

COMPARISON OF ESSENTIAL OILS COMPOSITION OF *JOHRENIOPSIS SESELOIDES* FROM IRAN, POPULATION TEHRAN AND KURDISTAN

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ABSTRACT

Johreniopsis seseloides (C.A.MEY) Pimenov (Umbelliferae) was collected from Tehran and Kurdistan provinces in August 2004. The essential oil of the plant powdered aerial parts which were prepared by hydro-distillation and Clevenger type apparatus were about 0.1% and 0.15% (v/w) respectively. The oil had pale yellow color and intensive odor. The essential oils were analyzed with GC/MS. Thirty six compounds were identified from two plants, accounting 77.19% and 97.04% of the oil contents respectively. The essential oil of *J.seseloides* from Darake (Tehran province) contains monoterpenes (24.05%) and sesquiterpenes (43.19%). The essential oil of *J.seseloides* collected from Gardaneh Haris Kurdistan (Kurdistan province) contains monoterpenes (69.67%) and sesquiterpenes (26.69%). The main constituents of the essential oil of *J.seseloides* from Tehran were spathulenol (18.21%) and α -terpineol (7.97%), followed by hexahydro-farnesyl acetone (7.05%) and α -pinene (6.98%). Other monoterpenes and sesquiterpenes, either as hydrocarbons or oxygenated, were present in smaller amounts. The essential oil of *J.seseloides* from Kordestan province was found to be rich in α -pinene (26.25%), α -bornyl acetate (12.36%), limonene (10.32%), α -fenchyl acetate (9.06%) and β -caryophyllene (8.58%). The essential oil of other species of *Johreniopsis* has not been investigated up to now and this is the first report about essential oil components of *J.seseloides*.

Keywords: *Johreniopsis seseloides*, Umbelliferae, Essential oil, Spathulenol, α -Terpineol, Hexahydrofarnesyl acetone, α -Pinene.

INTRODUCTION

Species of parsley family (Umbelliferae) are well known with regards to their economic importance and diversity of essential oils (1, 2). This family is well represented in the Iranian flora at least with 112 genera, 316 species and 75 endemic species (3). Genus of *Johreniopsis* which belongs to tribe of Peucedaneae, subfamily of Apiioideae and family of Umbelliferae has 4 species (*J.oligactis*, *J.scoparia*, *J.seseloides*, *J.sticticaulis*) in Iran (4). This family is rich in secondary metabolites such as flavonoids, coumarins, acetylenes, terpenes and essential oils (5). Since the essential oil of *J.seseloides* and other species of *Johreniopsis* have not been investigated up to now, the components of the essential oils of *J.seseloides* from Tehran and Kurdistan were determined and compared. This comparison defines effects of geographic and climatic condition on production of different terpenes in essential oils.

MATERIALS AND METHODS

Plant Materials

Aerial parts of *J.seseloides* were collected in August 2004 from Tehran (1950-2050 m) and

Kurdistan (2140 m) provinces, voucher specimens (Ajani 1219, Salimian 32, Tehran and Kurdistan specimens respectively) were deposited in the herbarium of Dr. H. Akhiani (Dept. of Plant Biology, Faculty of Sciences, Tehran University, Tehran, Iran).

Extraction of the essential oils

350g of powdered plant from Tehran or 300g of powdered plant from Kurdistan were hydro-distilled with a Clevenger type apparatus for 4 h. and pale yellow color oils were collected and dehydrated on anhydrous sodium sulfate and stored at 4°C in the dark for analysis.

GC/MS Analysis

The oil was analyzed by GC/MS using a Hewlett Packard 5973 mass selective detector connected to a HP 6890 gas Chromatograph. The separation was achieved by capillary column, HP-5MS (5% phenylmethylpolysiloxane) (30 m \times 0.25 mm, film thickness 0.25 μ m). The column temperature was kept at 60°C for 5 min and programmed to 220°C at a rate of 6°C/min. The flow rate of helium (the carrier gas) was 1 mL/Min. and MS were taken at 70 eV.

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Table 1. Essential oil composition of *Johreniopsis seseloides* from Tehran and Kurdistan provinces of Iran.

No	Compounds name	% of ^b T. Ess. oil	% of ^c K. Ess. oil	^a RRI	Methods of identification
1	α -pinene	6.98	26.25	941	GC/MS
2	camphene	-	4.48	956	GC/MS
3	β -pinene	0.67	3.33	980	GC/MS
4	myrcene	-	1.49	994	GC/MS
5	o-cymene	-	1.7	1022	GC/MS
6	p-cymen	0.69	-	1022	GC/MS
7	limonene	1.25	10.32	1028	GC/MS
8	endoborneol	1.49	-	1161	GC/MS
9	terpinolene	-	0.68	1083	GC/MS
10	α -terpineol	7.97	-	1185	GC/MS
11	β -fenchyl acetate	-	9.06	1230	GC/MS
12	α -bornyl acetate	2.52	12.36	1280	GC/MS
13	α -copaene	2.31	1.33	1372	GC/MS
14	trans- β -damascenone	3.34	-	1373	GC/MS
15	β -caryophyllene	1.94	8.58	1412	GC/MS
16	aromadendrene	0.98	1.49	1431	GC/MS
17	geranylacetone	2.48	-	1446	GC/MS
18	trans- β -fransene	-	1.23	1450	GC/MS
19	α -humulene	-	0.83	1451	GC/MS
20	γ -muurolene	-	1.9	1470	GC/MS
21	germacrene-D	-	1.19	1472	GC/MS
22	β -ionone	3.57	-	1478	GC-MS
23	ledene	-	2.33	1485	GC/MS
24	bicyclogermacrene	3.32	-	1486	GC/MS
25	α -muurolene	-	1.28	1492	GC/MS
26	α -amorphene	-	1.02	1500	MS
27	[E,Z]- α -farnesen	1.39	-	1501	GC/MS
28	δ -cadinene	-	3.45	1518	GC/MS
29	α -calacorene	-	0.42	1536	GC/MS
30	Cis-3-hexenyl benzoate	4.43	-	1564	GC/MS
31	spathulenol	18.21	-	1568	GC/MS
32	eremophilene	1.08	-	1578	GC/MS
33	trans- α -sesquicyclogeraniol	-	1.7	1580	MS
34	tetradecanoic acid	5.52	-	1670	MS
35	neo phytadiene	-	0.68	1685	MS
36	hexahydrofarnesyl acetone	7.05	-	1712	MS
	Monoterpene hydrocarbons	9.59	48.25		
	Oxygenated monoterpenes	14.46	21.42		
	Sesquiterpene hydrocarbons	17.93	24.99		
	Oxygenated sesquiterpenes	25.26	1.7		
	Nonterpenes	9.95	0.68		
	Unknown	22.81	2.96		
	Total identified	77.19	97.04		

^a Relative Retention Indices as determined on a HP-5MS column using the homologous series of n-alkanes; ^b Tehran sample essential oil; ^c Kurdistan sample essential oil.

Retention indices were calculated by using retention times of *n*-alkanes that were injected after the oil at the same chromatographic conditions. The compounds were identified by comparison of retention indices with those

reported in the literature and by comparison of their mass spectra with the Wiley library or published mass spectra (6 - 8). Relative percentage amounts were calculated from TIC data by the computer.

RESULTS AND DISCUSSION

The yield of essential oil of *J. seseloides* from Tehran and Kurdistan in Iran were 0.1% and 0.15% (v/w), respectively and their compositions are reported in (Table 1).

The color of essential oils was pale yellow and the number of components of oils that were identified from Tehran and Kurdistan samples were 20 and 23 which accounts 77.19% and 97.04% of their contents, respectively. The essential oil of *J. seseloides* from Darake contains monoterpenes (24.05%) and sesquiterpenes (43.19%). The essential oil of *J. seseloides* from Kurdistan contains monoterpenes (69.67%) and sesquiterpenes (26.69%).

The main constituents of the essential oil of *J. seseloides* from Tehran (Table 1) were spathulenol (18.21%) and α -terpineol (7.97%), hexahydrofarnesyl acetone (7.05%), α -pinene (6.98%), and tetradecanoic acid (5.52%). Other monoterpenes and sesquiterpenes, either as hydrocarbons or oxygenated were present in smaller amounts. The essential oil of *J. seseloides* from Kurdistan was found to be rich in α -pinene (26.25%), α -bornyl acetate (12.36%), limonene

(10.32%), α -fenchyl acetate (9.06%) and β -caryophyllene (8.58).

α -Pinene, α -bornyl acetate, limonene and β -caryophyllene which were the major components of *J. seseloides* from Kurdistan were also present in *J. seseloides* from Tehran. Most of the components of the essential oil of *J. seseloides* from Kurdistan were present in Tehran sample in lower amounts and with exception of α -pinene, other major component of *J. seseloides* essential oil from Tehran were not present in Kurdistan sample.

In conclusion there are some differences between components of *Johreniopsis* essential oils collected from Tehran and Kurdistan provinces which may be due to differences in geographia location, climatic conditions and kinds of soil.

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