate (positive detection) indicating the presence of alkaloids (Harborne.1984)

11- process was repeated several times to obtain a sufficient amount of plant extract

2-3-3 Preparation of the concentrations of the alkaloid extract:

Four types of concentrations of the alkaloid extract were prepared (10, 50, 250, 500) µg\L, where both concentrations were dissolved in 1 liter of distilled water.

2-4 Identification of the effective compounds of the studied plants (Peganum harmala and Ocimium basilium) using the GCMC gas-connected mass spectrometry technique:

The chemical compounds recovered in the studied samples were identified using a GILENT 7890 BGC type gas chromatography technique connected to an Agilent 5977 A MSD mass spectrometer, which is powered by Mass Hunter GC /MS program and manufactured in the United States of America located in Basrah Oil Company / Nahran Omar Laboratories. The device is based on a DB_MS5 capillary column, which is a compact silica column with dimensions of 30 m in length and 0.32 mm in diameter. The thickness of the static phase is 0.25 µm. High purity helium gas was used 99.99%. The separation

process was carried out depending on the thermal program of the GC _ MC at a temperature of 40 °C for five minutes, then the temperature was raised to 150 °C and then raised to a temperature of 250 °C at a rate of four temperatures per minute. 500 and the flow speed is 1.83 ml per minute, where the alkaloid extracts of the basil plant were prepared, treated with the alkaloid extract of the plant and the other untreated for the purpose of studying the effect and comparing between them. (Stein, 2005)

3-Result

3-1 Effect the different concentration of alkaloid extract of Peganum harmala on Ocimium bacilicium

We note from the results that appeared through the GS_MSS examination of the basil plant(table3-1), it was found that the control factor was 68 compounds with the presence of repeating compounds but in different proportions, where the highest percentage of the compound beta.-Carboline, 5-methoxy-) (15.07422) was recorded, then the compound 9-Octadecenoic acid 11.54395

As for the average values of Spiro[2.4]heptane, 1,5-dimethyl-6-methylene- 6.687542 and .gamma.-Sitosterol 5.501431, and the lowest percentage of Dodecanoic acid 0.166245 Acetamide, N-[2-(6-hydroxy-5-methoxy-1H) -indol-3-yl)ethyl]- 0.155193 7-Acetoxy-3-(3,4-methylenedioxyphenyl)-4-chromanone 0.152025

Most of the compounds of this plant have well-known medical importance and are used in the pharmaceutical industries according to the sources that have been viewed, but in different proportions as shown in the table (3-1) and figures (3-1),Whereas, the compound 2,4-Di-tert-butylphenol was found in the control treatment at a concentration of 250 and disappeared at a concentration of 10,50,500, while the compound Dodecanoic acid was found in the control treatment and at a concentration of 10,500, and the compound Tetradecanoic acid was found in the control treatment and at a concentration of 10,250,500, The compound Neophytadiene was found in all treatments, where its percentage increased when the control treatment, while the rest of the concentrations were slightly different.

As for the compound 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, it appeared in the control treatment and at a concentration of 500 percent higher than the control treatment. The compound n-Hexadecanoic acid was found in the control treatment and at concentrations 10, 50, 500 and disappeared at a concentration of 250 where The ratio increased at a concentration of10

The compound 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)- and the compound Phytol appeared at the control treatment at concentrations 10, 50, 250 and disappeared at the concentration 500. As for the compound 1-Propene-1,2,3-tricarboxylic acid , tributyl ester was found in the control treatment and at a concentration of 50 and the compound Tributyl acetylcitrate appeared in the control treatment and at a concentration of 50, 10 and disappeared at a concentration of 500, 250

The compound 9-Octadecenamide, (Z)- was found in the control treatment and at the concentration of 250 and 50 and disappeared at the concentration of 10, 500 and the compound Hexanedioic acid, dioctyl ester was found in the control treatment and at the concentration 500, where the percentage increased at the concentration 500

The compound l-Valine, N-methoxycarbonyl-, hexyl ester and Hexadecanoic acid, 2-hydroxy-

1-(hydroxymethyl) ethyl ester were found when the control treatment and the concentration of 50, where the percentage of both compounds increased at the concentration of 50

The compound Octadecanoic acid, 2,3-dihydroxypropyl ester was found in the control treatment and at a concentration of 50, while the compound 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester was found in the control treatment and at a concentration of 50,10, the compound dl-.alpha.-Tocopherol was found. When the control treatment at a concentration of 10,500 and disappeared at a concentration of 50, 250

The compound 4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl) - was found in the control treatment at a concentration of 50, 10 and disappeared at a concentration of 500, 250 and 5-O-Desmethyltangeretin appeared when treated with control at concentrations 10 and 50 and disappeared at concentrations 250 and 500. And the compound 5-O-Desmethyltangeretin was found at the control treatment at concentrations 10, 50, 500 and disappeared at the concentration 250 The compound Campesterol was found in the control treatment and at concentrations 10, 50, 250 and disappeared at a concentration of 500

4H-1-Benzopyran-4-one, 5-hydroxy-2-(4-hydroxyphenyl)-6,7-dimethoxy was found at the control treatment and at a concentration of 500. As for the compound Stigmasterol, .gamma.-Sitosterol and Benzenepropanoic acid, 3,5-bis(1) 1,1-dimethylethyl)-4-hydroxy-, octadecyl ester was found in all treatments ,Stigmastanol,Olean-12-en-3-ol, acetate, (3.beta.)-, found on control treatment and a concentration of 10, while the compound dl-.alpha.-Tocopherol was found in the control treatment, and at the concentration of 10, 50, the compound alpha.-Amyrin was found in all treatments.

The compound Pentanoic acid, 5-hydroxy-, 2,4-di-t-butylphenyl esters was found at a concentration of 50, 10, and the compound Fumaric acid, ethyl 2-methylallyl ester was found at a concentration of 50, 10, and disappeared at a concentration of 500, 250, as for compounds 1 -Dodecanol, Tetradecanoic acid and Loliolide and 1-Hexadecanol appeared in all concentrations anddisappeared upon control treatment

4-(1-Hydroxyallyl)-2-methoxyphenol and the compound 6-(Phenylthio)-1-azabicyclo [4.3.1] decan-10-one were found at 10,500 concentrations and disappeared at the rest of the concentrations. As for the compounds 2-Pentadecanone, 6, 10, 14 -trimethyl-and Hexadecanoic acid, methyl ester is found in a concentration of 10, 50

Palmitoleic acid ,Dibutyl phthalate ,Methyl stearate1,4-Cyclohex-2-enedione, Decyl acrylate

Cis-8-methyl-exo-tricyclo[5.2.1.0(2.6)]decane, 2-Oxonanone ,Nonanamide, Biperiden these compounds were found at a concentration of 10 and disappeared at the rest of the concentrations

Sulfurous acid, butyl heptadecyl ester was found at a concentration of 10, 50, and 500 and disappeared at a concentration of 250. As for the compound Harmine, it was found in all concentrations and disappeared when the control treatment and its percentage increased at a concentration of 500. As for the compound Octadecanoic acid, 2,3-dihydroxypropyl ester was found at all concentrations, but Compound 13-Docosenamide, (Z) - appeared at a concentration of 500, decreased at a

concentration of 50, 10 and disappeared at a concentration of 500, 250

The compound 3, 7-Dimethyl-1-phenylsulfonyl-2, 6-octadiene and the compound Navadensin was found at a concentration of 10 and disappeared in the rest of the concentrations. The compounds, Campesterol and Cholesterol, were found at a concentration of 10, 50, and 250 and disappeared at a concentration of 500 The compound 4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)- was found in all concentrations and disappeared in control treatment compounds Stigmast-7-en-3-ol, (3.beta.,5.alpha.,24S)-,Stigmast-4-en-3-one It was found in 10 concentrations and disappeared in other concentrations , Phytyl, 2-methylbutanoate Olean-12-en-28-oic acid, 3-hydroxy-, methyl ester, (3.beta.) Found in concentration 10, 50

(Fumaric acid, 4-methoxyphenyl dodec-2-en-1-yl ester),(Thunbergol) (n-Pentadecanol)(trans-2-methyl-4-n-pentylthiane, S,S-dioxide)(Butyl citrate) (Isophthalaldehyde) (1,2,5-Tri-O-acetyl-1-deuterio-3,4-di-O-methyl-D-arabinitol) (1H-Indole, 2-methyl,3,7-Dimethyl1 phenylsulfonyl-2,6-octadiene), was found at a concentration of 50 and disappeared in the rest of concentrations .9,12,15-Octadecatrienoic acid, (Z,Z,Z)-Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester, Hexadecanoic acid, methyl ester this compounds was found at a concentration of 50 and 250 and disappeared in the rest of the concentrations

2,4DI-tert-butylphenol) (1,4-benzenediol, 2-methyl-, 4-acetate)(3,7,11,15-Tetramethylhexadec-2-ene) (Hexadecanoic acid, ethyl ester) (Cyclobutanecarboxylic acid, dodec-9-ynyl ester(1H-Tetrazole-1-ethanol, 5-amino-(1,3,5-Trisilacyclohexane) Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester) 1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester) 13-Docosenamide, (Z)-) l-Alanine, N-(3-fluorobenzoyl)-, butyl ester) compounds was found at a concentration of 250 and disappeared at other concentrations

(Ergost-5-en-3-ol, (3.beta.)-(1,3-Methanopentalene, octahydro)(Cis-8-methyl-exotricyclo[5.2.1.0 (2.6)]decane) (Undecanenitrile) (2-Heptenoic acid, heptyl ester) (Phenol, 4-(2-propenyl)-(Phosphorochloridic acid, butyl propyl ester)(4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)-

Tris(2,4-di-tert-butylphenyl) phosphate was found at 50 concentration and disappeared at other concentrations.

The results showed GC_MASS that the control treatment recorded the emergence of 67compounds, while the concentration 10 recorded the appearance of 63 compounds, the emergence of 36 new compounds, and the disappearance of 31 compounds, while the concentration 50 recorded the appearance of 49 compounds, the appearance of 25 new compounds, and the disappearance of 24 compounds, while the concentration 250 recorded the appearance of 41 compounds, the appearance of 15 new compounds, and the disappearance of 26 compounds, while the concentration 500records the appearance of 42 compounds, the appearance of 19 compounds and the disappearance of 23 compounds compared to the control treatment

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Table (3-1) Identification of the active chemical compounds in the alkaloid extract of Ocimium basilli

no	Chemical compounds in the Ocimium basillium (control and treatments with alkaloid extract	The percentage of chemical compounds in the Ocimium basillium (control and treatments with alkaloid extract)				
		0	10µg/ml	50µg/ml	250µg/ml	500µg/ml
1	.beta.-D-Glucopyranose, 1,6-anhydro-	0.3554				
2	2,4-Di-tert-butylphenol	0.235991			0.873738175	
3	.beta.-D-Glucopyranose, 1,6-anhydro-	0.430216				
4	Dodecanoic acid	0.166245	0.396044071			0.484798523
5	Tetradecanoic acid	0.873771	0.569881444		0.374250895	0.343259784
6	(E)-4-(3-Hydroxyprop-1-en-1-yl)-2-methoxyphenol	0.970257				
7	6-Hydroxy-4,4,7a-trimethyl-5,6,7,7a-tetrahydrobenzofuran-2(4H)-one	0.754897				
8	Neophytadiene	2.28224	0.291812048	0.270176617	0.351402758	0.327039782
9	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	0.553175				1.142119123
10	n-Hexadecanoic acid	4.211332	5.872232263	3.672528309		3.079488793
11	E-11,13-Tetradecadien-1-ol	0.181273				
12	trans-Sinapyl alcohol	0.277002				
13	Hexasiloxane, tetradecamethyl-	0.173979				
14	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	0.192452	1.250993561	0.659058567	0.298995853	
15	Phytol	0.279188.	1.226590346	1.564509962	1.631750287	

16	9-Octadecenoic acid	11.54395				
17	1-Propene-1,2,3-tricarboxylic acid, tributyl ester	0.529223		0.406135706		
18	Spiro[2.4]heptane, 1,5-dimethyl-6-methylene-	6.687542				
19	Octadecanoic acid	2.839241				
20	Bicyclo[4.2.0]octan-7-one	0.220603				
21	Quinolin-2-ol, 6-methoxy-4-methyl-	0.369487				
22	2-Benzofuranmethanol, 2,4,5,6,7,7a-hexahydro-4,4,7a-trimethyl-, cis-	0.949037				
23	Pyrolo[3,2-d]pyrimidin-2,4(1H,3H)-dione	0.284075				
24	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	0.327683				
25	Linoelaidic acid	0.459292				
26	Tributyl acetylcitrate	3.007345	2.496291511	4.426642338	1.431583613	1.299140778
27	1,3,5,6-Tetramethyladamantane	0.22374				
28	.beta.-Carboline, 5-methoxy-	15.07422				
29	cis-9-Hexadecenal	0.490516				
30	E-8-Methyl-7-dodecen-1-ol acetate	1.395089				
31	Eicosanoic acid	0.533433				
32	9-Octadecenamide, (Z)-	0.828942		1.222496848	0.959939545	
33	Hexanedioic acid, dioctyl ester	3.095381				5.049326067
34	l-Valine, N-methoxycarbonyl-, hexyl ester	0.190384		1.043482458		
35	1H-Indene, 1-hexadecyl-2,3-dihydro-	0.179117				
36	Phenol, 4-(2-propenyl)-	0.368966				
37	7-Acetoxy-3-(3,4-methylenedioxyphenyl)-4-chromanone	0.152025				
38	Hexadecanoic acid, 2-hydroxy-1-	4.656885		23.703232 31		

	(hydroxymethyl)ethyl ester					
39	Bis(2-ethylhexyl) phthalate	0.184241				
40	Acetamide, N-[2-(6-hydroxy-5-methoxy-1H-indol-3-yl)ethyl]-	0.155193				
41	1H-Pyrido[3,4-b]indol-1-one, 2,3,4,9-tetrahydro-6-methoxy-	0.199837				
42	Docosanoic acid	0.451269				
43	3-Methoxydiphenlymethane	0.158006				
44	5-Nonadecen-1-ol	0.19666				
45	9,12-Octadecadienoic acid, methyl ester, (E,E)-	0.96579				
46	9,12,15-Octadecatrien-1-ol, (Z,Z,Z)-	2.001645				
47	Octadecanoic acid, 2,3-dihydroxypropyl ester	2.388966		13.43840327		
48	1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	0.231089	0.713487203	0.45077908		
49	Tetracosanoic acid	0.175361				
50	Nonadecane	0.184948				
51	dl-.alpha.-Tocopherol	0.282657	0.380583464			0.349489537
52	4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)-	2.12839	2.014655963	0.897767862		
53	5-O-Desmethyltangeretin	0.266551	0.553594477	0.379208587		0.456697141
54	5,7-Dihydroxy-3,6,8-trimethoxyflavone	1.899154				
55	Campesterol	1.278127	1.661646216		1.312701814	
56	4H-1-Benzopyran-4-one, 5-hydroxy-2-(4-hydroxyphenyl)-6,7-dimethoxy-	0.640505				1.414882594
57	Stigmasterol	1.565719	2.772542782	3.468461668	2.391998813	2.314850358
58	Eupatorin	0.782505				
59	.gamma.-Sitosterol	5.501431	7.24572967	7.907949438	5.847700924	5.692621522

60	Stigmastanol	0.320536	2.772542782			
61	Olean-12-en-3-ol, acetate, (3.beta.)-	0.231002	0.237436666			
62	Stigmast-7-en-3-ol, (3.beta.,5.alpha.)-	0.241391				
63	.alpha.-Amyrin	0.630817	0.783262758	0.891574357	0.679232076	0.6173742
64	dl-.alpha.-Tocopherol	0.207359	0.320242591	0.549446689		
65	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, octadecyl ester	0.202214	1.296147349	1.814056717	2.388210957	1.0855755
66	Syringaresinol	0.39152				
67	Disparlure	0.227231				
68	Pentanoic acid, 5-hydroxy-, 2,4-di-t-butylphenyl esters		0.449916617	0.585071823		
69	Fumaric acid, ethyl 2-methylallyl ester		0.315114387	0.255517264		
70	1-Dodecanol		0.561877288	0.851967728	1.336341319	0.4363234
71	4-(1-Hydroxyallyl)-2-methoxyphenol		0.288365375			0.3116144
72	Tetradecanoic acid		0.569881444	0.340166171	1.172069919	0.3432597
73	Loliolide		1.652317167	1.08265329	1.247455697	1.2805146
74	6-(Phenylthio)-1-azabicyclo[4.3.1]decan-10-one		0.350354664			0.3480202
75	2-Pentadecanone, 6,10,14-trimethyl-		0.508837892	0.420046783		
76	Hexadecanoic acid, methyl ester		0.641027424	0.435122977		
77	Palmitoleic acid		0.27650807			
78	Dibutyl phthalate		0.205381793			
79	1-Hexadecanol		0.602297923	0.448917869	1.156976213	0.5778690
80	Methyl stearate		0.223639046			
81	1,4-Cyclohex-2-enedione		0.482616385			
82	Decyl acrylate		2.328481884			
83	Cis-8-methyl-exo-		4.237166			

	tricyclo[5.2.1.0(2.6)]decane		178			
84	2-Oxonanone		0.221090259			
85	Nonanamide		0.377364947			
86	Harmine		5.537340193	6.069068154	7.901485977	29.0666794
87	Dodecanamide		0.848854854			0.467130999
88	1,8,11,14-Heptadecatetraene, (Z,Z,Z)-		0.432924486			1.730567712
89	Biperiden		5.621877484			
90	1,2,5-Tri-O-acetyl-1-deuterio-3,4-di-O-methyl-D-arabinitol		0.878606315	1.189816508	1.389743345	0.579972568
91	Phthalic acid, di(2-propylpentyl) ester		0.359221772	0.41065145	0.408065526	0.504545155
92	1,3,5-Trisilacyclohexane		0.952244622			
93	Sulfurous acid, butyl heptadecyl ester		19.09388646	0.643393496		0.784737209
94	1-Cyclohexene-1-carboxaldehyde, 4-(1-methylethenyl)-		0.516685088			
95	1,3-Cyclohexadiene, 5-ethyl-		0.71607109			
96	Octadecanoic acid, 2,3-dihydroxypropyl ester		10.92484224	13.43840327	12.898648812	9.149586588
97	13-Docosenamide, (Z)-		0.462010355	0.777326065		
98	3,7-Dimethyl-1-phenylsulfonyl-2,6-octadiene		0.225289117			
99	Cholesterol		0.259809495	0.299716483	0.354036942	
100	4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)-		2.014655963	0.897767862	0.280062136	1.414882594
101	Navadensin		0.372672689			
102	Campesterol		1.661646216	1.956000787	1.312701814	
103	Stigmast-7-en-3-ol, (3.beta.,5.alpha.,24S)-		0.20575979			

104	Stigmast-4-en-3-one		0.236161776			
105	Phytyl, 2-methylbutanoate		0.239148165	0.274394356		
106	Olean-12-en-28-oic acid, 3-hydroxy-, methyl ester, (3.beta.)-		0.190982491	0.261697112		
107	Fumaric acid, 4-methoxyphenyl dodec-2-en-1-yl ester			0.308191301		
108	2,4DI-tert-butylphenol				0.873738175	
109	Thunbergol			0.291087771		
110	n-Pentadecanol			0.761458993		
111	9,12,15-Octadecatrienoic acid, (Z,Z,Z)-			1.805586587	0.625912802	
112	trans-2-methyl-4-n-pentylthiane, S,S-dioxide			0.349265537		
113	Butyl citrate			0.508629284		
114	Isophthalaldehyde			0.23867505		
115	1,2,5-Tri-O-acetyl-1-deuterio-3,4-di-O-methyl-D-arabinitol			1.189816508		
116	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester			23.703232231	25.402116156	
117	1H-Indole, 2-methyl-			0.311540094		
118	1,8,11,14-Heptadecatetraene, (Z,Z,Z)-			1.031767084		1.730567712
119	3,7-Dimethyl-1-phenylsulfonyl-2,6-octadiene			0.614395829		
120						
121	1,4-benzenediol, 2-methyl-, 4-acetate				0.375492188	
122	3,7,11,15-Tetramethylhexadec-2-ene				0.56994057	
123	Hexadecanoic acid, methyl ester			0.435122977	0.259770298	

124	Hexadecanoic acid, ethyl ester				0.53907 2358	
125	Cyclobutanecarboxylic acid, dodec-9-ynyl ester				0.28109 759	
126	1H-Tetrazole-1-ethanol, 5-amino-				0.25559 8579	
127	1,3,5-Trisilacyclohexane				2.46414 8884	
128	1,4-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester				0.62409 2239	
129	13-Docosenamide, (Z)-				0.26938 4929	
130	4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)-					1.414882 594
131	l-Alanine, N-(3-fluorobenzoyl)-, butyl ester				0.28006 2136	
132	Undecanenitrile					1.010074 985
133	1-(2,2,6-Trimethylcyclohexyl)hexan-3-ol, TMS					0.592921 414
134	2-Heptenoic acid, heptyl ester					0.640390 004
135	Phenol, 4-(2-propenyl)-					1.025845 072
136	Phosphorochloridic acid, butyl propyl ester					0.817690 368
137	5-Aminopyrimidine, N-trimethylsilyl-					0.299754 651
138	Tris(2,4-di-tert-butylphenyl) phosphate			0.25508 697		
139	Ergost-5-en-3-ol, (3.beta.)-					1.344339 444
140	1,3-Methanopentalene, octahydro-					0.321764 11
141	Cis-8-methyl-exo-tricyclo[5.2.1.0(2.6)]decane					1.601696 641

Figure (3-1) Chemical composition of the alkaloid extract of Ocimum basilicum

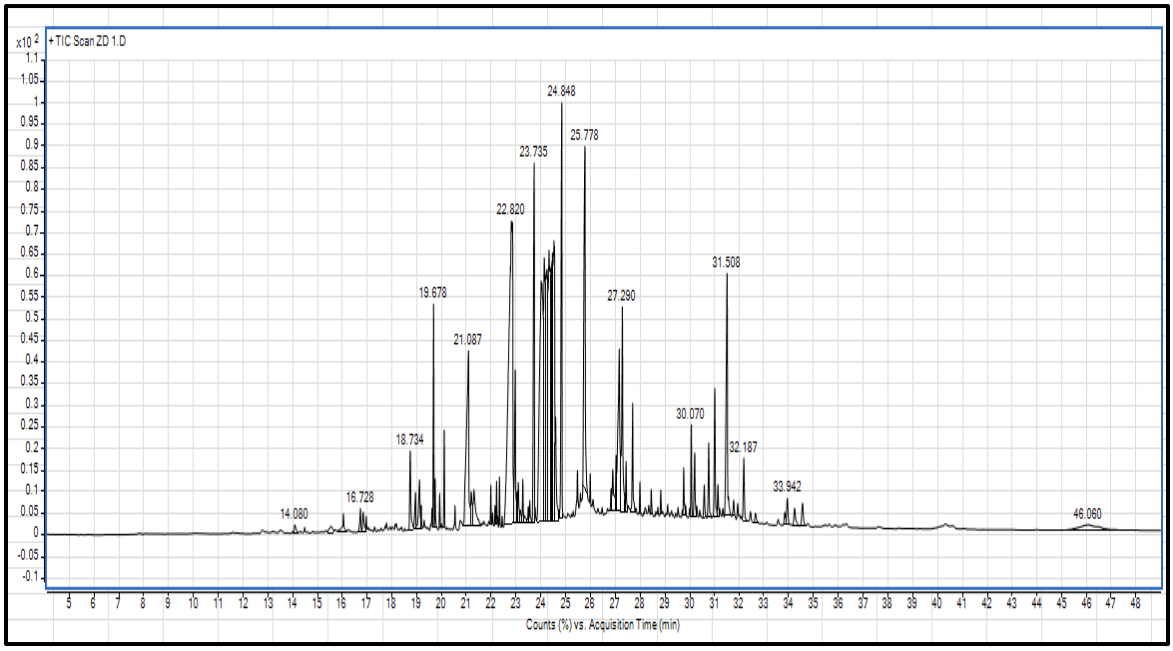


Figure (3-2) Chemical composition of the alkaloid extract of Ocimum basilicum at aconcentration of 10 µg/L

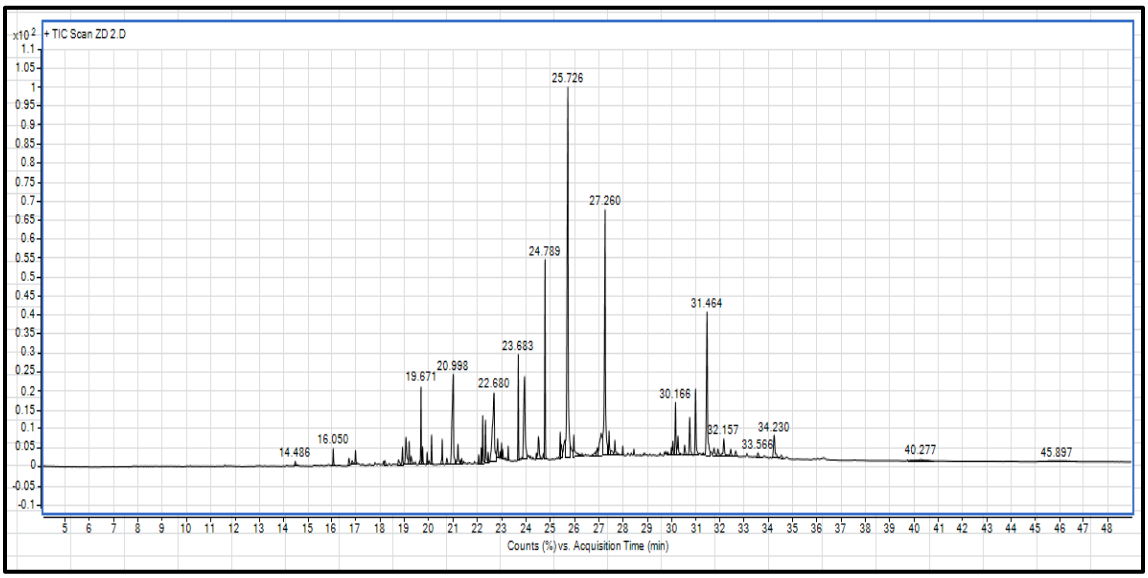


Figure (3-3) chemical composition of the alkaloid extract of Ocimum basilicum at a concentration of 50 µg/L

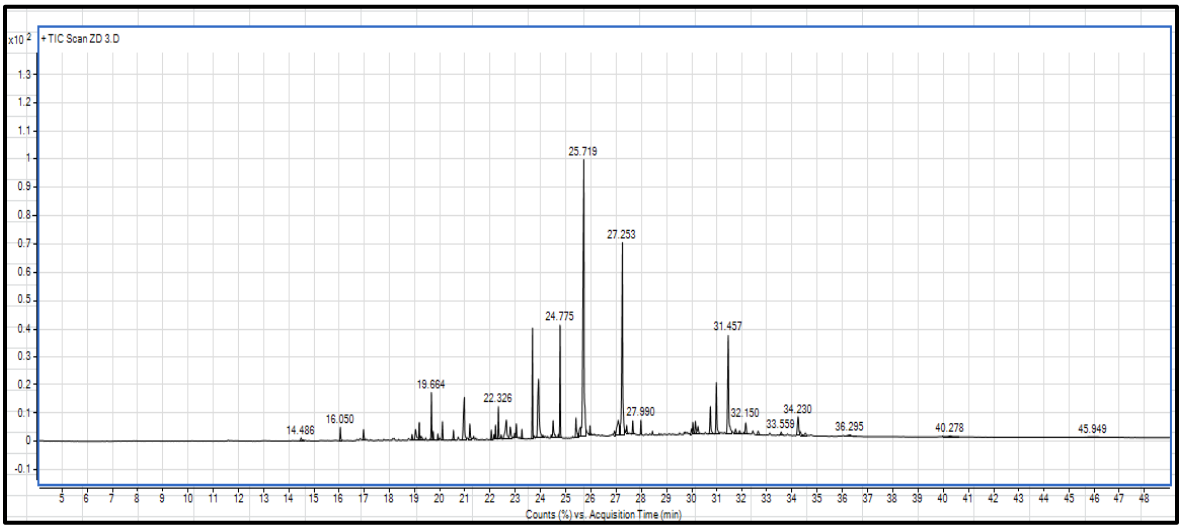


Figure (3-4) Chemical composition of the alkaloid extract of Ocimum basilicum at a concentration of 250 µg/L

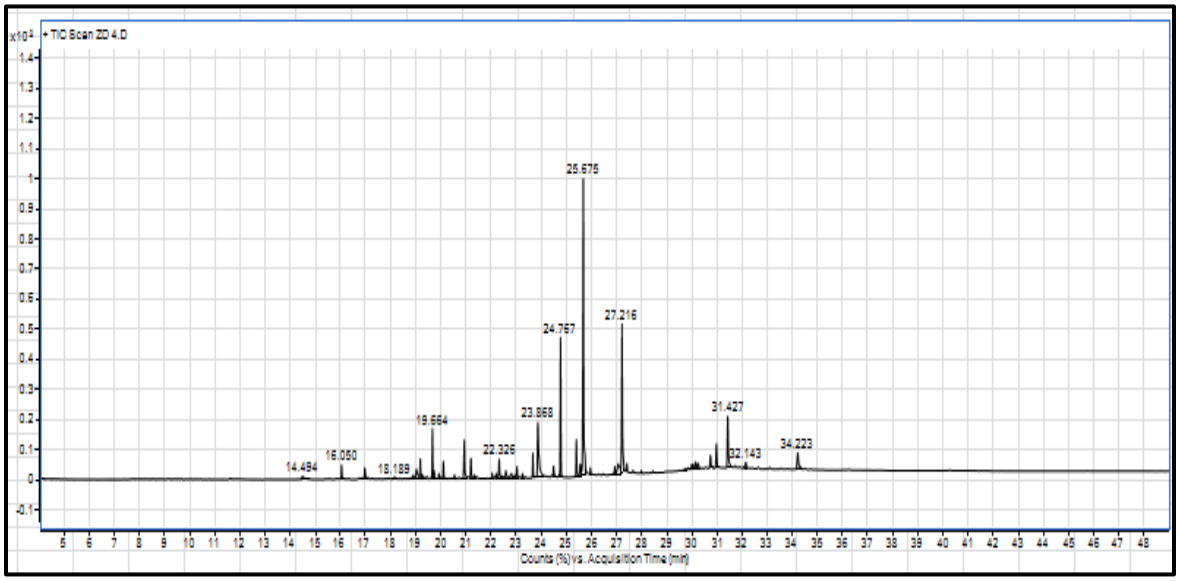


Figure (3-5) Chemical composition of the alkaloid extract of Ocimum basilicum at a concentration of 500 µg/L

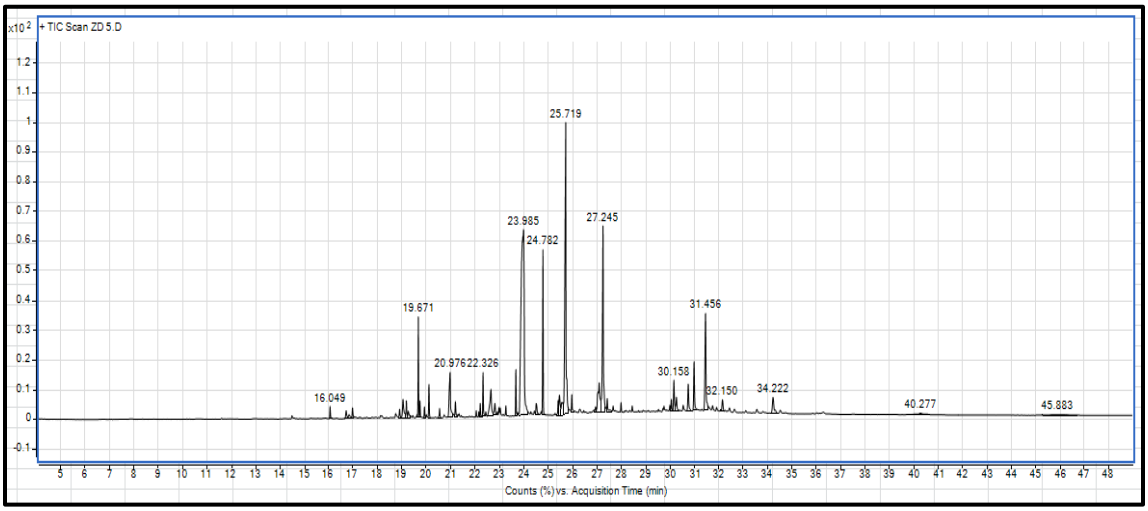
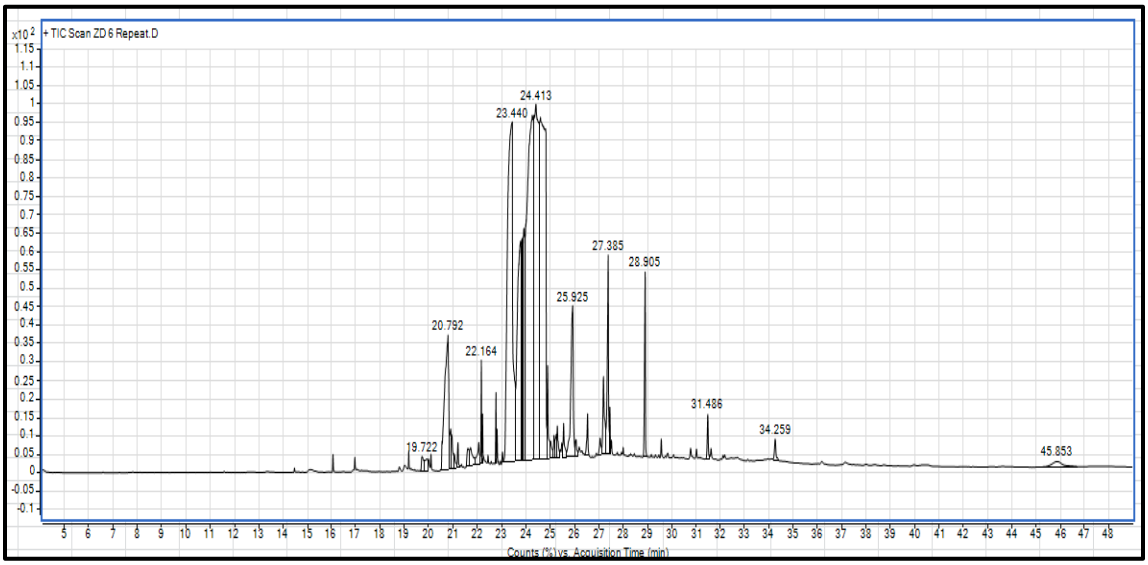


Figure (3-6) Chemical composition of the alkaloid extract of Peganum harmala



Discussion

many compounds that were detected in the GC-Mass screening are known for their biological activities such Hexadecanoic acid methyl ester which cause autolysis of membranes and can cause aortic dilation and inhibition of phagocytosis in addition to its effect on the production of nitric oxide for certain cells (Hagr and Adam., 2020; Ajoku et al., 2015;. Lohdip e t al., 2014).Hexadecanoic acid possesses several bioactivities also such as anti-androgenic, antioxidant, hypocholesterolemic, nematicide, pesticide and mosquito larvicide (Rajalakshmi et al., 2016; Kumar et al., 2017).9, 12 octadecadienoic acid (Z,Z) methyl ester, Is a fatty acid ester which interact with human physiology and pathology and are known to have an antifungal activity (Kumar et al., 2017). It is also known to be Antioxidant and anti-cancer(Abdurrahman and Cai-Xiab , 2020).anti-acne, anti-eczemic, anti-histamine, anti-inflammatory insectifuge , nematicide In

addition to be hepatoprotective and hyper cholesterol emic (Rajalakshmi et al.,2016).

The results showed that the control treatment recorded the highest percentage of the active compound.beta.-Carboline, 5-methoxy - the percentage was 15.07422 ,9-Octadecenoic acid 11.54395, which is considered an unsaturated fatty acid that has a role as anti-cancer, anti-insect, anti-inflammatory and has a role in lowering cholesterol. In the blood, works as an antibiotic, and is used as food oil. It also has a role in preventing colon and rectal cancer, and is used as a flavoring agent, as an exterminator of insects, rodents, herbs, and a plant growth regulator (Dilika et al., 2000).

The compound Spiro[2.4]heptane, 1,5-dimethyl-6-methylene - which has a ratio of 6.687542, and the compound Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester 4.656885 It appeared in the concentration 50 in a high percentage compared to the control treatment, which is considered as an antibacterial (Tyaji and Agarawal, 2017) and the compound n- Hexadecanoic acid 4.211332 It appeared that the concentration 10, 50, 500 increased at a concentration of 10 compared to the control treatment is a saturated fatty acid known as palm acid. This compound is of medical importance against bacteria, antioxidant, neuroprotective, anthelminthic, ant androgen, and cholesterol lowering (Sunil et al., 2018).

This result does not agree with the findings of the researchers (Chaudhuri, 2016; Kireeti et al., 2019). The compound recorded the highest percentage, as it recorded the highest percentage in the flowers of the N. oleander plant. Many researchers mentioned its inhibitory ability on plant growth due to its high concentration in The extracts used (Wang et al., 2011) It was found that the compound n-Hexadecanoic acid increases its ability to inhibit plant germination as the concentration increases in the extract (Zhang et al., 2014).

As for the compound gamma.-Sitosterol 5.501431, it appeared in all concentrations, and it increased at a concentration of 50 compared to the control treatment. It is used to treat hyperlipidemia, as an antioxidant and antibiotic (Venkata et al.,2012; Akapuaka et al., 2013).

Neophytadiene (2.28224) appeared in all concentrations, but in low proportions compared to the control treatment the compound Octadecanoic acid (2.839241) was found in the control treatment and has importance as an antibacterial and food improver and is used in cosmetics and perfumes and a cholesterol reducer (Sunita and Manju, 2017)

The compound 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)- (0.192452) is one of the compounds that have medical importance and its percentage decreased with increasing the concentration of the extract, the compound Hexadecanoic acid, ethyl ester (0.539072358) appeared only at a concentration of 250. It is of medical importance as an antioxidant, cholesterol reducer, anthelmintic, anti-androgen, and blood thinner (Sudha e t al., 2013).

The compound Phytol (0.279188) appeared in a concentration of 10, 50, and 250 and disappeared at a concentration of 500 and increased at a concentration of 250 compared to the control treatment. It is considered a phenolic compound that has known medical importance and is used in the treatment of many diseases. It is considered one of the compounds that have a role as an antioxidant and protects against cancer and diabetes. It is also considered an antibiotic and anti-inflammatory (Srinivasan and Kumaravel., 2016) It also has

a role in preventing cancer and is considered one of the compounds that prevent inflammation (Rajeswari al et., 2012) the compound alpha.-Amyrin appeared in all concentrations and increased at a concentration of 50 compared to the control treatment. It acts as an antibiotic, anti-inflammatory and anti-cancer agent (Chitra and Karthikeyen, 2012).

The compound Stigmasterol appeared in all concentrations, the percentage increased at a concentration of 50 compared to the control treatment, and it is vitamin D as it can be used as a substitute for milk, and it is a vegetable citrol consisting of an unsaturated bond between C22 and C23 and is found in foods such as yogurt. It is synthesized in the plant from the path of phenols and is present during the stages of development in growth) Guo et al.,2017) the compound Eicosanoic acid (0.533433), which is one of the hydrocarbon alkanes, and it is one of the paraffin and has a short carbon chain and is used in many industries (Rana and Kumar et al,.2019)

We notice the emergence of new compounds when watering with the alkaloid extract at a concentration of 10 4-(1-Hydroxyallyl)-2-methoxyphenol ,the compound Palmitoleic acid ,Dibutyl phthalate ,Methyl stearate ,1,4-Cyclohex-2-enedione ,Decyl acrylate andCis-8-methyl-exo-tricyclo[5.2.1.0(2.6)]decane ,2-Oxonanone ,Nonanamide ,Biperiden, 1,3,5-Trisilacyclohexane, 1-Cyclohexene-1-carboxaldehyde, 4-(1-methylethenyl)-,1,3-Cyclohexadiene, 5-ethyl-3,7-Dimethyl-1-phenylsulfonyl-2,6-octadiene, Navadensin, Stigmast-4-en-3-one .Also, the emergence of new compounds when irrigating with the alkaloid extract concentration 50 Fumaric acid, 4-methoxyphenyl dodec-2-en-1-yl ester ,Thunbergol,n-Pentadecanol ,trans-2-methyl-4-n-pentylthiane, S,S-dioxide Butyl citrate Isophthalmic acid 1,2,5-Tri-O-acetyl-1-deuterio-3,4-di-O-methyl-D-arabinitol ,1H-Indole, 2-methyl- 3,7-Dimethyl-1-phenylsulfonyl-2,6-octadiene, Tris(2,4-di-tert-butylphenyl) phosphate

New compounds appeared when irrigating with the alkaloid extract at a concentration of 250. Other compounds disappeared. 2,4-DI-tert-butylphenol and 1,4-benzenediol, 2-methyl-, Hexadecanoic acid, ethyl ester 4acetate.3,7,11,15-Tetramethylhexadec-2-ene, Cyclobutanecarboxylic acid, dodec-9-ynyl ester,1H-Tetrazole-1ethanol ,5amino,1,3,5Trisilacyclohexane 1,4Benzenedicarboxylic acid, bis(2-ethylhexyl) ester ,13-Docosenamide, (Z)-and l-Alanine, N-(3-fluorobenzoyl)-, butyl ester

New compounds appeared when watering with the alkaloid extract at a concentration of 500 and the disappearance of many other compounds 4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)- and Undecanenitrile and 2-Heptenoic acid. , heptyl ester,Phenol, 4-(2-propenyl)- Phosphorochloridic acid, butyl propyl ester ,Ergost-5-en-3-ol, (3.beta.)-,1,3-Methanopentalene, octahydro- ,Cis-8-methyl-exo-tricyclo[5.2.1.0(2.6)]decane,1-(2,2,6-Trimethylcyclohexyl)hexan-3-ol,

We notice the appearance of a number of compounds in all concentrations and their disappearance when treating the control 1-Dodecanol, Tetradecanoic acid, Loliolide, 1-Hexadecanol 4H-1-Benzopyran-4-one, 5-hydroxy-6,7-dimethoxy-2-(4-methoxyphenyl)- and Octadecanoic acid, 2 ,3-dihydroxypropyl ester 1,2,5-Tri-O-acetyl-1-deuterio-3,4-di-O-methyl-D-arabinitol Phthalic acid, di(2-propylpentyl) ester, and Harmine As some of these compounds have medical and economic importance, the harmine compound is

considered one of the alkaloid compounds beta-carbolene found in the plant harmala peganum as a result of watering with the alkaloid extract. It is considered antibacterial, anti-fungal, anti-inflammatory and hallucinogenic, in addition to the pharmaceutical importance. It has a strong inhibition effect on the growth and germination of other plants s (Sodaeizadeh et al., 2009).

Some of the compounds that have disappeared have great importance, but on the other hand, other compounds appeared that give the plant importance, and the percentages of the presence of compounds that maintained their presence differ which adds importance to the plant. Some compounds have many uses in the medical and industrial fields. The disappearance of the appearance of the compounds may be the result of the interaction between the chemical compounds of the plant and the compounds Chemical extracts that the plant was watered which led to the formation of new compounds, or the plant treated with extracts works to form them as a reaction to watering with foreign compounds .the Indian mustard plant is one of the plants that works to absorb substances and accumulate them in the plant tissue (Khudair, 2014).The difference in proportions of these compounds depends on environmental and genetic conditions, climatic effects on plants, and extraction methods (Kim et al., 2018; Kang et al., 2018).

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