

## The Essential Oil Composition of *Cunila platyphylla* Epling (Lamiaceae)\*

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**SUMMARY.** The essential oil of *Cunila platyphylla* wild growing in Rio Grande do Sul (Brazil) was analyzed by GC, GC/MS and <sup>13</sup>C-NMR spectroscopy. The main constituent in the leaves oil was found to be pulegone (71,2%). Other compounds in significant amounts were limonene (2,8%) and linalool (1,4%).

**RESUMEN.** "Composición del Aceite Esencial de *Cunila platyphylla* Epling (Lamiaceae)". El aceite esencial de *Cunila platyphylla*, especie nativa del sur de Brasil, fue analizado por cromatografía de gases (GC), cromatografía en fase gaseosa acoplada a espectrometría de masa (GC/MS) y resonancia magnética nuclear de carbono 13 (<sup>13</sup>C-RMN). El principal constituyente del aceite de las hojas es la pulegona (71,2%). Otros compuestos encontrados en cantidades significantes son el limoneno (2,8%) y el linalol (1,4%).

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### INTRODUCTION

*Cunila platyphylla* belongs to the section *Spicatae* of the genus<sup>1</sup> and is native of South Brazil (states of Paraná, Rio Grande do Sul and Santa Catarina)<sup>2</sup>. It is a perennial herb with prostrate or ascendent branches lignified at the base up to 50 cm high, growing in dense groupings in wet and shadowy places in clearing and edge of the *Araucaria angustifolia* forest. The leaves are subrotund to elliptical, 2-6 cm and 1-3.5 wide. Flowers and fruits are found from January to March. No popular uses have been quoted in the reviewed literature.

Continuing our investigation on essential oils from *Cunila* species<sup>3-6</sup>, we report here the composition of the essential oil of the title plant species, analyzed by GC, GC/MS and <sup>13</sup>C-NMR spectroscopy.

### EXPERIMENTAL

**Plant Material.** *C. platyphylla* sample was collected in Esmeralda (state of Rio Grande do Sul, Brazil) in September 1993. Herbarium specimens (voucher leg.

**KEY WORDS:** *Cunila platyphylla*, Essential oil, Labiatae, Lamiaceae, pulegone

**PALABRAS CLAVE:** Aceite esencial, *Cunila platyphylla*, Labiatae, Lamiaceae, pulegona.

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Bordignon 1308) are deposited in the Herbarium of the Federal University of Rio Grande do Sul, Brazil (ICN).

**Isolation of the Essential Oil.** Fresh aerial parts of the plant were subjected to steam distillation for 2 h using a Clevenger apparatus. The obtained essential oil was separated from water and dried over anhydrous sodium sulfate.

**GC analysis.** GC was carried out on a GC with flame ionization detector (FID, 250°) and a split/splitless injector (250°, split 1:10) equipped with a glass insert. N<sub>2</sub> was used as carrier gas (1 ml/min). Peak areas and retention times were calculated after electronic integration. Separation of the compounds was achieved on a fused silica capillary column (60 m x 0.25 mm x 0.25 µm) coated with Carbowax 20M using a temperature program (40-220°; 3°/min). The injection volume was 1.0 ml of a 2% (v/v) solution of essential oil in pentane. Linear retention indexes of the compounds were determined relative to the retention times of a series of paraffin hydrocarbons (C<sub>9</sub>-C<sub>26</sub>) using a non-logarithmic scale <sup>7</sup>.

**GC/MS analysis.** GC/MS analysis were done with an ionization energy of 70 eV. Source and interface temperatures were 225°C and 220°C, respectively. Separation of the compounds was carried out with the same capillary column and temperature program as used in the GC analysis. He was used as carrier gas (1 bar). Each chromatographic peaks was checked for homogeneity with the aid of the mass chromatograms of characteristic fragment ions.

**<sup>13</sup>C-Nuclear magnetic resonance spectroscopy.** <sup>13</sup>C-NMR spectra (broad band decoupled and attached proton test (APT) mode) were recorded in CDCl<sub>3</sub> solution (1:1 v/v) at 50 MHz as described previously <sup>3</sup>. The presence of pulegone in the <sup>13</sup>C NMR spectrum of the oil could be proved by the signals at δ 203.67 (CO), 141.55 (Cq), 131.50 (Cq), 50.56 (CH<sub>2</sub>), 32.55 (CH<sub>2</sub>), 31.32 (CH), 28.36 (CH<sub>2</sub>), 22.75 (CH<sub>3</sub>), 21.86 (CH<sub>3</sub>), 21.52 (CH<sub>3</sub>). Linalool was characterized by the signals at 144.44 (CH), 131.00 (Cq), 124.22 (CH), 111.22 (Cq), 72.85 (CH<sub>2</sub>), 41.86 (CH<sub>2</sub>), 27.16 (CH<sub>3</sub>), 25.28 (CH<sub>3</sub>), 22, 46 CH<sub>2</sub>), 17. 24 (CH<sub>3</sub>) and limonene by the signals 149.81 (Cq), 133.47 (CH), 120.37 (CH), 108.13 (CH<sub>2</sub>), 40.83 (CH).

## RESULTS AND DISCUSSION

The leaves from *C. platyphylla* have been examined before the flowering, yielding 0.64% (v/w) of an yellow oil with intense fragrance,. The composition of the oil is presented in table 1. The main component was found to be pulegone (71,2%). Other compounds in significant amounts were limonene (2,8%) and linalool (1,4%). One compound in significant amount (10,4%), with the molecular weight 154 could not be identified by the retention index and mass spectrometry. Its spectrum point to a monoterpene alcohol, isomere to linalool. Menthofuran, the main compound of the oils of the *C. fasciculata* Bentham and *C. microcephala* Bentham, section *Spicatae*<sup>+</sup>, was not detected in the sample examined.

Essential oils characterized by the accumulation of pulegone has been reported earlier for *Mentha pulegium* L. and *Hedeoma pulegioides* Pers. <sup>8</sup>, both referred

Compound	Sample (Area %)	Identification method
$\alpha$ -Pinene	0.3	1, 2
$\beta$ -Pinene	0.2	1, 2
Sabinene	0.1	1, 2
$\beta$ -Myrcene	0.2	1, 2
Limonene	2.8	1, 2, 3
1,8-Cineole	0.8	1, 2
Linalool	1.4	1, 2, 3
Isocaryophyllene	0.9	1, 2
Unknown MW 154	10.4	1, 2
Pulegone	71.2	1, 2, 3
Germacrene D	0.7	1, 2
Farnesen *	0,3	1, 2
Germacrene B	0.3	1, 2
Caryophyllene oxide	0.3	1, 2
(-)-Spathulenol	1.0	1, 2
Total identified	90.9	

Identification methods: 1 = Mass spectrometry; 2 = Retention index; 3 =  $^{13}\text{C}$  NMR spectroscopy; \* tentative identification

**Table 1.** Composition of the essential oil from *Cunila platyphylla* (fresh leaves of sterile plants).

as pennyroyal and considered to be hepatotoxic <sup>9</sup>. Other oils reported with pulegone as the main component are *Hedeoma drummondii* Bentham <sup>8</sup>, *Rhabdocalyon denudatus* (Bentham) Epling <sup>10</sup>, *Hesperozygis ringens* (Bentham) Epling (79.2%) <sup>11</sup>, genera considered closely allied to the *Cunila* genus <sup>1, 12, 13</sup>. In this genus, the accumulation of pulegone (49.5%) has been reported before for *C. angustifolia* Bentham <sup>14</sup>. Recently we reported the occurrence of pulegone (40.7%) together with isomenthone (50.6%) in the inflorescences from *C. menthoides* Bentham, a species from the same section *Spicatae* <sup>5</sup>.

On the basis of the present results, the utilization of these species (*C. angustifolia*, *C. menthoides* and *C. platyphylla*), and also *C. microcephala* and *C. fasciculata*, for which we reported the accumulation of menthofuran <sup>4</sup>, considered as well as pulegone to be hepatotoxic <sup>15, 16</sup>, should be viewed with the same concern as the utilization of pennyroyal.

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