# ESSENTIAL OIL COMPOSITION OF *Pleurothyrium cinereum* LEAVES.

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## COMPOSICIÓN DEL ACEITE ESENCIAL DE LAS HOJAS DE *Pleurothyrium cinereum.*

**Luis E.** Cuca-Suárez[1] • **Ericsson D.** Coy-Barrera[2,3]

## ABSTRACT

The essential oil of *jigua* (*Pleurothyrium cinereum*, Lauraceae) leaves was extracted by steam distillation and analysed by GC (gas chromatography) and GC/MS (gas chromatography-mass spectrometry). Seventeen compounds were identified. The main components detected were β-caryophyllene (21.3%), caryophyllene oxide (18.7%), guaiol (15.5%), α-cadinene (7.3%), and germacrene-D (6.8%). The composition of essential oil from *P. cinereum* leaves is in agreement with the chemical composition of several neotropical Lauraceae plants.

**Keywords:** Lauraceae, *Pleurothyrium cinereum*, essential oil, sesquiterpenes.

1 Laboratorio de Productos Naturales Vegetales, Departamento de Química, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
2 Laboratorio de Química Bioorgánica, Departamento de Química, Facultad de Ciencias Básicas y Aplicadas, Universidad Militar Nueva Granada, Cajicá, Colombia.
3 Corresponding author: ericsson.coy@unimilitar.edu.co

## RESUMEN

El aceite esencial de las hojas de la *Jigua* (*Pleurothyrium cinereum*, Lauraceae) se extrajo por destilación por arrastre con vapor y se analizó por CG (cromatografía de gases) y CG/MS (cromatografía de gases-espectrometría de masas). Se identificaron diecisiete compuestos como componentes del aceite. Los principales componentes detectados fueron β-cariofileno (21.3%), óxido de cariofileno (18.7%), guaiol (15.5%), α-cadineno (7.3%), y germacreno-D (6.8%). La composición del aceite esencial de las hojas de *P. cinereum* posee correspondencia con la composición química de aceites de otras plantas de la familia Lauraceae del neotrópico.


**Palabras Clave:** Lauraceae, *Pleurothyrium cinereum*, aceite esencial, sesquiterpenos.

## INTRODUCTION

Laurel family (Lauraceae) of plants is composed of 52 genera and nearly 3000 species, mainly distributed in tropical and warm subtropical regions. The Lauraceae family is well known, not only for its role in traditional medicine, but because in phytochemical studies performed to plants belonging to this family have been found several types of metabolites, including alkaloids, lignans, neolignans, and flavonoids (Pagotto *et al.*, 1998; Ma *et al.*, 1991; Rossi *et al.*, 1991; Guinaudeau *et al.*, 1982) with important activities (Céspedes *et al.*, 2006). Among the most representative alkaloids are related benzylisoquinoline especially apophine-related alkaloids (Liscombe *et al.*, 2005). Plants of this family are also recognized as essential oil producers, because of that a plethora of studies had been conducted in order to determine the composition of essential oils of Lauraceae specimens (Takaku *et al.*, 2007).

The *Pleurothyrium* genus (Lauraceae) has an occurrence from Guatemala to Bolivia and possibly southwest of Brazil (van der Werff, 1993). However, the genus is better represented in Peru, Ecuador and Colombia, especially in the Andes (below 1300 MASL). In Colombia, eleven species are known, distributed especially in the departments of Antioquia, Boyacá, Valle del Cauca, Putumayo, Nariño and Amazonas (Coy and Cuca, 2008). *P. cinereum*, known in Colombia as *jigua*, can be found at south of the country, in bordering areas to Peru and Ecuador. This plant, as well as the genus, has no background in essential oil composition studies, therefore the information showed below is reported for the first time. In this paper is presented the analysis of the *P. cinereum* essential oil toward the determination of its composition.

## EXPERIMENTAL DETAILS

### Plant Material

Leaves of *P. cinereum* were collected in Tumaco municipality (Nariño, Colombia) in November 2005. A voucher specimen, numbered COL518334, has been deposited at the Herbario Nacional Colombiano of the Instituto de Ciencias Naturales - Universidad Nacional de Colombia.

### Essential oil extraction

Dry leaves (325 g) were finely chopped and steam distilled for 3 h to obtain 0.125 g essential oil. It was dried over anhydrous sodium sulfate.

### Analysis of essential oil

Essential oil was analyzed by capillary GC and GC/MS. GC analysis was carried out on a Shimadzu GC-17A gas chromatograph equipped with a FID and operated in split mode (1:15, injected volume 1 μL), using a fused silica capillary column HP-5, 30 m x 0.25 mm, 0.5 μm coating thickness. The operational conditions used were as follows: temperature program from 50°C (4 min) to 300°C (20 min) at 4°C/min, split/splitless injector (300°C), carrier gas was helium at 1.0 mL/min, and makeup gas was nitrogen at 30 mL/min. Quantitation was made by using the Class 5000 software. Relative percentages were calculated by electronic integration of FID, whose peak areas were used without response factor correction. Retention indices (RI) were calculated to help determination by using linear hydrocarbons (C8-C24) (certified standard, Supelco®).

GC/MS analyses were carried out on a Shimadzu GC-17A gas chromatograph coupled to a Shimadzu GCMS-QP5050A mass spectrometer (70 eV) using a fused silica capillary column HP-5ms, 30 m x 0.25 mm, 0.5 μm coating thickness, using identical temperature programmed as in GC. Interface temperature 300°C. Detector voltage: 1.20 kV. Acquisition mass range: 42-800u. Acquisition mode: full scan; scan interval: 0.35 s. Solvent delay: 3 min. The components of the oil were determined by comparison of their mass spectra with those of a computer library search (NIST02) and confirmed by comparison of their RI (Adams, 2001; Kondjoyan and Berdagué, 1996; Jennings and Shibamoto, 1980). The compounds determined in the oil are listed in Table 1.

## RESULTS AND DISCUSSION

The gas chromatogram of the *P. cinereum* leaves volatiles showed the presence of twenty two compounds. Seventeen compounds were found to be the main components. The relative concentration of other compounds was below 0.3%. Main compounds

**Table 1.** Essential Oil Composition of *P. cinereum* leaves.

| No. | RI[b] | Compounds[a] | % | No. | RI[b] | Compounds[a] | % |
|---|---|---|---|---|---|---|---|
| 1 | 942 | α-pinene | 1.2 | 11 | 1581 | caryophyllene oxide* | 18.7 |
| 2 | 1039 | dl-limonene* | 4.1 | 12 | 1605 | guaiol | 15.5 |
| 3 | 1341 | α-cubebene | 2.2 | 13 | 1624 | 1,10-di-*epi*-cubenol | 3.0 |
| 4 | 1391 | β-elemene | 2.7 | 14 | 1629 | 1-*epi*-cubenol | 1.8 |
| 5 | 1436 | β-caryophyllene | 21.3 | 15 | 1654 | α-muurolol | 3.5 |
| 6 | 1495 | germacrene-D | 6.8 | 16 | 1660 | α-muurolol | 2.6 |
| 7 | 1512 | α-muurolene | 1.5 | 17 | 1670 | *trans*-calamenen-10-ol | 2.1 |
| 8 | 1527 | y-cardinene | 2.9 | Monoterpenes hydrocarbons (%) | | | 2 (5.3%) |
| 9 | 1529 | □-cadinene | 2.8 | Sesquiterpenes hydrocarbons (%) | | | 8 (47.5%) |
| 10 | 1550 | α-cadinene | 7.3 | Oxygenated sesquiterpenes (%) | | | 7 (47.2%) |

[a]Compounds are listed in order of their elution time from a HP-5 column; b RI = Retention Indices as determined on HP-5 using the homologous series of n-alkanes C8-C24; *correct isomeric form not identified.

were identified by GC/MS and CG/FID (listed in table 1). The main constituents of the essential oil were β-caryophyllene (21.3%), caryophyllene oxide (18.7%), guaiol (15.5%), α-cadinene (7.3%), and germacrene-D (6.8%) (Figure 1). The oil was found to be rich in sesquiterpene hydrocarbons (47.5%) and oxygenated sesquiterpenes (47.2%), being the cadinane-type skeleton the most abundant moiety in the oil's components.

So far, no oil of any *Pleurothyrium* plant has been studied. However, the oils extracted from several plants from other genera of the Lauraceae family have been described (Palazzo *et al.*, 2009; Telascrea *et al.*, 2007; Unlu *et al.*, 2010; Fidelis *et al.*, 2013). However, the genus possessing more studies related to essential oil composition is *Ocotea* (Takaku *et al.*, 2007; Chaverri and Ició, 2005; Bruni *et al.*, 2004). All studies coincide that the composition varies even inter and intra genera, comprising those plants producing phenylpropanoid-abundant essential oils (Unlu *et al.*, 2010). However, the main oil components of the most of the Lauraceae plants is sesquiterpene hydrocarbons and oxygenated sesquiterpenes (ca. 30-50%), including common chemical components such as α- and β-pinene, β-caryophyllene, and germacrene-D (Takaku *et al.*, 2007). *P. cinereum* essential oil shares some components to that of other Lauraceae plants indicating a good correlation with neotropical plants. However, seasonal variations had been reported due to intrinsic and external factors that affect the oil's content and composition, suggesting an important requirement for further studies involving other variations, e.g., circadian cycle (Telascrea *et al.*, 2007; Lopes *et al.*, 1997).

In conclusion, the composition of essential oil from *P. cinereum* leaves no significantly differs from reported data of other Lauraceae plants, perhaps due to geographical factors, constituting this specific oil as a source of sesquiterpene and oxygenated sesquiterpene-type compounds. The present work constitutes as the first report for the essential oil composition for a *Pleurothyrium* plant as well as *P. cinereum*.

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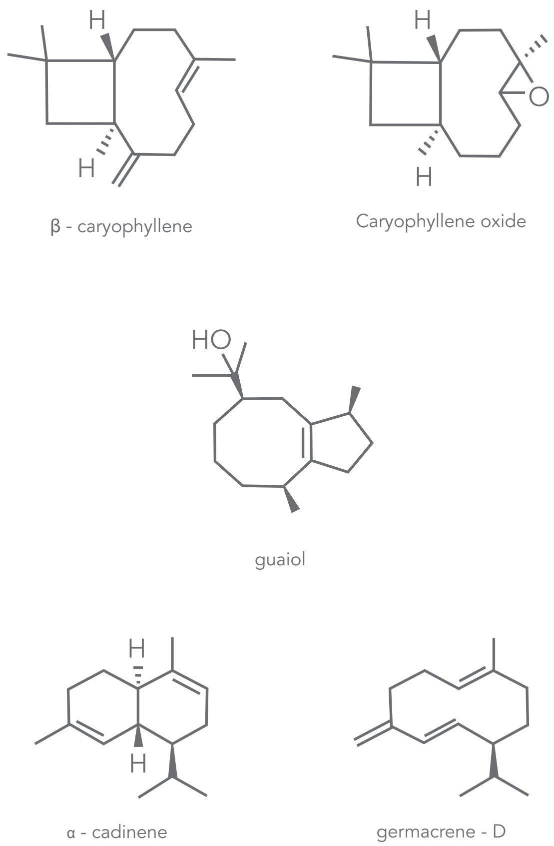


**Figure 1.** Main components of the essential oil from *P. cinereum* leaves.

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