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Volatile constituents of *Cunila polyantha* (Lamiaceae) from Costa Rica. A rich source of menthone

José F. Cicció[1] and Luis J. Poveda[2]

1 Centro de Investigaciones en Productos Naturales (CIPRONA), Escuela de Química, Universidad de Costa Rica, 2060 San José, Costa Rica. Fax (506) 225 9866. E-mail jfciccio@calzada.equi.ucr.ac.cr

2 Escuela de Ciencias Ambientales, Universidad Nacional, Heredia, Costa Rica.

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Abstract: The constituents of the volatile oil of *Cunila polyantha* from Dota, Costa Rica, were investigated using coupled gas chromatography-mass spectrometry (GC-MS) analyses. Menthone (63%), pulegone (14%), β-caryophyllene (4.5%) and 3-octanyl acetate (3%) were found to be the major constituents of the volatile oil.

Key words: *Cunila polyantha*, Lamiaceae, essential oil, GC-MS, menthone.

Cunila polyantha Benth. (Lamiaceae) known in Honduras as "poleo", is an scandent shrub to 2 m tall, squared stems, leaves opposite, simple, ovate-lanceolate, acute-acuminate, weakly serrulate, 2-6 cm long and white inflorescences. The leaves are used in traditional medicine for colds, menstrual pains and it is indicated as blood tonic (House *et al.* 1995). In Costa Rica it is an uncommon plant growing in open sites between 1200 and 1800 m elevation in the area around Santa María de Dota, San José.

Previous investigations on the genus *Cunila* deals with the chemical constitution of the essential oils (Moreira & Krambeck 1976, Mendes *et al*. 1994, Bordignon *et al*. 1996) and the terpenoid content of extracts of the aerial parts of the plants (Delgado *et al.* 1989, Manns & Hartmann 1992, Manns 1993). To our knowledge nothing has been reported concerning the composition of the essential oil of *C . polyantha.*

The plant material was collected in March 1995 at Cedral de Dota, province of San José, Costa Rica. A voucher specimen was deposited at the Herbarium of the University of Costa Rica at the School of Biology (USJ 56544).

Freshly crushed aerial parts which gave off a strong minty odour were submited to hydrodistillation for 2.5 h in a Clevenger type apparatus. The isolated oil was dried over anhydrous sodium sulfate with a yield of 0.3% (v/w of fresh material) of transparent and colourless oil.

The essential oil was analyzed by GC-FID using a Hewlett-Packard 5890 gas chromatograph. Two different fused silica capillary columns were used; one coated with methyl silicone (SE-30), 30 m x 0.2 mm i.d. (film thickness 0.25 μm) and the other one with Supelcowax 10™, 30 m x 0.2 mm i.d., (film thickness 0.25 μm). Analytical conditions were: carrier gas He (1mL/min); split 1:60; inj. temp. 250°C; det. temp. 270°C. The oven temperature was programmed from 80°C to 220°C at a rate of 4°C/min.

The GC-MS analyses were performed using a Shimadzu QP-1100EX instrument. Data were obtained on a 5% methyl phenyl silicone fused silica capillary column, 50 m x 0.32 mm i.d. (film thickness 0.25 μm) installed in a Shimadzu GC-14A gas chromatograph. Operating conditions were: carrier gas: He linear velocity 32 cm/s; oven temp. prog. 75°C (4 min), 75-200°C at 3°C/min, 200°C (8 min); injection port temp. 250°C; jet separator temp. 250°C; ionization voltage: 70eV; ionization current: 60 μA; scanning speed 1 s over 30-500 amu range; split injection system, 1:100.

By combining gas chromatography with mass spectrometry, it was possible to separate and identify 28 components (98.2% of the oil): eight monoterpene hydrocarbons (2,0%); 11 oxygenated monoterpenoids (86.5%); four sesquiterpene hydrocarbons (5.4 %); one sesquiterpene alcohol (0.2%) and four miscellaneus oxigenated compounds (4.0%).

Identification of the components of the oil was performed using the retention indices, which were calculated in relation to a homologous series of fatty acid methyl esters in both columns (SE-30 and Supelcowax 10™), and by comparison of their mass spectra with those reported in the literature (McLafferty 1993, Adams 1995) or those of our own database.

The main components of the oil are menthone (63%), pulegone (14%), β-caryophyllene (4.5%) and 3-octanyl acetate (3%). The identity of the components, their relative retention times (RR_t) to β-pinene and their percentages are given in Table 1.

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TABLE 1

Identified constituents of the volatile oil of Cunila polyantha *(Lamiaceae)*

Constituent	RR_t[d]	% composition	Identification method
(E)-2-hexenal	0.58	0.4	GC-MS
3-hexen-1-ol[b]	0.59	0.2	GC-MS
α-thujene	0.78	tr[c]	GC-MS
α-pinene	0.81	0.3	GC-MS, S[d]
camphene	0.87	tr	GC-MS
sabinene	0.99	0.2	GC-MS
β-pinene	1.00	0.5	GC-MS, S
β-myrcene	1.06	tr	GC-MS
3-octanol	1.09	0.3	GC-MS
p -cymene	1.26	0.1	GC-MS
limonene	1.28	0.8	GC-MS, S
1,8-cineole	1.30	0.1	GC-MS, S
linalool	1.76	2.6	GC-MS, S
3-octanyl acetate	1.91	3.1	GC-MS
menthone	2.23	63.1	GC-MS
isomenthone	2.25	2.3	GC-MS
isopulegone	2.30	tr	GC-MS
α-terpineol	2.40	0.1	GC-MS, S
pulegone	2.77	13.9	GC-MS, S
piperitone	2.83	1.0	GC-MS
citronellyl acetate	3.43	0.9	GC-MS
neryl acetate	3.50	0.3	GC-MS
geranyl acetate	3.63	2.2	GC-MS
β-caryophyllene	3.85	4.6	GC-MS, S
α-humulene	4.03	0.1	GC-MS, S
germacrene D	4.19	0.1	GC-MS, S
bicyclogermacrene	4.28	0.6	GC-MS
(E)-nerolidol	4.77	0.2	GC-MS

[a] Retention time relative to β-pinene (RR_t = 1.00).
[b] Correct isomer not identified.
[c] tr = trace (≤0.05%).
[d] S = Standard.

RESUMEN

Se investigaron los constituyentes del aceite esencial obtenido por hidrodestilación de la parte aérea de la planta *Cunila polyantha* (Lamiaceae), mediante las técnicas de cromatografía de gases y espectrometría de masas (GC-MS). Se encontró que los constituyentes mayoritarios del aceite fueron los monoterpenoides mentona (63%) y pulegona (14%), el sesquiterpeno β-cariofileno (4.5%) y el acetato de 3-octanilo (3%).

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