

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

ALIREZA GHANNADI, SEYED EBRAHIM SAJJADI, ABOLFAZL BEIGHASAN

Department of Pharmacognosy, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan , Iran

## 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 Apiodeae, 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.

**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.

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