

## 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 wildy in Iran was analyzed by GC/MS for the first time. Fifty-two constituents were identified of which  $\delta$ -3-carene (16.1%),  $\beta$ -phellandrene (14.7%),  $\alpha$ -pinene (10.5%),  $\alpha$ -humulene (7.8%), germacrene-D (5.4%),  $\delta$ -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,  $\delta$ -3-Carene,  $\beta$ -Phellandrene,  $\alpha$ -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, antifatulent, 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  $\times$  0.25 mm; film thickness 0.25  $\mu$ m). The oven temperature was programmed from 60-280  $^{\circ}$ C at 4 $^{\circ}$ 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 $^{\circ}$ 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,

**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	$\alpha$ -thujene	930	0.2
4	$\alpha$ -pinene	939	10.5
5	camphene	951	1.0
6	sabinene	975	2.5
7	$\beta$ -pinene	979	1.5
8	myrcene	992	3.5
9	$\alpha$ -phellandrene	1006	0.6
10	$\delta$ -3-carene	1010	16.1
11	$\alpha$ -terpinene	1019	0.1
12	$\delta$ -cymene	1026	0.1
13	$\beta$ -phellandrene	1031	14.7
14	(Z)- $\beta$ -ocimene	1039	0.1
15	(E)- $\beta$ -ocimene	1048	0.1
16	$\gamma$ -terpinene	1060	0.5
17	<i>cis</i> -sabinene hydrate	1067	0.1
18	octanol	1070	0.1
19	terpinolene	1089	4.0
20	nonanal	1104	0.3
21	<i>trans</i> -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	<i>cis</i> -chrysanthenyl acetate	1262	1.1
26	bornyl acetate	1287	2.7
27	hexyl tiglate	1330	0.1
28	bicycloelemene	1336	1.0
29	$\beta$ -bourbonene	1382	0.1
30	$\beta$ -elemene	1390	0.5
31	methyl eugenol	1403	0.6
32	$\beta$ -caryophyllene	1418	0.5
33	$\gamma$ -elemene	1432	0.5
34	$\alpha$ -humulene	1456	7.8
35	(E)- $\beta$ -farnesene	1460	0.2
36	germacrene-D	1482	5.4
37	$\beta$ -selinene	1487	0.2
38	bicyclogermacrene	1496	2.4
39	$\alpha$ -muurolene	1499	0.4
40	$\gamma$ -cadinene	1511	1.2
41	$\delta$ -cadinene	1524	4.2
42	cadina-1,4-diene	1529	0.3
43	$\alpha$ -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 <sup>a</sup>	1636	1.4
49	$\alpha$ -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.

### Essential oil of *prangos asperula boiss.*

<sup>a</sup> MS, 70 eV, 200°C, m/z (rel. int.): 222[M]<sup>+</sup>(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  $\delta$ -3-carene (16.1%),  $\beta$ -phellandrene (14.7%),  $\alpha$ -pinene (10.5%),  $\alpha$ -humulene (7.8%), germacrene-D (5.4%),  $\delta$ -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. *Hausknechtii* fruits with the previous studies on volatile oils of other species showed variation of the major components.  $\alpha$ -Pinene is main

constituent of oils of fruits of *P. uloptera* (41.9%), *P. latiloba* (25.1%) and *P. ferulacea* (16.7%) (14-16).  $\delta$ -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* respectively (17,18). However, according to results of our study,  $\delta$ -3-carene (16.1%) was found to be the major component of the fruit oil of *P. asperula* Boiss. subsp. *Hausknechtii*.

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