Egypt. J. Chem. **59**, No.1, pp. 21–31 (2016)

Isolation and Identification of Some Chemical Constituents and Antimicrobial Activity of Two *Lamiaceae* Plants Growing in Saini

K. A. Abdelshafeek[#], H. A. Elgendy[*], M. M. ElMissiry and M. M. Seif ElNasr

Phytochemistry Dept., National Research Center and [*]Pharmacog. Dept., Fac. of Pharmacy, Misr Univ. for Sci. and Tech. (MUST), 6- October City, Giza, Egypt.

TWO plants known as *Nepeta septemcrenata* (N.S.) and *Otostegia fruticosa* (O.F.) of family *Lamiaceae* were chosen for the present study. The volatile oils (V. oil) of aerial parts of both plants were isolated by hydrodistillation method and their constituents were identified using GC/MS analysis. It was found that nepetalactone (53.65%) and caryophylline oxide (60.86%) are the main components in both N.S. and O.F., respectively. The lipid constituents were extracted with pet. ether and fractionated to fatty alcohols, unsaponifiable materials and fatty acids which were identified by GLC analyses. The antimicrobial activity of different extracts of both plants (V. oil, pet. Ether, Fatty alc., Fatty acids (F. acids), 70% methanol, Chloroform and Ethyl acetate)were evaluated using disc diffusion method against gram positive and gram negative bacteria in addition to fungi. The results proved that, the V. oil and ethyl acetate extract of N.S. are the most effective on *E. coli*, while, the F. acids fraction and 70% alc. extract of O.F. exhibited the highest activity against *Staphylococcus aurous* and *Asparaglus niger* , respectively.

Keywords: *Lamiaceae*, *Nepeta septemcrenata*, *Otostegia fruticosa*, Volatile oil, Lipid constituents and Antimicrobial activity.

Many of the species belonging to *Lamiaceae* family are aromatic and have been used as flavoring agents, spices and in the manufacture of perfumes. Two plants (*Nepeta septemcrenata* Ehrenb. [N.S.] and *Otostegia fruticosa* Forssk [O.F.]) from this family were chosen for investigation. The previous phytochemical studies of this family proved the isolation of many of essential oils, flavonoids, iridoids and phenolic acids[(1)]. The *Nepeta* genus is represented in Egypt by only one endemic species known as *N. septemcrenata*. It is growing in South Saini, named as Elghomissa in Arabic and used by the native Bedouins as antipyretic, sedative and in sore throat. While, *Otostegia fruticosa*is the most common species of *Otostegia* genus[(2-4)]. Zuhal *et al*.[(5)] isolated two iridoid glycosides, ixoroside and nepetanudoside B ; one phenylpropanoid glycoside, coniferine; two flavone glycosides, apigenin 7-*O*-glucuronide and apigenin 7-*O*-glucopyranoside; triterpenes, oleanolic acid and ursolic acid; and sterol, *β*-sitosterol from the aerial parts of *Nepeta heliotropifolia* while, Khan *et al*.[(6)] isolated a tetracyclic

#Corresponding author: mobile phone: 00201155470568
Email: khabdelhady @gmail.com

triterpenediol (Nepetadiol), in addition, lawsonin and lawsonic acid from the chloroform-soluble portion of *Nepeta suavis*.

Ashraf *et al*.[7] isolated an isopimarane-type diterpene identified as:1a-hydroxy-7a,14a,18-triacetoxy-isopimara-8,15-diene from the ethanol extract of the aerial parts of *N. septemcrenata.*

Tauheeda *et al*.[8] investigated the essential oils of *N. laevigata* and *N. elliptica* and identified the main constituents as: α-Citronellol, germacrene D, α-caryo-phyllene , β-bisabolol oxide B, β-bourbonene, α-humulene , spathulenol and β-bisabolol were the major ones. Other constituents such as 4a α,7 α,7a α-nepetalactone , *allo*-aromadendrene , and caryophyllene oxide were present in small amounts. In addition, some other constituents such as β-pinene, 1,8-cineole, linalool, geraniol, citronellyl acetate, … etc. were present in trace amounts.

Fariba *et al*.[9] studied the volatile constituents and their biological activity from the flowers and fruits of *O. persica*, they identified the main compounds as a-pinene,1-octene-3-Ol, cubenol (from the flowers), whereas diisooctyl phthalate and hexadecanoic acid (from the fruits). The antioxidant of flowers oil is greater than the fruits oil. Four *trans*-clerodane diterpenoids provisionally named as limbatolide D, E , F and G were isolated from the chloroform extract of *O. limbata*[10,11], while otostegindiol[12] which displayed a significant antimalarial activity at doses of 25, 50 and 100 mg/kg.

The observed antioxidant activity of *O. aucheri* methanolic extract (OAME) was significant and it was compared with the standard BHT inhibition method. The IC_{50} value obtained of methanolic extract was 2.23μg/ml. The results obtained from the oral administration of OAME (1.25 g/kg) proved no hypoglycemic effect in normal and type I diabetic rats. However, the OAME significantly lowered serum glucose level in type II diabetic models [13].

Anwar *et al*.[14] examined the antimicrobial effect of *O.limbata* extracts obtained with solvent of different polarities (ethanol, dimethylsulphoxide (DMSO) and methanol) on six different bacteria. The results values showed that *S.aureus* was the most sensitive against all three extracts, where, the highest zone of inhibition value against DMSO extract was 19 mm. No antimicrobial activity was observed against the *P. aeruginosa*, while only ethanolic extract showed some effect against *E. coli* with value of 11.5mm.

Mohammad *et al*.[15] proved that *O. persica* extract pretreatment significantly protected the renal injury from skeletal muscle ischemia-reperfusion. The aim of this study was to isolate V.oils, some lipid constituents and evaluates the antimicrobial effect of different extracts of both *N. septemcrenata* [N.S.] and *O. fruticosa* [O.F.]).

Materials and Methods

Plant material

Both N.S. and O.F. herbs were collected from St. Catherine region (Southern Sinai), both plants were collected in May during the flowering stage, dried in shade and grinded to fine powder. The plants were kindly, identified by prof. Dr. Ibrahim Algarf, Botany Dept., Faculty of Sci., Cairo Univ., and the voucher specimens were deposited at NRC herbarium.

Extraction of the volatile oils

About 250g of both fresh aerial parts of both plants (N.S. and O. F.) were subjected to hydrodistillation method for about three hours according to Gunther method[16]. The obtained oil was removed, separately, after complete distillation and dried over anhydrous sodium sulphate to give a pale yellow oil having a characteristic odor for each plant (for N.S.0. 26% and 0.08% for O.F. v/w, respectively) and kept in refrigerator to GC/MS analysis.

GC/MS analysis of V. oils of both plants

The V. oils were subjected to GC/MS analysis using the following conditions: instrument, Hewlett PackerdHP 5890 gas chromatograph series II with electronic pressure control equipped with an HP5972mass selective detector. Column: HP-5MS capillary column (30m, 0.25mm i.d., 0.25□m film). Temp.: oven: 38°C up to 250°C, 3°C/min., injector: 50°C., injection splitless. The mass spectra were measured in EI mode scan at 70 ev from 30-550 mass unit, using different data bank of NIST and Wiley 275 L libraries for the identification of the V. oil components according to their GC retention time and matching with as well as by comparison of the with fragmentation patterns of their mass spectra with those reported in the literature [17,18] as shown in Tables 1 & 2.

Extraction of lipid constituents

About 1.0 Kg of the dried powder of both plants were extracted with petroleum ether (b.r. 40-60 °C) in a Soxhlet apparatus. The pet. ether extracts were passed through fuller's earth, filtered, dried over anhydrous sodium sulphate and evaporated in *vacuo* at 40 °C till dryness to give a pale yellow residues (9.60g and 4.30g) for N.S. and O.F., respectively. These residues were dissolved in boiling acetone (250 ml) and left overnight at room temperature. Amorphous precipitates were filtered, washed with cold acetone and recrystallized from chloroform/methanol to give bright white crystals (2.10g) and (0.95g) of acetone insoluble fraction (Fatty Alcohols mixture). The filtrates (Acetone soluble fraction) were evaporated till dryness (7.1g) and (3.0 g) and subjected to saponification process[1] to afford the unsaponifiable materials, fatty acid methyl esters of both plants .

GC/MS analysis of fatty alcohols of both plants

The fatty alcohols were analyzed using the following conditions, instrument, MS Model 88 SW/HW rev.. Column: DB-1 (crosslinked methyl silicone gum,

3m, 0.2mm i.d., 0.33μm film). Temp.: source: 200°C , analyzer 220°C, carrier gas: helium 600cc/min., injection splitless. The results were summarized in Table 3.

GLC analysis of unsaponifiable matters and fatty acid methyl esters

The GLC analyses were carried out using the following conditions; Instrument: Varian model 3700GC. Column for unsap. : 10% OV-101 on chromsorb W/HP, 80/100, (2m stainless steel, 0.25 mm i.d.), Column for fatty acid methyl esters:15% DEGS on chromsorb bW/AW, 80/100, (2m stainless steel, 0.25mm i.d.), Temp. for unsap:column:70°C up to 270°C, 4°C/min, injector: 280°C., Detector (FID): 290°C.Temp. for fatty acid methyl esters: column:70°C up to 190°C, 4°C/min, injector: 240°C., Detector : 280°C, Flow Rates for both of them: N_2 and H_2: 30 ml / min, Air: 300 ml /min the data were tabulated in Tables 4 & 5.

Antimicrobial activity study

The study of the antimicrobial activity of different extracts of both plants (V. oil, pet. ether, Fatty alcohols, F. acids, unsap. Fraction, 70% aqueous methanol, chloroform and ethyl acetate) was carried out using Disc-diffusion method [19] against some selected microorganisms and measuring the inhibition zone in mm after 24 hr for bacteria and 48 hr for fungi as shown in Table 6.

Tested microorganism

Cultures of the following organisms were used: *St. aureus* (ATCC 25923), *B. subtillis* (ATCC6633), *E. coli* (ATCC 15036), by microbial Nat. Prod. Dept., NRC. The organisms were supplied through the unit of the Chemistry of Natural and Microbial Products Dept., and the members of this unit isolated the fungi *(A. niger* and *S. cerevisiae*), National Research Center, Cairo, Egypt. The control used as antimicrobial are Tetracycline as antibacterial and Metronidazole as antifungal. The microbiological media are Nutrient broth and Nutrient agar (DIFCO laboratories, Detroit, Michigan, USA) was used.

Results and Discussion

The results of GC/MS of the V. oil of N.S. in Table 1 proved that, it is a mixture of 56 compounds in which 47 of them were identified representing 93.23%. The identified compounds belong to several chemical classes : hydrocarbons (3.64%), alcohols (3.98%), ketones (5.85%), acids (0.07%), oxides (0.18%), esters (1.83%), cyano compounds (2.01%), etherials (2.96%), chlorinated compounds (8.84%), terpenes (0.15), in addition to the main compound nepetalactone (53.65%). It was found that, the characteristic odor of the plant may be due to the presence of this compound; these results are in a good agreement with many investigators [20,21], where they reported that, nepetalactone is considered as a main compound in other *Nepeta* species.

TABLE 1. GC/MS data of V. oil of N.S.

Peak no.	R_t (min.)	%	Mass data			Compounds
			MW	B.P.	Fragments m/z (%)	
1	3.89	8.77	106	41	55(89),77(84), 91(15)	2-chloro-2-methyl-butane
2	7.64	0.11	86	71	41(46), 55(11), 86(50)	-1methoxy1-butene
3	8.16	0.07	140	77	41(50), 69(24), 89(14)	2.3-dichloro-2-methyl-butane
4	9.41	0.23	98	69	42(59), 55(85), 98(79)	3-methylcyclopentanone
5	15.60	0.09	143	93	57(39), 71(13),107(38)	Unknown
6	16.22	0.36	128	57	27(30), 55(32),72(15)	4-Ol-7-octene
7	16.57	0.26	128	43	57(80),71(52), 99(47)	3-octanone
8	16.97	0.14	126	69	41(61), 56(68), 98(47)	2,6-dimethyl cyclohexanone
9	18.33	0.66	134	119	82(21), 91(34),134(22)	*P*-cymene
10	18.66	0.79	124	81	43(68), 77(9), 109(83)	1-acetyl-1-cyclohexene
11	19.54	0.16	124	124	55(22), 81(90), 96(48)	Bicycli[3.3.1] nonane
12	19.74	0.74	138	69	41(22), 81(90), 96(48)	Comphenilone
13	20.07	0.17	136	69	55(56), 83(20), 97(42)	Unknown
14	20.94	2.20	170	59	43(65), 68(27),111(22)	*Cis*-linalool oxide
15	21.74	1.38	170	59	43(65), 68(27),111(22)	*trans*-linalool oxide
16	22.59	0.13	124	109	43(53),81(55), 124(09)	6-methyl-3,5-heptadien-2-one
17	22.76	0.07	172	55	67(70), 93(65),111(74)	Furan-2(2-ethoxy-1-methoxyeth)
18	23.08	0.66	155	99	54(74),67(43), 128(23)	1-octen-1-Ol acetate
19	24.54	0.06	138	81	68(48), 109(24),138(40)	1.2-dihydrolimonene
20	25.69	0.17	170	68	59(73), 94(50), 155(9)	2-H-pyran-3-OL6-ethenyl-tetrahydro-2,2,6-trimethyl
21	25.98	0.22	170	68	43(32), 59(65), 94(51)	Unknown
22	27.96	2.81	138	138	55(23), 67(18), 123(98)	*p*-methoxyanisol
23	28.21	0.42	138	67	41(30), 82(38), 95(15)	1-pentyl cyclopentene
24	28.78	0.28	184	57	67(83), 82(93), 100(34)	*Cis*-3-hexenyl-2-methyl-butanoate
25	28.97	0.23	184	82	67(84), 57(59),41(52)	*Cis*-3-hexenyl-3-methyl-butanoate
26	30.47	0.18	166	81	41(89), 67 (91), 95 (34)	1-dodecyne
27	30.69	0.18	164	104	51(15), 91(74), 164(24)	Benzene propanoic methyl ester
28	31.03	0.28	152	81	41(42), 69(56), 100(95)	1-methyl comphenilone
29	31.40	0.13	194	159	43(32), 69(32), 107(15)	2-H-benzopyran-3,4,4a,5,6,8a – hexa-hydroxy 2,5,5,8a-tetramethyl
30	32.08	0.38	150	135	91(16), 115(22), 150(30)	Thymol
31	32.69	12.7	150	135	77(19), 91(15), 150(27)	Carvacrol
32	32.97	0.5	150	55	67(97), 83 (29), 135(46)	Unknown
33	33.21	0.36	152	41	27(59), 81(62),124(31)	cis-bicyclo[5.2.0]nonane-1,7-dimethyl
34	35.25	53.65	168	81	69(90), 123(85), 166(77)	Nepetalactone
35	35.69	2.01	153	153	69(13), 81(51), 105(90)	naphthlene-2-carbonitrile
36	35.89	0.88	189	81	55(37), 95(31), 153(78)	Unknown
37	36.86	1.09	152	82	41(33), 67(78),95(51)	3,7,7-trimethyl, bicyclo[4.1.0] heptane-2-one
38	38.92	0.07	224	69	93 (41), 121(21),136(24)	2-methyl-Propanoic acid-3,7-dimethyl,2,6-octadiene
39	39.16	0.31	204	81	55(51), 95(41), 180(81)	Unknown
40	39.40	0.09	204	119	41(33), 96 (38),105(53)	Thujopsene

TABLE 1. Cont.

Peak no.	R_t (min.)	%	Mass data			Compounds
			MW	B.P.	Fragments	
41	39.61	0.16	204	105	55(68),67(80),93(91)	Valencene
42	40.22	0.32	204	81	57(68),105(80),153(74)	Germacrene-D
43	40.71	0.22	196	69	57(78), 121(35),161(15)	Geranyl acetate
44	40.85	0.26	154	123	67(30), 82(72), 136 (23)	*p*-menth-3-ene-9-Ol
45	41.10	0.42	202	159	91(5), 105(17), 128(11)	Calamenene
46	41.88	0.47	200	157	81(54), 142(48),166(15)	4-ethyl-1,1,6-Trimethyl-1,2-dihydronaphthalene
47	42.20	1.93	138	67	81(48), 95(63), 109(93)	spiro[4.4]nonan-2-one
48	42.62	0.11	206	81	55(11),123(18), 168(14)	Dihydro-β-humulene
49	42.74	0.46	204	80	53(10), 123(59),161(16)	Unknown
50	43.00	0.32	166	105	51(53), 67(29), 82(79)	Unknown
51	43.82	0.16	196	123	51(21), 67(75), 82(84)	Ethyl chrysanthemate
52	44.39	0.26	206	82	41(96), 107(47),191(15)	6,10-dimethyl,3-(1-methyl ethyl)1-cyclodecene
53	44.92	0.16	206	79	55(57), 93(80), 164 (33)	Unknown
54	46.08	0.24	222	181	95(94), 151(85),165(17)	Widdrol
55	57.38	0.05	275	55	81(84), 137(38),257(35)	Manoyloxide
56	61.16	0.15	266	209	147(40),171(61), 251(98)	Equilenin

The data of GC/MS of V. oil of O.F. in Table 2 revealed the presence of 13 compounds in which caryophyllin oxide is the major one (60.86%). The other compounds include hydrocarbons (2.8%), alcohols (4.36%), aldehydes (2.15%), esters (4.21%), and nitrogenous compounds (1.39%). It was found that the oil content of N.S. is higher than that of O.F. This result is coincided with that reported on *Lamiaceae* family, where it is divided into two subfamilies *Lamioideae* of poor oil content and *Nepetoideae* of rich oil content so, we can consider N.S. is belonging to *Nepetoideae* while O.F. is belonging to *Lamioideae*[4].

TABLE 2. GC/MS data of V. oil of O.F.

Peak no.	R_t (min.)	%	Mass data			Compounds
			MW	B.P.	Fragments m/z(%)	
1	4.66	0.23	119	83	53(16), 69(20), 104(17)	Chloroform
2	20.64	2.15	112	57	55(51), 83(13), 89(10)	2-heptenal
3	21.96	1.86	152	91	65(9), 105(14), 119(14)	*Cis*-carveol
4	24.22	2.5	154	71	55(21), 93(54), 136(17)	4-terpineol
5	33.10	1.91	204	119	93(49), 105(89), 161(80)	α-copaene
6	33.47	4.16	204	81	67(13), 91(15), 161(32)	β-bourbonene
7	34.91	4.39	204	93	69(80), 119(30), 189(7)	α-*cis*-bergamotene
8	38.70	9.16	204	69	53(14), 93(86), 189(12)	β-bisablene
9	38.93	2.09	204	161	79(30), 107(60),122(28)	α-cadenen
10	40.30	1.39	121	106	52(11), 78(29), 121(28)	Pyridine-2-(1-methyl ethyl)
11	41.56	60.86	220	79	55(54), 91(78), 187(12)	Caryophyllene oxide
12	42.50	5.09	138	67	53(36), 96(69), 123(21)	4-decyne
13	44.96	4.21	198	93	41(89), 69(50), 136(4)	linalyl acetate

The data in Table 3 showed that, N.S. contain seven fatty alcohols in which octacosanol and triacontanol are the main (34.68% and 27.04%, respectively) while O.F. include five fatty alcohols with triacontanol as main (47.58%).

TABLE 3. GC/MS data of fatty alcohols of both N.S. and O.F.

Peak no.	Ret. Time (min.)	Rel. %		Fatty alc.	Molecular formula	M. Wt.
		N.S.	O.F.			
1	11.18	12.20	-	Hexacosanol	$C_{26}H_{54}O$	382
2	12.53	4.90	-	Heptacosanol	$C_{27}H_{56}O$	396
3	14.16	34.68	29.5	Octacosanol	$C_{28}H_{58}O$	410
4	15.39	7.06	4.05	Nonacosanol	$C_{29}H_{60}O$	424
5	17.04	27.04	47.58	Triacontanol	$C_{30}H_{62}O$	438
6	18.24	3.89	3.31	Hentriacontanol	$C_{31}H_{64}O$	452
7	19.86	9.91	15.55	Dotriacontanol	$C_{32}H_{66}O$	466

The GLC analysis of the unsap. fraction (Table 4) of both plants revealed the presence of a mixture of n-hydrocarbons, sterols and triterpenes. There is a similarity in the n-hydrocarbon mixtures of both plants but differ only in the percentage of each component. Also, the sterol fraction of N.S. constitutes 8.76% which contain cholesterol, β-sitosterol and stigasterol, while that of O.F. represents 9.37% with campasterol and β-sitosterol. The triterpene in N.S. is α-amyrene (3.11%) and in O.F. is β- amyrene (4.39%).

TABLE 4. GLC data of the unsap. fraction of both N.S. and O.F.

Peak no.	Ret. Time (min.)	%		Compounds
		N.S.	O.F.	
1	14.91	0.70	5.28	Dodecane, n-C 12
2	19.65	0.11	0.90	Tridecane, n-C 13
3	23.02	0.68	1.70	Tetradecane, n-C 14
4	25.86	0.22	1.45	Pentadecane, n-C 15
5	31.24	0.78	1.54	Heptadecane, n-C 17
6	34.99	1.38	3.14	Octadecane, n-C 18
7	36.91	0.88	0.96	Nonadecane, n-C 19
8	39.58	1.68	1.50	Eicosane, n-C 20
9	41.49	2.29	1.30	Heneicosane, n-C 21
10	44.31	5.70	0.28	Docosane, n-C 22
11	44.36	6.31	0.01	Tricosane, n-C 23
12	47.15	30.77	6.45	Lupeol
13	48.38	3.11	-	β - amyrine
14	50.18	6.08	29.28	Tetracosane, n-C 24
15	52.41	5.46	0.52	Hexacosane, n-C 26
16	53.51	4.88	2.78	Squalene
17	55.0	3.21	7.09	Octacosane, n-C 28
18	57.17	2.34	4.31	Triacontane, n-C 30
19	66.73	0.58	-	Cholesterol
20	71.96	-	0.45	Campasterol
21	76.09	5.01	8.93	β -sitosterol
21	79.01	3.17	-	Stigmasterol
22	83.63	0.29	4.39	α -amyrine
23	---	14.16	18.55	unidentified compounds

TABLE 5. GLC of FAME of both N.S. and O.F.

Peak no.	Ret. Time (min.)	Rel. %		Compounds	Molecular formula
		N.S.	O.F.		
1	4.17	-	0.08	Butyric acid	$C_4H_8O_2$, C4(0)
2	6.67	-	0.30	Caproic acid	$C_6H_{12}O_2$, C6(0)
3	8.37	-	0.20	Caprylic acid	$C_8H_{16}O_2$, C8(0)
4	10.24	-	0.40	Pelargonic acid	$C_9H_{18}O_2$, C9(0)
5	13.16	-	0.32	Capric acid	$C_{10}H_{20}O_2$, C10(0)
6	16.65	-	0.36	Undecanoic acid	$C_{11}H_{22}O_2$, C11(0)
7	19.03	-	0.35	Lauric acid	$C_{12}H_{24}O_2$, C12(0)
8	22.39	1.16	1.6	Tridecanoic acid	$C_{13}H_{26}O_2$, C13(0)
10	25.51	2.13	0.48	Myrestic acid	$C_{14}H_{28}O_2$, C14(0)
11	27.85	28.39	19.0	Palmitic acid	$C_{16}H_{32}O_2$, C16(0)
12	29.80	1.42	1.04	Margaric acid	$C_{17}H_{34}O_2$, C17(0)
13	31.88	10.21	8.0	Stearic acid	$C_{18}H_{36}O_2$, C18(0)
14	32.82	12.48	5.60	Oleic acid	$C_{18}H_{34}O_2$, C18(1)
15	34.65	9.87	16.0	Linoleic acid	$C_{18}H_{32}O_2$, C18(2)
16	35.65	8.35	3.0	Linolenic acid	$C_{18}H_{30}O_2$, C18(3)
17	37.59	13.02	43.10	arachidic acid	$C_{20}H_{40}O_2$, C20(0)
18	39.97	12.96	-	Behenic acid	$C_{22}H_{44}O_2$, C22(0)

The data in Table 6 proved that, the V. oil of N.S. gave the highest inhibition against *E. coli* and *St. aureus* where are inhibition zone (IZ)19 and 18 mm respectively, whereas, the V. oil of O.F. gave moderate activity against the same two species with IZ of 11,14 mm. The unsap. fraction of both N.S. and O.F. exhibited highest activity *A. niger and S. cereviseae*, respectively, the lowest activity was found against *B. sabtilis* with unsap. fraction of N.S. and chloroform extract of O.F.

TABLE 6. Antimicrobial activity of different extracts of both N.S. and O.F.

Plant	Extracts	Inhibition zone diameter (mm)				
		Gr. +ve bacteria		Gr. -ve bacteria	Fungus	Yeast
		St. aureus	*B. sabtilis*	*E. coli*	*A. niger*	*S. cereviseae*
N. septemcrenata	Volatile oil	16	8	19	11	14
	Pet. ether	15	8	17	18	18
	Fatty alc.	-	-	-	10	-
	Fatty acids	16	9	14	18	13
	Unsap. Fr.	-	8	10	19	9
	70%Methanol	12	10	17	21	9
	chloroform	18	10	18	15	12
	Ethyl acetate	10	11	22	17	18
O. fruticosa	Volatile oil	14	10	11	16	-
	Pet. ether	10	-	12	16	-
	Fatty alc.	-	-	-	12	-
	Fatty acids	16	12	13	-	12
	Unsap. Fr.	-	-	10	13	14
	70% Methanol	9	10	14	17	11
	chloroform	-	9	-	11	10
	Ethyl acetate	12	12	11	14	16

Acknowledgement : The authors are in debt to Prof. Dr. Abdel Hamid A. Hamdy Chemistry of Microbial and Natural Products Dept., National Research Center, Dokki, Giza, Egypt, for providing the different microbial cultures and his help in carrying out of antimicrobial activity of different extracts.

References

1. **Abdelshafeek, K.A.,** *M.Sc. Thesis*, Chemistry Dept., Fac. of Sci., Cairo Univ., Egypt (1997).

2. **Tackholm, V.,** *Student's Flora of Egypt*, Cairo Univ.,2nd ed.,coop, Beirut (1974).

3. **Barberan, F.A.T.,** The flavonoid compounds from labiateae. *Fitotrapia*, **57**(2), 67-95 (1986).

4. **Barberan, F.A.T. and Wollenweber, E.,** Flavonoid aglycones from the leaf surfaces of some *Labiatae* species. *Pl. Syst. Ecol.***173**, 109-118 (1990).

5. **Zuhal, G.P., Hilal, O., Kuruuzum, Z., Cavit, K.L. and Omur, D.,** Secondary metabolites from *Nepeta heliotropifolia*. *Turk. J. Chem*. **33,** 667-675 (2009).

6. **Khan, F.U., Hussain, J., Khan, I., Ullah, U. R., Ali, I., Muhammad, Z., Hussain, H. and Shah M. R.,** Nepetadiol, A new triterpenediol from *Nepeta suavis. Chem. Nat. Compds.* **47** (2) , (2011).

7. **Ashraf, T.K., Saharr, G., Ohamedf, M.L., Hamed, F.H. and Markusv, O.,** A diterpene from *N. Septemcrenata*. *Phytochem.* **44** (3), 475-478 (1997).

8. **Tauheeda, H., Manzoor, A. R., Abdul, S. S., Khursheed, A. B., Haroon, M. B., Bilal, A. D., Ghulam, H. D. and Mushtaq, A. Q.,** Chemical composition of the essential oils of *N. laevigata* and *N. elliptica* from India. *Chem. Nat. Compds.* **47**, 3 (2011).

9. **Fariba, S., Valiolah, M. and Shirin, M.,** Comparison of antioxidant and free radical scavenging activities of the essential oils from flowers and fruits of *O. persica*. *Pak. J. Biol. Sci.***10** (21), 3895-3899 (2007).

10. **Khan, F. and Kousar, H.,** Two new clerodane diterpenoids from *O. limbata*. *J. Asian Nat. Prods. Res*. **9**, 91 – 95 (2007).

11. **Khan, F., Ahmad, K. , Iqbal, M. and Limbatolide, F.,** Two new trans-clerodane diterpenoids from *O. limbata*. *Pol. J. Chem.* **79** (11), 1757-1762 (2005).

12. **Bisrat, D., Animut, A., Bucar, F. and Asres, K.,** In vivo antimalarial activity of a labdane diterpenoid from the leaves of *O. integrifolia*. *Phytother. Res.* **27** (12), 1805-1809 (2013).

13. **Rashid, R., Murtaza, G., Khan, A. K. and Mir, S.,** Antioxidant and hypoglycemic effect of *O. aucheri* methanolic extract in streptozotocin-induced diabetic male long-evans rats. Acta Poloniae Pharm. *Drug Res.* **71** (4), 631- 635 (2014).

14. **Anwar, N., Salik, S. and Ahmad, D.,** Antibacterial activity of *O. limbata*. *Inter. J. Agri. Biol.* **11**(5), 647-650 (2009).

15. **Mohammad, A.T., Hamed, A.T., Fariborz, M., Poorya, K. and Hesam, A.A.,** Effect of *O. persica* extraction on renal injury induced by hindlimb ischemia-reperfusion: A rat model. *Intern. J. Surgery*, **13**, 124-130 (2015).

16. **Guenther, E.,** The Production of Essential Oils, p. 87: In: E.Guenther (Ed.). *The Essential Oils*. Krieger Publ. Co., Malabar, Fla (1972).

17. **Adams, R.P.,** *Identification of Essential Oil Components by GC-MS*. Allured Publ.Corp., Carl Stream, II (1995).

18. **Mclafferty, F.W. and Staffer, D.B.,** *The Eiley NBS Registry of Mass Spectral Data*, vol. 1-7, Wiley Int. Public (1989).

19. **Hamdi, A.,** *M. Sc. Thesis*, Pharmacog. Dept., Faculty of Pharmacy, Cairo Univ., Egypt (1979).

20. **Heba, I.A.,** Essential oil and iridoid glycosides of Nepeta septemcrenata. *J. Nat. Prod*. **3,** 103-111 (2010).

21. **Wafaa, H.B.H., Mai, A., Ebtesam, E., Ali, E., Nida, N.F. and Zeinab, I.A.E.,** Chemical composition and antimicrobial activity of the essential oil of *Nepeta deflersiana* Growing in Saudi Arabia. *J. Appl. Sci. Res.***10** (12), 51-56 (2014).

(*Received* 4/2/2016;
accepted 28/2/2016)

فصل وتعريف بعض المكونات الكيميائية والفاعلية كمضادات للميكروبات لاثنين من نباتات العائلة الشفوية التى تنمو في سيناء

خالـد عبدالهادى ، حسينى عبدالمحسن الجنـدى*، مصطفى المسيـرى و مدحت سيف النصر

قسم كيمياء النباتات الطبية –المركزالقومى للبحوث و *قسم العقاقيـر –كليـة الصيدلـة – جامعة مصر للعلوم والتكنولوجيا – 6 اكتوبر – الجيزة –مصر.

لقد تم اختيار اثنين من النباتات المعروفة باسم نبيتا سبتيمكريناتا (N.S). وأوتوستجيا فروتوكوزا من العائلة الشفوية لهذه الدراسة. تم تحضير الزيوت الطيارة من الأجزاء الهوائية من كلا النباتين بواسطة التقطير المايئ وحددت مكوناتهما باستخدام طريقة تحليـــل MS/GC. وقــد تبين أن النيبيتالاكتون (53.65٪) ، وأكسيد الكيروفيللين (60.86٪) هي المكونات الرئيسية في كل من N.S. وO.F على التوالي. تم استخلاص المكونـــات الدهنيـــة مع الأثيرالبترولى ، و تجزئته إلى الكحولات الدهنية ، المواد الغير متصبنة والأحماض الدهنية التي تم تحديدها باستخدام تحليل كروماتوجرافيا الغاز- سائل. تم قياس الفاعلية كمضادات الميكروبات للخلاصات المختلفة لكلا النباتين (الزيت الطيار ، الاثيرالبترولى ، الكحولات الدهنية ، الأحماض الدهنية ، الجزء الغير متصبن ، 70٪ والميثانول ، والكلوروفورم وخلات الإيثيل) تم التقييم باستخدام طريقة الانتشار القرصي ضد البكتيريا موجبة وسالبة الجرام بالإضافة إلى الفطريات.