Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research

ISSN No: 0975-7384
CODEN(USA): JCPRC5

J. Chem. Pharm. Res., 2011, 3(6):478-482

Volatile components of the resin of *Pistacia lentiscus* "Mistica" used in Sudanese Traditional medicine

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ABSTRACT

The present study describe the chemical profile of volatile compounds from the resin of Pistacia lentiscus L. (Anacardiaceae) "Mistica" marketed sample used in Sudanese Traditional Medicine. The essential oils was obtained by steam-Distillation and analyzed by GC/MS. From the 37 compounds representing 58% of the oil : alpha-copaene (17.12%), beta-caryophellene (9.78%), gamma-muurolene (9.60%), 8,8-Dimethyl-9-methylene-1,5-Cycloundecadiene (8.10%), gamma-elemene (5.76%) and beta-bourbonene (5.46%) appear as the main components. The oil also contained smaller percentages of alpha-cubebene, alpha-humulene, cyclostivene, (-)-spathulenol and ledol. P. lentiscus oil was characterized by the presence of many components which could have numerous applications in food, pharmaceutical and perfume industries.

Keywords: Essential oil composition; *Pistacia lentiscus*; alpha-copaene; beta-caryophyllene; gamma-muurolene.

INTRODUCTION

Pistacia lentiscus L. is an aromatic member of the Anacardiaceae and native to the Mediterranean countries. The resin of *P. lentiscus* has traditionally been used in Sudan folk medicine to treat catarrh and as stimulant [1]. The leaves are used in the treatment of inflammatory, antidiarrheal, antihypertensive, antispasmodic , diuretic, in antistress agents in traditional medicine [2]. *P. lentiscus* oil is used in several industrial application such as perfumery , food and pharmaceutical and it has been re-evaluted recently as a flavouring in chewing gum. Several studies have been reported on the chemical composition of essential oil of *P. lentiscus* belonging to different regions in the world [3 – 9].

Several studies have been reported that essential oil from of *P.lentiscus* possesses appreciable biological properties such as antimicrobial [10-11] , antiproliferative [12] and antioxidant [13-15].

The aim of this research work was to analyze the essential oil of the *Pistacia lentiscus* by using GC/MS , to identify their composition of volatiles.

EXPERIMENTAL SECTION

Plant material:

The plant material (resin) used in this study was purchased in April , 2010 from Bahry Market, Khartoum State , Sudan . Based on the available marketed sample brought from Saudi Arabia , the plant material was identified as *P. lentiscus* by one of the author, Prof. H.H EL-Kamali.

Table 1. Chemical composition of *Pistacia lentiscus* resin

NO	Compound	%	Formula	Class Type	Retention Time (RT)	Mass peaks	Base peaks	Main fragment ions (m/z)
1)	1,8-cineole	0.05	$C_{10}H_{18}O$	OM	6.361	21	43.10	41,43,69,81,93,108,119,139,154
2)	Unidentified	0.02	$C_{15}H_{24}$	SH	8.468	16	189.10	41,56,81,93,105,119,133,147,189
3)	Unidentified	0.20	$C_{20}H_{34}O$	-	8.947	44	149.20	41,55,67,79,91,105,119,133,149,161,189,204
4)	Isoterpinolene	0.03	$C_{10}H_{16}$	MH	9.055	19	121.10	41,43,67,79,93,107,121,136,149
5)	Unidentified	0.04	$C_{18}H_{26}O$	-	9.103	22	41.10	41,44,67,81,91,107,121,135
6)	Alpha-cubebene	1.92	$C_{15}H_{24}$	SH	9.194	80	105.10	41,55,69,81,91,105,119,133,147,161,189,204
7)	5-isopropenyl -3,8-dimethyl-1,2,4,5,6,7,8,8a alpha-octahydroazulene	1.83	$C_{15}H_{24}$	SH	9.350	79	95.10	41,55,67,79,95,105,119,133,147,161,175,189,204
8)	Alpha-Ylangene	0.13	$C_{15}H_{24}$	SH	9.418	41	105.10	41,43,67,79,91,105,119,133,147,161,189,204
9)	Alpha-copaene	17.12	$C_{15}H_{24}$	SH	9.527	118	119.10	41,55,69,81,93,105,119,133,147,161,175,189,204
10)	Beta-bourbonene	5.46	$C_{15}H_{24}$	SH	9.702	85	81.10	41,43,67,81,91,105,123,133,147,161,175,189
11)	8,8-Dimethyl-9-methylene-1,5-cycloundecadiene	8.10	$C_{14}H_{22}$	-	9.777	98	93.10	41,53,67,81,93,107,121,133,147,161,175,189,204
12)	Valencene	0.06	$C_{15}H_{24}$	SH	9.923	27	204.20	41,43,69,79,91,105,119,133,147,161,189,204
13)	Germacrene D	0.65	$C_{15}H_{24}$	SH	10.117	68	161.15	41,55,67,79,91,105,120,133,147,161,177,189,204
14)	Beta-caryophyllene	9.78	$C_{15}H_{24}$	SH	10.170	101	41.10	41,55,69,79,93,105,120,133,147,161,175,189,204
15)	Alpha-longipinene	0.10	$C_{15}H_{24}$	SH	10.326	54	119.10	41,55,67,79,91,105,119,134,147,161,175,189,204
16)	Gamma-gurijunene	0.22	$C_{15}H_{24}$	SH	10.363	51	41.10	41,43,67,79,91,105,119,133,147,161,176,189,204
17)	Alpha-amorphene	0.22	$C_{15}H_{24}$	SH	10.438	49	161.15	41,43,65,81,91,105,119,133,148,161,204
18)	Alpha-humulene	2.08	$C_{15}H_{24}$	SH	10.572	80	93.10	41,53,67,80,93,107,121,136,147,161,175,189,204
19)	Isocaryophyllene	0.05	$C_{15}H_{24}$	SH	10.629	42	41.10	41,55,67,81,93,107,122,133,148,162,204
20)	Beta-cubebene	0.24	$C_{15}H_{24}$	SH	10.686	48	161.15	41,55,69,81,91,105,119,133,148,161,204
21)	Beta-patchoulene	1.04	$C_{15}H_{24}$	SH	10.743	81	161.15	41,55,67,79,91,105,119,133,148,161,175,189,204
22)	(-)-alpha-muurolene	0.06	$C_{15}H_{24}$	SH	10.791	42	105.10	41,55,69,79,94,105,119,133,148,161,177,189,204
23)	Gamma-muurolene	9.60	$C_{15}H_{24}$	SH	10.847	98	161.15	41,55,67,81,91,105,119,133,147,161,190,204
24)	Guaiene	0.61	$C_{15}H_{24}$	SH	10.904	76	105.05	41,55,67,81,93,105,119,133,147,161,175,189,204
25)	Beta-selinene	0.77	$C_{15}H_{24}$	SH	10.970	70	41.10	41,55,67,79,93,105,121,133,147,161,175,189,204
26)	Gamma-elemene	5.76	$C_{15}H_{24}$	SH	11.071	94	121.10	41,43,67,79,93,107,121,136,147,161,175,189,204
27)	Unidentified	0.97	$C_{15}H_{24}$	SH	11.176	57	161.15	41,55,67,79,91,105,119,133,148,161,176,189,204
28)	Cyclostivene	2.40	$C_{15}H_{24}$	SH	11.223	102	161.15	41,43,69,81,91,105,119,134,147,161,176,189,204
29)	Unidentified	0.20	$C_{15}H_{24}$	SH	11.378	46	105.10	41,53,65,81,91,105,119,133,147,161,189,204
30)	Unidentified	0.56	$C_{15}H_{24}$	SH	11.452	77	93.10	41,55,67,81,93,105,119,131,145,165,177,187,202
31)	17-(Acetyloxy)Kauran -19-al	0.42	$C_{22}H_{34}O_3$	-	11.940	77	43.05	41,43,69,81,93,109,123,131,145,159,179,187,202,222
32)	Unidentified	0.15	$C_{15}H_{26}O$	OS	11.673	55	43.10	41,43,59,81,93,108,121,131,147,161,177,189,204
33)	Unidentified	1.44	$C_{14}H_{22}O$	-	11.752	103	123.10	41,43,67,79,91,105,123,131,146,159,177,187,205,220
34)	Unidentified	0.04	$C_{10}H_{16}O$	OM	11.819	46	81.10	41,53,67,81,97,110,123,138,149,161,177,205
35)	Unidentified	0.09	$C_{15}H_{24}O$	OS	11.859	50	41.10	41,43,69,79,93,106,120,133,147,157,177,218
36)	Unidentified	1.33	$C_{15}H_{24}$	SH	11.912	94	81.10	41,43,67,81,93,105,123,131,147,161,179,189,204,222

37)	Unidentified	1.39	$C_{15}H_{24}O$	OS	12.024	104	41.10	41,43,67,79,93,107,121,135,149,159,177,187,204,222
38)	Pyrethrin 1	0.30	$C_{21}H_{28}O_3$	-	12.122	76	123.05	41,55,67,81,91,109,123,131,145,176,187,220
39)	(-)-spathulenol	4.82	$C_{15}H_{24}O$	OS	12.180	124	43.10	41,43,67,79,91,105,119,131,147,159,177,187,205,220
40)	Ledol	2.42	$C_{15}H_{26}O$	OS	12.242	113	41.10	41,69,79,93,109,123,136,149,161,177,187,205,220
41)	Megastigmatriene	0.77	$C_{13}H_{22}$	-	12.376	72	123.10	41,43,67,81,93,107,123,137,149,159,177,207,220
42)	Unidentified	2.16	$C_{13}H_{20}O_3$	-	12.461	112	91.10	41,43,67,79,91,105,119,131,145,159,177,187,205,220
43)	Unidentified	0.42	$C_9H_{14}O$	-	12.571	62	43.10	41,43,67,81,96,109,123,138,147,161,179,204
44)	Alpha-cadinol	0.38	$C_8H_{26}O$	OS	12.722	77	43.10	41,43,58,79,95,105,123,136,148,161,175,189,204,220
45)	Unidentified	0.13	$C_{13}H_{20}$	-	12.804	40	133.10	41,43,69,82,95,105,119,133,148,161,176,204
46)	Unidentified	0.27	$C_{14}H_{22}O$	-	12.860	57	119.10	41,67,82,93,105,119,134,147,162,187,202,220
47)	Unidentified	0.91	$C_{15}H_{24}$	SH	12.924	57	41.10	41,43,67,81,91,107,123,131,149,161,177,187,205
48)	Unidentified	2.03	$C_{15}H_{24}O$	OS	13.043	107	159.15	41,43,67,81,91,105,117,131,149,159,177,187,202,220
49)	unidentified	0.29	$C_{14}H_{22}O$	-	13.118	63	133.15	41,43,67,79,91,105,119,133,145,163,176,206,220
50)	Unidentified	0.30	$C_{15}H_{24}O$	OS	13.199	58	41.10	41,67,81,93,109,123,131,149,161,177,187,205
51)	Unidentified	0.19	$C_{15}H_{24}O$	OS	13.326	55	93.10	41,43,65,79,93,107,123,135,145,163,177,187,205,220
52)	Unidentified	1.48	$C_{15}H_{24}O$	OS	13.526	98	159.15	41,43,67,77,91,105,119,131,145,159,177,187,202,220
53)	Allethrin	0.12	$C_{19}H_{26}O_3$	-	13.675	43	123.10	41,55,69,81,95,111,123,133,151,161,207
54)	Unidentified	0.31	$C_{10}H_{17}Br$	-	13.793	45	123.15	41,51,57,81,91,105,123,136,148,161,175,203,232
55)	Beta-cubene	0.38	$C_{15}H_{24}$	HS	13.891	56	120.10	41,43,69,81,91,105,120,133,147,161,204,232
56)	Cubenol	0.61	$C_{15}H_{26}O$	OS	14.099	68	161.15	41,43,69,81,91,105,123,133,150,161,177,191,204,220,232
57)	Unidentified	0.29	$C_{14}H_{24}O$	-	14.570	43	150.10	41,43,67,79,91,105,117,135,150,159,177,189,207,220
58)	Bicyclo[5,2,0]nonane,4 ethenyl-4,8,8-trimethyl-2-methylene	0.52	$C_{15}H_{24}$	HS	16.305	57	93.15	41,53,68,81,90,107,121,133,147,161,173,189,201,215,257,272
59)	Unidentified	0.19	$C_{15}H_{22}O_2$	-	16.567	36	41.10	41,55,69,79,91,105,123,131,151,163,177,191
60)	Unidentified	0.17	$C_{15}H_{24}$	SH	16.775	36	93.10	41,44,67,81,93,107,121,135,149,161,175,189,229
61)	Bicycle[3.1.0]hexane,6-isopropyl	0.10	$C_{10}H_{16}$	MH	17.174	25	121.15	41,43,68,81,93,107,121,136,272
62)	16-kaurene	0.88	$C_{20}H_{32}$	-	17.601	71	41.10	41,55,67,79,93,107,119,133,146,161,173,189,201,229,257,272,341
63)	Unidentified	2.90	$C_{21}H_{32}O_4$	-	20.245	137	43.10	41,43,67,71,107,125,134,150,177,187,202,219,227,245,273,288,305,315,348
64)	2/-Dodecyl-1,1/,3/,1"-tercyclopentane	1.55	$C_{27}H_{50}$	-	20.435	97	43.10	41,43,69,71,93,107,125,127,151,156,177,187,203,221,238,263,306

Preparation of the essential oil:
The essential oil of the resin of *P. lentiscus* was obtained by Steam- distillation (1.5 ml). The oil was dried over anhydrous sodium sulfate and stored at 5 C until analysis. [16]. GC analysis of the oil was undertaken in Central Laboratory , Chemistry Department , Ministry of Science and Technology , Khartoum , in May 2010 , and the result is presented in Table 1.

Gas Chromatographic – Mass Spectrometry (GC/MS):
GC-MS analyses were performed on a QP-2010 Shimadzu spectrometer instrument. Fused silica capillary column with stationary phase was used : (50% phenyl and dimethylpolysiloxane) and (50% dimethylpolysiloxane), 30 m , 0.25 mm diameter. The analytical conditions were as follows: carrier gas , helium ; injector temperature , 250 C; temperature program, 1 min at 70C rising to 220 C at a rate of 3 C/min. Individual components were identified by comparison of the retention times and mass spectra provided by Wiley Library in the data system and literature [17].

RESULTS AND DISCUSSION

The components of the oil of *P. lentiscus* are summarized in Table 1. Analysis of the oil by GC/MS resulted in the separation of 64 components, of which 37, comprising 58% of the total volatiles, were identified. The oil contained 4 monoterpenes (0.22%) and 40 sesquiterpenes (79.02%).

Alpha-copaene (17.12%) was the major component identified, followed by beta-caryophyllene (9.78%), gamma-muurolene (9.60%), 8,8-Dimethyl-9-methylene -1,5-cycloundecadiene (8.10%), gamma-elemene (5.76%) and beta-bourbonene (5.46%). 40 sesquiterpenes, indicating 30 hydrocarbons (65.16%) and 10 oxygenated (13.86%). Alpha-copaene (17.12%) was the predominant sesquiterpene.

The main constituents of Turkish *P. lentiscus* leaf oil were terpinen-4-ol (29.2%), p-cymene (7.1%), caryophellene oxide (3.3%) and alpha-cadinol (3.0%). (Kivcak *et al*., 2004). Alpha-pinene (40%), beta-myrcene (9%) , beta-pinene (1.5%), limonene (1%) and beta-caryophyllene (5%) were found to be the major components in *Pistacia lentiscus* var. *chia* , mastic gum oil from Greece [18].

Twenty three compounds were identified in leaves oil of mastic tree growing in Morocco representing 77.22% of the total oil composition. The major compound in aerial parts were alpha- pinene (24.25%), followed by beta-pinene (12.58%), limonene (7.56%), alpha-terpinen-4-ol (6.98%), terpineol (4.89%), beta-caryophyllene (3.15%), verbenol (3.05%), linalool (2.85%), camphene (2.32%) and myrcene (2.09%) [19].

Acknowledgement
The authors thank Central Laboratory, Chemistry Department, Ministry of Science and Technology, Khartoum, for the technical assistance.

REFERENCES

[1] HH EL-Kamali; SA Khalid. *Fitoterapia*, **1996**, 69(4):305.
[2] B. Kivcak;S. Akay; B Demirci; KHC Baser, *Pharmaceutical Biology*, **2004**, 42(4-5):360-366.
[3] F Ben Douissa; N Hayder; L Chekir-Ghedira; M Hammami; K Ghedira; AM Mariotte; M Dijoux , *Flavour Fragr.J*. **2005**, 20: 410-414.
[4] EH Benyoussef; S Charchari; N Nacer-Bey; N Yahiaoui; A Chakou; M Bellatreche, J.EssentOil Res., **2005**, 17:642-644.
[5] V Castola; A Bighelli; J Casanova, *Biochemical Systematics and Ecology* , **2000**, 28(1): 79-88.
[6] ME Duru ;A Cakir; S Koralli; H Zengin; M Hamandar; S Izumi; T Hirata, *Fitoterapia*, **2003**, 74(1-2): 170-176.
[7] P Magliatis; E Melliou;L Skaltsounis; I.B Chinou; S Mitaku, *Planta Mediaca*, **1999**, 65(8):749-752.
[8] HJ Poorter, ; NM Schamp; EA Abutabl; SF Tohamy; SL Doss, *Flavour Fragr.Journal*, **1991**, 6:229-232.

[9] L Preti; MD Sciarrone; ML Crupi; C Rosaria; R Salvatore; D Giovanni; M Luigi, *Flavour Fragr. J.*, **2008**, 20:32-38.
[10] GB Serafino; L Bono; L Daghetta;, P Marone, *The American Journal Gastroenterol*., **2001**, 96(9):S49.
[11] CC Tassou, GJ Nychas, *Int.Biodeterior. Biodegrad*, **1995** , 411-420.
[12] KV Balan; J Pricea; Z Hana; K Dimasb; M Cladarasc; JH Wychea; NM Sitarasd; P Pantazis, *Phytomedicine* , **2007**, 14:263-272.
[13] AN Assimopoulou; SN Zlatanos; VP Papageorgiou, *Food Chemistry* , **2005**, 92:721-727.
[14] N Benhammou; AF Bekkara; KT Panovska, *Afri.J.Pharm.Pharmacol*., **2008**, 2:22-28.
[15] G Chryssavgi; P Vassiliki; M Athanasios; TH Kibouris; K Michael, *Food Chemistry* , **2008**, 107: 1120-1130.
[16] LJ Reddy; B. Jose, *Journal of Chemical and Pharmaceutical Research*, **2011**, 3(1):440-444.
[17] RP Adam, Identification of essential oil components by Gas Chromatography/Mass Spectrometry. Allured Publishing Corp., Illinois, USA, **2001**.
[18] C Koutsoudaki; M Krsek; A Rodger, *Journal of Agricultural and Food Chemistry*, **2005**. 53:7681-7685.
[19] E Derwich; A Manar; Z Benziane; A Boukir, *World Applied Sciences Journal*, **2010**, 8(10):1267-1276.