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Volatile Components of the Essential Oil of *Prangos asperula* from West of Iran

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The essential oil of the *Prangos asperula* was collected in Lorestan province west of Iran and was extracted by hydro-distillation method from aerial part and identified using GC/MS as the method of analysis. 42 Components were characterized for the *Prangos asperula* oil. The major components of the oil were α-pinene (13.6 %), limonene (12.94 %), myrcene (8.1 %), β-pinene (5.4 %), δ-3-carene (25.54 %), α-terpinolene (14.76 %), caryophylene (2.98 %) and γ-curcumene (2.65 %).

Key Words: *Prangos asperula*, Essential oil, GC/MS.

INTRODUCTION

The genus *Prangos belongs* to the Umbelliferae family consists of about 30 species[1]. 15 Species of the genus *Prangos* are found in Iran, among which 5 are endemic[2]. Some *Prangos* species have been used in the folk medicine as emollient, carminative[3], antifungal[4], antioxidant[5], antibacterial[6], cytokine, release inhibitor[7], nutritive[8], anti-HIV[9], antimicrobial[10]. To the best of our acknowledge, there is no previous report on the chemical composition of the *Prangos asperula* which grow wild at 950 m altitude in Zagros mounts, west of Iran.

EXPERIMENTAL

The fresh plant of *Prangos asperula* was collected during flowering stage from of altitude 950 m Zagros Mountain in the Lorestan province, west of Iran, in June 2006. The plant was identified and authenticated by Dr. H. Amiri at the Department of Biology University of Lorestan. Voucher specimens were deposited in the Herbarium of Research Institute of Forest and Rangeland Tehran.

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Isolation of essential oil: The air-dried aerial parts (50 g) of the plant were subjected to hydrodistillation for 3 h in a Clevenger-type apparatus to produce the oil. The oil was dried over anhydrous sodium sulphate and immediately injected into GC/MS.

Gas chromatography-mass spectrometry: GC analyses were carried out on a Shimudzu 17A gas chromatograph and a BP-5 (non-polar and 95 % dimethyl polysiloxane) capillary column (30 m × 0.25 mm; 0.25 μm film thickness). The oven temperature was held at 60 °C for 3 min then programmed at 5 °C /min to 300 °C. Other operating conditions were as follows: carrier gas He, with a flow rate of 5 mL/min; injector temperature 230 °C; detector temperature 300 °C; split ratio, 1:7. A GC/MS analysis was performed on a Shimudzu 17A GC coupled with Shimudzu QGD5050 Mass system. The operating conditions were the same conditions as described above but the carrier gas was helium Mass spectra were taken at 70 ev. Mass range was from m/z 50-450 amu. The constituents of the volatile oils were identified by calculation of their retention indices under temperature-programmed conditions for *n*-alkanes (C_6-C_{24}) and the oil on a BP-5 column under the same conditions. Identification of individual compounds was made by comparison of their mass spectra with those of the internal reference mass spectra library (Wiley 7.0) or with authentic compounds and confirmed by comparison of their retention indices with authentic compounds or with those of reported in the literature[11]. Quantitative data was obtained from FID area percentages without the use of correction factors.

RESULTS AND DISCUSSION

The volatile oil of the *Prangos asperula* at flowering was obtained by a conventional hydrodistillation method using a Clevenger-type apparatus and the yield of the oil was found to be in 0.95 ± 0.1 % (v/w) on dry weight basis. According to the GC-MS analysis a total of 42 compounds constituting (99.62 %) form aerial part oil of the *P. asperula* identified and quantified.

Table-1 presents the list of compounds identified in the oils. According to the present result, the major components which were determined form aerial part oil of the *Prangos asperula* are α-pinene (13.6 %), limonene (12.94 %), myrcene (8.1 %), β-pinene (5.4 %), δ-3-carene (25.54 %), α-terpinolene (14.76 %), caryophylene (2.98 %) and γ-curcumene (2.65 %).

Monoterpene phenols were the main constituents (86.55 %) of the oil and contained δ-3-carene (25.54 %) as the main compounds. The oxygenated monoterpenes, which constituted (4.83 %) of the oil, were found to contain nerol (2.5 %) as the main compound. Further analysis of the volatile of aerial part oil showed that sesquiterpene hydrocarbons (8.59 %) contained caryophyllene (2.98 %) as major components.

TABLE-1
COMPOSITION ESSENTIAL OIL OF *Prangos asperula*

No.	Compound	Retention time	Kovatas constant	Area %
1	α-Thujene	5.30	925	0.10
2	α-Pinene	5.50	932	13.60
3	Camphene	5.80	944	0.26
4	β-Pinene	6.50	973	5.40
5	β-Myrcene	7.00	992	8.10
6	α-Terpinene	7.30	1011	0.15
7	δ-3-Carene	7.70	1015	25.54
8	*p*-Cymene	7.90	1024	1.09
9	Limonene	8.10	1030	12.94
10	*trans*-β-Ocimene	8.30	1037	0.32
11	*trans*-Ocimene	8.00	1050	2.20
12	γ-Terpinene	8.90	1057	1.07
13	α-Terpinolene	9.80	1087	14.76
14	α-Methylstyrene	10.10	1095	0.50
15	Linalool	10.20	1100	0.87
16	Verbenol	11.40	1138	0.16
17	α-Terpineol	12.40	1173	0.32
18	*p*-Cymene-8-ol	12.60	1180	0.07
19	Linalyl propionate	12.80	1184	0.18
20	Myrtenol	13.02	1193	0.10
21	Nerol	14.90	1255	2.50
22	Bornyl acetate	15.70	1282	0.34
23	Carvacrol	16.20	1300	0.08
24	Eugenol	17.70	1357	0.19
25	α-Copaene	18.20	1361	0.16
26	β-Bourbonene	18.50	1382	0.16
27	α-Copaen	18.60	1385	0.12
28	Di-epi-α-Cedrene	18.90	1399	0.10
29	β-Funebrene	19.20	1407	0.34
30	Caryophyllene	19.40	1415	2.98
31	α-Cedrene	19.60	1422	0.06
32	Aromadendrene	19.70	1426	0.01
33	α-Caryophyllene	20.30	1449	0.88
34	β-Farnesene	20.50	1456	0.17
35	Acoradiene	20.70	1464	0.11
36	γ-Curcumene	21.10	1480	2.65
37	Bicyclogermacrene	21.50	1494	0.40
38	β-Elemene	21.70	1501	0.18
39	(E,E)α-Farnesene	21.80	1506	0.08
40	Germacrene B	23.00	1552	0.16
41	Caryophyllene oxide	23.70	1579	0.11
42	α-Cadinol	25.50	1653	0.11
	Total			99.62

In similar study on this plant, Sajjadi and Mehregan[12] reported that the oil of crushed dry fruits of *Prangos asperula* from Yasoug in center of Iran in May 2000 at on altitude of 1950 m, contained 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 %) as main constituents. As can be seen from the above information the compositions of both oils were different qualitatively and quantitatively. It has been acknowledged that many factors can affect the composition of essential oils from a given species. Theses are including soil compositions, altitude[13] hervesting seasons and geographical source[14].

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