

COMPOSITION OF THE ESSENTIAL OIL OF *FERULA OVINA* (BOISS.) BOISS. FROM IRAN

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ABSTRACT

Water-distilled essential oil from aerial parts of *Ferula ovina* (Boiss.) Boiss. growing wild at the vegetative stage in Isfahan province Iran was analyzed by GC/MS. Forty-three compounds consisting 86.7% of the total components were identified in the oil which was obtained in 1.0% (v/w) yield. Among them, carvacrol (9.0%), alpha-pinene (8.2%), geranyl isovalerate (7.2%) and geranyl propionate (7.0%) were the major components.

Key Words: *Ferula ovina*, Umbelliferae, Essential oil, Carvacrol

INTRODUCTION

Genus of *Ferula* which belongs to tribe Peucedaneae, subfamily of Apioidae, Umbelliferae family has 133 species distributed throughout Mediterranean area and central Asia (1-3). The chemistry of this genus has been studied by many investigators. More than 70 species of *Ferula* have already been investigated chemically (4). Several species of this genus have been used in folk medicine (5). The Iranian flora comprises 30 species of *Ferula*, of which some are endemic (2,6). The popular Persian name of the most of these species is "Koma" (6). *Ferula ovina* (Boiss.) Boiss. is one of these species which is distributed in different regions of Iran (2). Anti-spasmodic, anticholinergic and smooth muscle relaxant activities of the aqueous extracts of *F. ovina* have previously been reported (7,8). This investigation describes the constituents of the oil of *F. ovina* which has not been studied previously.

MATERIAL AND METHODS

Plant Material: The aerial parts of wild-growing *F. ovina* at the vegetative (non-flowering) stage were collected from Meimeh area (Isfahan Province, Iran) at an altitude of ca. 2550 m in May 1999. The plant was identified as *F. ovina* by the Herbarium Department of Iranian Research Institute of Forests and Rangelands, Isfahan, Iran. A voucher specimen of the plant was deposited in the Herbarium of the Department of Pharmacognosy, School of Pharmacy and Pharmaceutical

Sciences, Isfahan University of Medical Sciences, Isfahan , Iran (HN 1112).

The air-dried parts of the plant were powdered and the volatile fraction was isolated by hydrodistillation for 3 h according to the method recommended in British Pharmacopoeia (9). The oil was dried over anhydrous sodium sulfate and stored in refrigerator (4°C).

Analysis: The oil was analyzed by GC/MS using a Hewlett Packard 6890 mass selective detector coupled with a Hewlett Packard 6890 gas chromatograph, equipped with a cross-linked 5% PH ME siloxane HP-5MS capillary column (30 m × 0.25 mm, film thickness 0.25 μm). Operating conditions were as follows: carrier gas, helium with a flow rate of 2mL/min; column temperature, 60-275°C at 4°C/min; injector and detector temperatures, 280°C; volume injected, 0.1 μL of the oil; split ratio, 1:50. The MS operating parameters were as follows: ionization potential, 70 eV; ionization current, 2 A; ion source temperature, 200°C; resolution, 1000.

Identification of the components in the oil was based on retention indices relative to *n*-alkanes and computer matching with the WILEY 275.L library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (10-13).

RESULTS AND DISCUSSION

The aerial parts of *F. ovina* yielded 1.0% (v/w) of a pale yellowish oil with a strong acrid odor.

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Table 1. Composition of the aerial parts essential oil of *Ferula ovina* (Boiss.) Boiss. from Iran

No	Compound	Ret Index	%	No	Compound	Ret Index	%
1	2-hexenal	865	0.2	23	myrtenol	1193	0.5
2	tricyclene	920	0.2	24	trans-piperitol	1204	0.3
3	alpha-pinene	933	8.2	25	endo-fenchyl acetate	1217	2.6
4	camphene	946	3.9	26	citronellol	1226	1.0
5	verbenene	950	0.1	27	exo-fenchyl acetate	1230	trace
6	beta-pinene	974	1.6	28	carvone	1240	trace
7	myrcene	988	2.4	29	geraniol	1253	1.5
8	alpha-phellandrene	1003	trace	30	bornyl acetate	1283	4.0
9	alpha-terpinene	1014	0.2	31	thymol	1291	2.0
10	ortho-cymene	1021	0.3	32	carvacrol	1307	9.0
11	limonene	1027	6.7	33	alpha-terpinyl acetate	1346	0.8
12	gamma-terpinene	1055	0.4	34	geranyl acetate	1380	0.5
13	fenchone	1087	4.5	35	methyl eugenol	1401	trace
14	linalool	1099	3.1	36	beta-caryophyllene	1413	0.2
15	fenchol	1111	1.1	37	2-methylmethylene cyclohexane	1420	1.2
16	cis-para-menth-2-en-1-ol	1119	0.8	38	alpha-farnesene	1509	1.2
17	cis-verbenol	1138	0.2	39	gamma-cadinene	1517	0.7
18	camphor	1141	1.6	40	caryophyllene oxide	1576	0.5
19	borneol	1164	3.2	41	carotol	1592	6.5
20	4-terpineol	1174	0.8	42	geranyl propionate	1600	7.0
21	naphthalene	1177	trace	43	geranyl isovalerate	1606	7.2
22	2-hexenal	1187	0.5				

% Identification	86.7
Monoterpene hydrocarbons	24.0
Oxygen-containing monoterpenes	52.2
Sesquiterpene hydrocarbons	2.1
Oxygen-containing sesquiterpenes	7.0
Hydrocarbons	1.4
Phenylpropanoids	trace

Forty-three components were characterized, representing 86.7% of the total oil components (Table 1). The major constituents of the oil were carvacrol (9.0%), alpha-pinene (8.2%), geranyl isovalerate (7.2%), geranyl propionate (7.0%), limonene (6.7%) and carotol (6.5%). Many of the identified compounds in the essential oil of the aerial parts of *F. ovina* like alpha and beta-pinene, camphene, myrcene, alpha-phellandrene, limonene and alpha-terpineol were those which were reported to be present in the essential oil of the aerial parts of Iranian *Ferula* species (14-15).

However, in contrast to the results of one of these reports, gamma-cadinene and alpha-cadinol which were reported to be present as predominant components of the oil (15) were not identified in the present study.

ACKNOWLEDGMENTS

We are grateful to M. Norouzi (Herbarium Department of Iranian Research Institute of Forests and Rangelands, Isfahan, Iran) for his help in identifying of plant material.

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