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CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *PRANGOS ASPERULA* BOISS. SUBSP. HAUSSKNECHTII (BOISS.) HERRNST. ET HEYN FRUITS

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ABSTRACT

The hydrodistilled oil from crushed dry fruits of *Prangos asperula* Boiss. subsp. haussknechtii (Boiss.) Herrnst. et Heyn which is grown wildly in Iran was analyzed by GC/MS for the first time. Fifty-two constituents were identified of which δ-3-carene (16.1%), β-phellandrene (14.7%), α-pinene (10.5%), α-humulene (7.8%), germacrene-D (5.4%), δ-cadinene (4.2%) and terpinolene (4.0%) were found to be the major components of the oil.

Key words: *Prangos asperula* subsp. haussknechtii, Umbelliferae, Essential oil composition, δ-3-Carene, β-Phellandrene, α-Pinene.

INTRODUCTION

The genus *Prangos*, which belongs to the Umbelliferae family, consists of about 30 species (1). In Iran 15 species are present, among which five are endemic (2).

Some *Prangos* species have been used in the folk medicine as emulient, carminative (3), tonic, antiflatulent, anthelmintic, antifungal and antibacterial agents (4, 5).

Chemical investigations on the components of the genus *Prangos* have resulted in the isolation of various coumarins, alkaloids, flavonoids and terpenoids (6).

Prangos asperula Boiss. subsp. haussknechtii (Boiss.) Herrnst. et Heyn is a native plant growing wild in many parts of Iran (7). According to the literature, *P. asperula* Boiss. subsp. haussknechtii has not been the subject of any investigation and this paper is the first phytochemical studies on this plant.

MATERIALS AND METHODS

Plant material

The plant material was collected from Yasouj in Kohgiluyeh-Boirahmad Province in May 2000 at an altitude of 1950 m. A voucher specimen has been deposited in the herbarium of the Faculty of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran.

Isolation of the oil

The crushed dry fruits of *P. asperula* subsp. haussknechtii were subjected to hydro-distillation for 3 h using a Clevenger-type apparatus and the resulting oil was subsequently dried over anhydrous sodium sulfate.

GC/MS analysis

GC/MS analysis was carried out on a Hewlett-Packard 6890 gas chromatograph fitted with a fused silica HP-5MS capillary column (30 m × 0.25 mm; film thickness 0.25 μm). The oven temperature was programmed from 60-280 °C at 4°C/min. Helium was used as carrier gas at a flow rate of 2 mL/min. The chromatograph was coupled to a Hewlett-Packard 6890 mass selective detector. The MS operating parameters were: ionization voltage, 70 eV; ion source temperature, 200°C. Identification of components of the oil was based on retention indices relative to *n*-alkanes and computer matching with the WILEY275.L library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (8-9).

RESULTS AND DISCUSSION

The air-dried fruits of *P. asperula* subsp. haussknechtii yielded 0.3% of a pale clear yellowish oil with a characteristic odor. Fifty-two components were identified in the fruit of *P. asperula* subsp. haussknechtii. The list of compounds which were identified in the oil sample is presented in table 1. As it can be seen,

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Table 1. Composition of the fruit oil of *Prangos asperula* Boiss. subsp. haussknechtii (Boiss.) Herrnst. et Heyn

Peak	Compound	Retention indices	Percentage
1	hexanol	869	0.3
2	heptanal	901	0.1
3	α-thujene	930	0.2
4	α-pinene	939	10.5
5	camphene	951	1.0
6	sabinene	975	2.5
7	β-pinene	979	1.5
8	myrcene	992	3.5
9	α-phellandrene	1006	0.6
10	δ-3-carene	1010	16.1
11	α-terpinene	1019	0.1
12	ð-cymene	1026	0.1
13	β-phellandrene	1031	14.7
14	(Z)-β-ocimene	1039	0.1
15	(E)-β-ocimene	1048	0.1
16	γ-terpinene	1060	0.5
17	*cis*-sabinene hydrate	1067	0.1
18	octanol	1070	0.1
19	terpinolene	1089	4.0
20	nonanal	1104	0.3
21	*trans*-verbenol	1145	0.3
22	terpinen-4-ol	1178	0.4
23	p-cymen-8-ol	1184	0.3
24	hexyl isovalerate	1242	0.1
25	*cis*-chrysanthenyl acetate	1262	1.1
26	bornyl acetate	1287	2.7
27	hexyl tiglate	1330	0.1
28	bicycloelemene	1336	1.0
29	β-bourbonene	1382	0.1
30	β-elemene	1390	0.5
31	methyl eugenol	1403	0.6
32	β-caryophyllene	1418	0.5
33	γ-elemene	1432	0.5
34	α-humulene	1456	7.8
35	(E)-β-farnesene	1460	0.2
36	germacrene-D	1482	5.4
37	β-selinene	1487	0.2
38	bicyclogermacrene	1496	2.4
39	α-muurolene	1499	0.4
40	γ-cadinene	1511	1.2
41	δ-cadinene	1524	4.2
42	cadina-1,4-diene	1529	0.3
43	α-cadinene	1535	0.2
44	hexadecane	1595	0.3
45	germacrene-B	1553	0.3
46	germacrene-D-4-ol	1573	3.8
47	carotol	1591	1.2
48	T-cadinol[a]	1636	1.4
49	α-cadinol	1650	1.6
50	heptadecane	1696	0.3
51	octadecane	1797	0.5
52	osthol		1.9

Identified compounds = 98.2%, Retention indices on HP-5 capillary column.

[a] MS, 70 eV, 200°C, m/z (rel. int.): 222[M]$^+$(9), 204(38), 189(12), 161(100), 134(19), 119(30), 105(43), 91(45), 79(52), 67(20), 55(29),43(61)

the main components which were characterized were δ-3-carene (16.1%), β-phellandrene (14.7%), α-pinene (10.5%), α-humulene (7.8%), germacrene-D (5.4%), δ-cadinene (4.2%) and terpinolene (4.0%). The composition of oils of some *Prangos* species has been the subject of several investigations (10-18). A comparison of the chemical composition of *P. asperula* Boiss. subsp. Haussknechtii fruits with the previous studies on volatile oils of other species showed variation of the major components. α-Pinene is main constituent of oils of fruits of *P. uloptera* (41.9%), *P. latiloba* (25.1%) and *P. ferulacea* (16.7%) (14-16). ð-Cymene (10.9%) and germacrene-D-4-ol (42.8%) have been reported as major components of fruit oils of *P. uechtritzii* and *P. bornmuelleri* respect-tively (17,18). However, according to results of our study, δ-3-carene (16.1%) was found to be the major component of the fruit oil of *P. asperula* Boiss. subsp. Haussknechtii.

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