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Essential oil of *Coespeletia timotensis* Cuatrec

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Abstract

The essential oil from the aerial parts of *Coespeletia timotensis* was analyzed by GC and GC–MS (Gas chromatography/Mass Spectra). Twenty seven compounds representing 96.52% of the oil were identified. The most abundant constituents were β-phellandrene (45.7%), α-pinene (27.1%), and β-pinene (11.83%). © 1999 Elsevier Science Ltd. All rights reserved.

Keywords: Coespeletia timotensis; Compositae; Essential oil; β-Phellandrene; Monoterpenes

1. Introduction

Coespeletia timotensis (Cuatrecasas, 1956, 1976) is a shrub with a special rosette growth form commonly known as frailejon. The plant has strongly aromatic leaves, and grows in the Venezuela Andes around 4000 m above sea level. Inhabitants of the mountains use leaves of this plant as a remedy for rheumatic pains and asthma (Garcia-Barriga, 1975). A previous phytochemical study led to the isolation of (−)-kaur-9(11)-16-dien-19-oic acid and 15(α)-hydroxi-(−)-kaur-16-en-19-oic acid (Pérez Rodriguez, 1972); both acids were also isolated from *Espeletia schultzii* (Brieskorn & Pöhlman, 1968). To our knowledge this is the first study on the composition of its essential oil.

2. Results and discussion

The essential oil yield from fresh plant material was 0.45%. Physicochemical properties of the isolated oil were: density 0.8525 (22°C); $[\alpha]_D^{22}$ 30.1; refractive index 1.479 (22°C).

Data from GC–MS (Gas chromatography) analysis are given in Table 1. The oil is rich in monoterpene hydrocarbons which account for 91.99% of the mixture. The identification of each compound was checked against its Kovats Index (Jennings & Shibamoto, 1980) on AT-5, HP-5 and Carbowax 20 M capillary columns (Davies, 1990; Adams, 1995).

3. Experimental

3.1. Plant material: Coespeletia timotensis Cuatrec

Aerial parts were collected at Pico del Aguila, Mérida, Venezuela, at 4000 m above sea level, when it was flowering. A voucher specimen (Luis B. Rojas and A. Usubillaga 10) is kept at the MERF Herbarium (Faculty of Pharmacy, University of Los Andes, Mérida). The identity of the plant was confirmed by Dr. Gilberto Morillo, Faculty of Forestry, University of Los Andes.

3.2. Isolation of the essential oils

Freshly picked aerial parts were hydrodistilled in a Clevenger-type apparatus for 3 h. The oil was dried over Na_2SO_4 and stored under N_2 at 4°C.

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Table 1
Constituents of the essential oil of *Coespeletia timotensis* Cuatrec

No.	Compound	Percentage	R.T.[a]	Method of identification[b]
1	α-Thujene	0.11	4.85	GC–MS, RI[1c]
2	α-Pinene	27.10	5.04	GC–MS, RI[1], P[d]
3	Camphene	0.10	5.34	GC–MS, RI[1], P
4	Sabinene	1.71	5.92	GC–MS, RI[1]
5	β-Pinene	11.83	6.02	GC–MS, RI[1], P
6	Myrcene	0.47	6.37	GC–MS, RI[1], p
7	α-Phellandrene	0.20	6.69	GC–MS, RI[1]
8	δ-3-Carene	0.09	6.86	GC–MS, RI[1]
9	α-Terpinene	0.12	7.03	GC–MS, RI[1]
10	*P*-Cymene	0.59	7.26	GC–MS, RI[1]
11	β-Phellandrene	45.70	7.46	GC–MS, RI[1]
12	γ-Terpinene	0.19	8.22	GC–MS, RI[1]
13	Terpinolene	0.19	9.11	GC–MS, RI[1]
14	Linalool	0.45	9.45	GC–MS, RI[1], P
15	*P*-Menth-2-en-1-ol	0.59	10.13	GC–MS, RI[1]
16	1-Terpineol	0.56	10.69	GC–MS, RI[1]
17	4-Terpineol	1.10	11.92	GC–MS, RI[1]
18	α-Terpineol	0.50	12.35	GC–MS, RI[1]
19	*cis*-Piperitol	0.17	12.90	GC–MS, RI[1]
20	Cinnamaldehyde	0.10	13.94	GC–MS, RI[1]
21	*P*-Cymen-7-ol	0.12	15.59	GC–MS, RI[1]
22	Cyperene	0.18	19.07	GC–MS, RI[1]
23	α-Gurjunene	0.16	21.64	GC–MS, RI[1]
24	Cadinene	2.72	21.89	GC–MS, RI[1]
25	γ-Selinene	0.19	25.57	GC–MS, RI[1]
26	Manoyl oxide	0.40	35.69	GC–MS, RI[1]
27	Kaur-16-ene	0.88	36.21	GC–MS, RI[1]

[a] R.T. = retention time on a HP-5 (30 m) column in min.
[b] Identification: GC–MS = Gas chromatography/Mass-spectra.
[c] RI[1] = Kovats index on AT-5.
[d] P = standard.

3.3. GC–MS analyses

Analysis was performed with a Hewlett Packard 6890 series II chromatograph linked to a Hewlett Packard 5973 mass spectrometer system equipped with a HP automatic injector and a 30 m long, 0.25 mm id, 0.25 μm film thickness HP-5 capillary column. The ionization energy was 70 eV. A sample of 1.0 μl of 2% solution of the oil in *n*-heptane was injected with split ratio of 100 : 1. The temperature of the injection block was 250°C. The GC oven temperature was programmed as follows: initial temperature 60°C (1 min) followed by a temperature increase of 4°C min^{-1} up to 200°C and a second ramp of 10°C min^{-1} to the final temperature of 280°C. The carrier gas was He at 1.0 ml min^{-1} at constant volume. Identification of the oil components was established using a Wiley MS Data Library (6th edition).

3.4. Kovats indices

Values were determined relative to the retention times of a series of *n*-paraffin hydrocarbons on a Perkin Elmer gas chromatograph using a fused-silica AT-5 capillary column (60 m long, 0.25 mm i.d., 0.25 μm film thickness) and a Carbowax 20 M column of similar dimensions. The carrier gas was He at 0.8 ml min^{-1}. Analytical conditions were the same as for the GC–MS analysis.

3.5. Physicochemical properties

Optical rotation was measured in a Jasko model DIP-370 electropolarimeter and the refractive index in an Abbe refractometer.

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