

Characterization of Volatile Constituents from Aerial Parts of *Varthemia persica* DC (var. *persica*)

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Abstract

The volatile constituents of the aerial parts of *Varthemia. persica* DC. var. *persica*, growing wild in Iran, were investigated by GC-MS. Sixty seven constituents were identified. δ -Cadinene (9.7%), Selin-11-en-4- α -ol (5.30%), Germacrene D (4.9%), Bicyclogermacrene (4.7%), α -Muurolene (4.7%), β -Eudesmol (4.52%), β -Himachalen oxide (3.6%), γ -Eudesmol (3.54%), β -Bourbonene (3.21%) were found to be the major constituents of the oil respectively.

Keywords: *Varthemia persica*; Asteraceae; Volatile Oil; δ -Cadinene.

Introduction

The aromatic genus *Varthemia* (Asteraceae) has one species, *V. persica* DC, in Iran. This species is also distributed in Afghanistan and Pakistan. *V. persica* has three varieties including var. *persica*, *squarrosula* and *stenocephala* (1-3). In this study the essential oils of aerial parts of *V. persica* var. *persica* were analyzed.

There is no report on the pharmacological activity of this species, but antibacterial, anti-spasmodic and hypoglycemic effect have been reported for other spices (4, 5)

Experimental

Plant materials: Aerial parts of *Varthemia persica* DC. were collected from the northern slopes of Karkas mountains, at altitudes of 2200 - 2400 m in Isfahan province, Iran. The plant was identified by Mr. Mehregan, Department of Pharmacognosy, School of Pharmacy, Shiraz University of Medical Sciences. A voucher specimen (1378) has been deposited in

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the herbarium of the Faculty of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences.

Analysis: The volatile oil was obtained by wet steam distillation (for 2 h) and analyzed by a GC/MS (Hewlett-Packard 6890) equipped with a HP-5MS capillary column (30 m x 0.25 mm; film thickness 0.25 μ m) coupled with a Hewlett-Packard 6890 ion trap detector. The carrier gas was helium with a flow rate of 2 ml/min. The oven temperature was started at 60° C and then increased at a rate of 4°C/min, until reach to the temperature of 280°C. Other conditions of the instrument were as follows: ionization voltage, 70 eV; injector temperature, 280°C; ion source temperature, 200°C.

Compounds were identified by comparing the retention indices of the peaks on the HP-5 MS column relative to *n*-alkanes with literature values and comparison of the WILEY275 library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (7, 8). Relative percentages of the separated compounds were calculated from the total ion chromatograms by computerized integration.

Table 1. Composition of volatile constituents from aerial parts of *Varthemia persica* DC.

Peak	Compound	Retention Index*	Percentage
1	α -Thujene	931	0.20
2	α -Pinene	939	0.16
3	Sabinene	976	0.53
4	β -Pinene	980	0.09
5	Myrcene	991	0.03
6	α -Phellandrene	1005	0.02
7	δ -3-Carene	1011	0.02
8	α -Terpinene	1018	0.44
9	ρ -Cymene	1026	0.24
10	Limonene	1031	0.11
11	γ -Terpinene	1062	1.11
12	Terpinolene	1088	0.33
13	Isopentyl isovalerat	1103	0.03
14	Menthol	1173	0.04
15	Terpin-4-ol	1177	0.35
16	Decanal	1204	0.58
17	Octanol acetate	1211	0.05
18	Sabinene hydrate acetate	1253	0.06
19	Decanol	1272	0.23
20	Bornyl acetat	1285	0.08
21	Acetophenone	1297	0.06
22	Tridecane	1299	0.04
23	Undec-9-en-1-al	1308	0.12
24	Sesamol	1312	0.08
25	Limonene aldehyd	1325	0.14
26	α -Cubebene	1351	0.17
27	α -Ylangene	1372	0.94
28	α -Copaene	1376	1.88
29	β -Bourbonene	1384	3.21
30	Longifolene	1387	0.23
31	β -Elemene	1391	0.88
32	Trimenal	1395	0.12
33	Tetradecane	1399	0.09
34	α -Cedrene	1409	0.41
35	Caryophyllene <i>trans</i> (E)	1418	3.90
36	β -Gurjunene	1432	0.90
37	γ -Elemene	1433	0.20
38	Aromadendrene	1439	0.70
39	α -Humulene	1454	1.31
40	Allo-Aromadendrene	1461	1.27
41	Germacrene D	1480	4.90
42	β -Selinene	1485	1.50
43	Bicyclogermacrene	1494	4.70
44	α -Muurolene	1499	4.70
45	γ -Cadinene	1513	1.60
46	δ -Cadinene	1524	9.70
47	Artedouglosia oxid A	1535	1.95
48	α -Calacorene	1542	1.30
49	Elemol	1549	1.30
50	β -Calacorene	1563	0.34
51	Spathulenol	1576	2.10
52	Arteannuic alcohol	1593	0.55
53	Cedrol	1596	0.43
54	Himachalen oxide (β)	1610	3.60
55	Cubenol (1,10-di-epi)	1614	1.66
56	γ -Eudesmol	1630	3.54
57	Cubenol	1642	1.05
58	Selin-11-en-4- α -ol	1652	5.30
59	β -Eudesmol	1649	4.52
60	Khusinol	1674	1.76
61	Cedrol-5-neo	1677	1.61
62	Cedren-13-ol	1688	2.93
63	β -Sinensal	1695	0.84
64	α -Atlantone	1713	0.91
65	Bisabolene	1737	0.28
66	β -Bisabolen-12-ol	1760	0.37
67	α -Atlantone	1773	0.10

* Retention indices on HP-5 capillary column

Results and Discussion

The aerial parts of *V. persica* yielded 0.1% of a yellowish oil. The identified components accounted for 86.5% of the oil. GC-MS analysis of the oil resulted in the identification of 67 components. List of compounds identified in the oil are presented in table 1. This is the first report on the analysis of volatile oil of *V. persica* var. *persica*. The interesting point to note is that there is no previous report on phytochemical studies on the other *Varthemia* spp either.

The *V. persica* volatile oil contains mainly terpenoid including monoterpenes (3.28%), oxygenated monoterpenes (1.82%), sesquiterpenes (44.91%) and oxygenated sesquiterpenes (36.49%). this may indicate the existence of a correlation between mono and sesquiterpenes hydrocarbons content and the level of oxygenated mono and sesquiterpenes. It seems that the *V. persica* oil is a sesquiterpen-rich essential oil (>80%).

As presented in table 1, the δ -Cadinene (9.7%), Selin-11-en-4- α -ol (5.30%), Germacrene D (4.9%), Bicyclogermacrene (4.7%), α -Muurolene (4.7%), β -Eudesmol (4.52%), β -Himachalen oxide (3.6%), γ -Eudesmol (3.54%), β -Bourbonene (3.21%) were found to be the major constituents of the oil. However, several studies carried out on aromatic plants have shown that volatile oil composition may vary considerably throughout a year (9, 10).

Aknowledgement

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