

Essential Oil Composition of *Salvia. Rhytidia* from Taftan

A. R. SardashtiDepartment of Chemistry, Faculty of Science,
University of Sistan and Baluchestan

E-mail: sardashti@chem.usb.ac.ir

Z. DarijaniDepartment of Chemistry, Faculty of Science,
University of Sistan and Baluchestan

Abstract – The chemical composition of the essential oil obtained by hydrodistillation from the aerial parts of *Salvia rhytidia* was analyzed by employing GC-MS technique. During the pre flowering and flowering period, two oils: *Salvia rhytidia* Benth collected in July 2005 and May 2006 from Taftan, Iran. 23 components (85.36%) of the total oil were identified in the essential oil of *S. rhytidia* collected in July 2005 flowering.

The main components of this oil were α -terpinolen (32.06%), sabinene (13.01%), J-terpinyl acetate (10.30%), 51 components (98.45%) of the total oil were identified in the essential oil of *S. rhytidia* collected in May 2006 (before flowering). The main components of this oil were α -terpinolen (36.56%), sabinene (5.61%), germacrene D (15.09%), Limonene (5.82%), α -copaene (5.26%).

Keywords – *Salvia Rhytidia*, Essential Oil, GC-MS, α -Terpinolene.

I. INTRODUCTION

The genus *Salvia* (Lamiaceae) consists of about 1000 species and is well known in folk medicine [1]. This genus is represented in the Iran flora by 500 species of which 60 are endemic [2], [3]. Some members of this genus are used as herbal tea and for food flavoring, as well as in cosmetics, perfumery, and pharmaceutical [1], [3].

Salvia rhytidia is a biennial or perennial herb with an erect stem and white corolla, and is 60-150 cm high. This species grows on steppes, igneous and limestone slopes, fallow fields, and roadside, banks, its leaves are simple, mostly basal and ovate-elliptic to oblong [3], [4].

The essential oil composition of *S. rhytidia* was reported previously [5]. How we report the percentage chemical composition of the essential oil isolated from *S. rhytidia* in eastern Iran in Sistan & Baluchestan province by means of GC-MS technique in combination with retention indices. Saijadi and his colleagues, in this research (2005) about volatile compounds from *Salvia rhytidia* in Iran was obtained and sixty compounds were identified, representing 98.2% of total oil. The essential oil was characterized by a high content of hydrocarbon and oxygenated monoterpenes. The main constituents were p-cymene-8-ol (11.9%), spathulenol (7.3%), pulegone (6.4%), sabinene (5.8%), terpinen-4-ol (5.5%) and α -copaene (5.3%) [6].

II. MATERIALS AND METHODS

Plant Material

S. rhytidia was collected at the pre-flowering and flowering stage from Taftan, eastern Iran in Sistan &

Baluchestan province. The taxonomic identification of plant materials was confirmed in the herbarium of the Research Institute of Forests and Rangelands [4]. Collected plant materials were dried in the shade, and the leaves were separated from the stem, and ground in a grinder with a 2mm diameter mesh.

Essential Oil Isolation

The air-dried and ground aerial parts of plants collected were submitted for 4h to water-distillation using a Clevenger type apparatus (yield 0.37% v/w for sample collected in July 2005). The obtained essential oil was dried over anhydrous sodium sulfate and after filtration, stored at 4 °C until tested and analyzed.

GC-MS Analysis

The analysis of the essential oil was performed using a Thermo Quest 2000GC, equipped with a DB-1 MS Capillary column (30m \times 0.25mm \times 0.25 μ m) and a HP5973 mass selective detector for GC-MS detection an electron ionization system with ionization energy of 70eV was used. Helium was the carrier gas, at a flow rate of 1 ml/min. Injector and MS transfer line temperatures were set at 24 °C and 265 °C, respectively. Column temperature was initially kept at 60 °C for 4 min, then gradually increased to 250 °C at a 5c/min rate, held for 5 min, and finally raised to 280 °C at 5 c/min. Diluted samples (1/100 in acetone, v/v) of 1.0 μ l were injected manually and in the splitless mode. The identification of components was based on a comparison to their relative retention indices on non-polar phases reported in the literature [7], [8]. The components were identified based on the comparison of their relative retention times and mass spectra with those of standards, NBS75K library data of the GC-MS system, and literature data [9].

III. RESULTS AND DISCUSSION

The essential oil of *S. rhytidia* was extracted by hydro distillation method. The yields of oil (w/w %) in different stages were in the order of: pre-flowering (0.26%) collected in May 2006, flowering (0.37%) collected in July 2005 and pre-flowering leaf collected in 2006 (0.52%). GC/MS analysis of the crude oil isolated from dried aerial parts of *S. rhytidia* resulted in the identification of 23 compounds representing 85.36% of the essential oil (collected in July 2005). The compounds identified with their percentages are given in the table I. The compounds are listed in order of their elution from the DB-1 column. 23 components (85.36% of the total oil) were identified in the essential oil from aerial parts of *S. rhytidia* collected in July (flowering).

The main components of this oil. were α -terpinolen (32.06%), sabinene (13.01%), J-terpinyl acetate (10.30%), α - muurolene (7.10%), cis-ocimene (4.37%), α -copaene (2.13%).

51 components (98.45% of the total oil) were identified in the essential oil from aerial parts of *S. rhytidia* collected in May 2006 (pre flowering). The main components of this oil listed in table II. were α -terpinolen (36.56%), sabinene (5.61%), germacrene D(15.09%), limonene (5.82%), α -copaene (5.26%). bicyclogermacrene (4.35%), α -pinene (1.39%), β -myrcene (2.44%), spathulenol (1.74%).

31components (97.15% of the total oil) were identified in the essential oil from leaf of *S. rhytidia* collected in May 2006 (preflowering). The main components of this oil listed in tabe III. were 2-methyl acetophenone (22.60%), 2 -methyl acetophenone (5. 59%), α -terpinolen (6.40%), α -pinene (3.55%), β -Myrcene (4.16%), limonene (14.24%), γ -terpinene (12.29%), germacrene D (15.09%), limonene (5.82%), α -copaene (7.71%). bicyclogermacrene (4.35%), spathulenol (5.15%).

Our literature survey showed that this was the first report on *S. rhytidia* from Iran.

Table 1. Chemical composition of the essential oil from aerial parts of *Salvia rhytidia* collected July 2005 (have the amounts of trace>0. 1%)

N ₀	Compound	RI	%
1	n-heptane	710	0.46
2	sabinene	891	13.01
3	2-J-pinene	939	0.36
4	cis- ocimene	965	4.37
5	p-ment-2-ene-1-ol	998	2.10
6	1-3-6-octateriene-3-1-7-dimethyl	1010	1.96
7	α - terpinolene	1022	32.06
8	linalyl acetate	1036	7.09
9	J-terpinel acetate	1049	10.30
10	bicyclopentyl-diene	1058	0.13
11	perilaalcol	1088	0.22
12	3-carene-10-ol	1107	0.15
13	R- +-camphere	1303	0.77
14	Jonipene	1364	0.26
15	α - copaene	1374	2.13
16	J-bourbonene	1393	0.30
17	(-)-J-lemene	1403	0.20
18	J-cubebene	1437	0.28
19	α - muurolene	1464	7.10
20	cadinene	1484	0.74
21	isolanciphol-8-ol	1511	1.07
22	isoaromadndrinp oxide0	1552	0.15
23	isopropyilemyristate	1836	0.12
	Monoterpene hydrocarbons	51.89	
	Oxygenated.monoterpenes	19.89	
	Sesquiterpene hydrocarbos	11.01	
	Oxygenated sesquiterpenes	1.22	
	Other hydrocarbons	0.46	
	Other oxygenated	0.89	
	Terpenoid hydrocarbons	62.90	
	Oxygenated terpenoids	21.11	
	Total terpenoids	84.01	
	Total	85.36	

Table 2. Chemical composition of the essential oil from aerial parts of *Salvia rhytidia* collected May 2006 (have the amounts of trace>0. 1%)

N ₀	compound	RI	%
1	-thujene α	579	0.14
2	-pinene α	581	1.39
3	sabinene	595	5.61
4	-pinene β	596	1.16
	-myrcene β	610	2.44
6	phellandrene	642	0.65
7	-3-carene δ	657	0.78
8	α -terpinene	674	0.76
9	limonene	706	5.82
10	1, 8-cineole	720	0.12
11	β -ocimene	734	1.07
12	γ -terpinene	751	0.50
13	-terpinolene α	807	36.55
14	p-cymene	828	0.12
15	o-cymene	845	0.15
16	P-mentha-1-5-8-triene	856	0.15
17	4-terpineol	912	0.46
18	β -fenchy alcohol	926	0.18
19	msitol	942	0.16
20	puligone	977	0.36
21	piperitone	994	1.14
22	α -cubebene	1069	0.18
23	bicycloelemene	1058	0.12
24	α -copaene	1094	5.26
25	β -bourbonene	1100	0.38
26	β -cubebene	1106	1.38
27	β -elemene	1108	0.48
28	methyl eugenol	1125	0.61
29	trans-caryophyllene	1130	0.54
30	α -bergamotone	1145	0.67
31	α -caryophyllene	1159	0.20
32	germacrene D	1187	15.09
33	β -Selinene	1189	0.21
34	bicyclogermacrene	1199	4.35
35	calarene	1201	0.15
36	α -germacrene	1205	0.31
37	α -farnesene	1210	0.29
38	7-epi- α -selinene	1216	0.27
39	dehydro- β -agarofuran	1219	0.75
40	Δ -cadinene	1223	1.45
41	elemol	1252	0.19
42	farnesol	1267	0.56
43	spathulenol	1279	1.74
44	caryophyllene oxide	1284	0.20
45	β -maliene	1314	0.14
46	γ -eudesmol	1323	0.19
47	isopathulenol	1330	0.15
48	β -gurjunene	1333	1.04
49	β -eudesmol	1338	1.11
50	α -eudesmol	1340	0.54
51	α -panasycene	1343	0.19
	Monoterpene	57.29	
	Monoterpene		
	Oxygenated.monoterpenes	2.87	
	Sesquiterpene	33.26	

hydrocarbons		
Oxygenated sesquiterpenes	4.87	
Other oxygenated Terpenoid hydrocarbons	0.16	
Oxygenated terpenoids	90.55	
Total terpenoids	7.74	
Total	98.29	
	98.45	

Table 3. Chemical composition of the essential oil from leaf of *Salvia rhytidia* collected in May 2006 (have the amounts of trace>0. 1%)

N ₀	compound	RI	%
1	α -thujene	578	0.08
2	α -pinene	582	3.55
3	β -pinene	600	0.93
4	β -myrcene	630	4.16
5	δ -3-carene	674	1.39
6	limonene	725	14.24
7	1, 8 cineole	732	0.84
8	β -ocimene	738	0.51
9	γ -terpinene	751	12.29
10	cis-beta-terineol	793	0.18
11	α -terpinolene	818	6.40
12	p-cresol	833	0.46
13	1, 6-octadien-3-ol, 3, 7-dimethyl	843	0.22
14	1, 3, 8-para-menthatriene	851	0.28
15	4-terpineol	928	2.71
16	3-methylacetophenone	944	5.59
17	2- methylacetophenone	970	22.60
18	5-norbornen-2ol	1002	1.06
19	Piperitone	1007	0.35
20	α -copaene	1104	7.71
21	β -bourbornene	1109	0.67
22	β -cubebene	1114	1.66
23	β -elemene	1116	0.60
24	methyleugenol	1136	1.55
25	germacrene D	1192	1.06
26	β -selinene	1195	0.23
27	dihydro-beta-agarofuran	1222	1.00
28	δ -cadinene	1225	0.91
29	spathulenol	1285	5.15
30	trans-beta-lonone	1321	0.45
31	β -gurjunene	1349	1.17
	Monoterpene hydrocarbons	43.75	
	Oxygenated.Monoterpenes	4.52	
	Sesquiterpene hydrocarbons	14.01	
	Oxygenated sesquiterpenes	5.15	
	Other oxygenated	29.72	
	Terpenoid hydrocarbons	57.76	
	Oxygenated terpenoids	9.67	
	Total terpenoids	67.43	
	Total	97.15	

IV. CONCLUSION

The present study has elucidated the chemical composition of the essential oil of *S. rhytidea* aerial parts for its possible use in foods, beverages and toiletry products.

This work shows that further investigations on the essential oil and evaluation of

the biological activities of *S. rhytidea* should be initiated. As a renewable bioresource, this low thujene and α -pinene content essential oil can serve as a good source of safe and natural medicines and cosmetics with a traditional background.

V. ACKNOWLEDGEMENTS

The authors are indebted to Sistan and Bluchestan University for the financial support of this work and the Tehran University for GC-MS analysis of essential oil.

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