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CICCIÓ, JOSÉ F.
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# CHEMICAL COMPOSITION OF THE LEAF OIL OF *PEPEROMIA HERNANDIIFOLIA* (PIPERACEAE) FROM COSTA RICA

José F. Cicció

Centro de Investigaciones en Productos Naturales (CIPRONA) and Escuela de Química, Universidad de Costa Rica, 2060 San José, Costa Rica. jfciccio@equi.ucr.ac.cr

Abstract. The composition of the essential oil from leaves of *Peperomia hernandiifolia* (Piperaceae) from Costa Rica was analyzed by capillary GC/MS. Eight compounds were identified corresponding to about 99% of the oil. The oil was constituted almost exclusively by fatty acid derivatives. The mayor components were decanal (85.0%) and decanoic acid (12.6%).

Resumen. Se estudió la composición del aceite esencial de las hojas de *Peperomia hernandiifolia* (Piperaceae) de Costa Rica, mediante la técnica de cromatografía de gases capilar y espectrometría de masas (GC/MS). Se identificaron ocho compuestos que representan cerca de 99% del aceite obtenido. El aceite está constituido casi exclusivamente por derivados de ácidos grasos. El decanal (85.0%) es el constituyente mayoritario, seguido por el ácido decanoico (12.6%).

Key Words / Palabras Clave: Piperaceae, *Peperomia hernandiifolia*, leaf essential oil composition, GC/MS, fatty acid derivatives, decanal, decanoic acid.

## Introduction

The genus *Peperomia* Ruiz & Pav. belongs to the Piperaceae family (some authors put the genus in the Peperomiaceae family). It is constituted mainly by herbs growing as epiphytes of tropical and subtropical regions. Most of this genus occurs in Central and Northern South America. In Costa Rica, the genus is best represented in the evergreen rainforest habitats of the Caribbean slope and the central highlands with over sixty species (Burger 1971).

In Middle America and South America (Morton 1981, Duke & Vásquez 1994) some species of the genus *Peperomia* are used traditionally to treat various ailments: colds and coughs, influenza, fever and bronchitis, as a diuretic, sudorific and vulnerary, to relieve headaches, for indigestion and stomach pains, and also for snakebites. Some dried plants are smoked or, fresh plants are extracted with water, to relieve asthma. Several species are used as ornamentals.

*Peperomia hernandiifolia* (Vahl) A.Dietrich is distributed from Mexico and the West Indies to South America. This is a terrestrial or epiphytic climbing succulent herb, rooting at most nodes. The leaves are alternate and peltate, broadly ovate, tapering to short acuminate apex, rounded or subcordate at the base. The inflorescences are leaf-opposed, terminal and solitary, up to about 25 cm long (Burger 1971). When leaves are crushed they give off a scent reminiscent of coriander due to an essential oil of unknown composition.

The chemical composition of the volatile oils of some species belonging to this genus has been the subject of several studies (de Díaz *et al*. 1988, Bessiere *et al*. 1994, da Silva *et al*. 1999, Moreira *et al*. 1999, dos Santos *et al*. 2001).

To the best of my knowledge nothing has been reported concerning the composition of the essential oil of this plant.

## Materials and methods

**Plant Material:** Leaves of *Peperomia hernandiifolia* were collected in December 2000, near Pacayas, Cartago (Costa Rica). A voucher specimen was deposited at the Herbarium of the University of Costa Rica (herbarium number USJ-77432).

**Oil Isolation:** Fresh leaves were subjected to hydrodistillation for 3 hours using a modified Clevenger-type apparatus. The distilled oil was collected and dried over anhydrous sodium sulfate and stored in a freezer at 0°-10°C.

**General Analytical Procedures**: The GC/MS analyses were performed using a Shimadzu GCMS-QP5050 apparatus and CLASS 5000 software with

Wiley 138 computer database. The data were obtained on a 5% phenyl methyl silicone fused silica capillary column (30 m x 0.25 mm, film thickness 0.25 µm). Operation conditions were: carrier gas He, flow 1.0 mL/min; oven temperature program 60°-240°C at 2°C/min; sample injection port temperature 250°C; detector temperature 260°C; ionization voltage: 70 eV; ionization current 60 µA; scanning speed 0.5 sec over 38-400 amu range; split 1:70.

**Identification:** Identification of the components of the oil was performed using the retention indices on a DB-5 column, and by comparison of their mass spectra with those published in the literature (Stenhagen 1974, Adams 1995) or those of our own database.

## Results and discussion

The composition of the oil is summarized in Table 1. Decanal was found to be the major constituent of the oil (85.0%) with decanoic acid (12.6%) as the second compound in quantity. The other constituents with the exception of (*E*)-β-ocimene (in traces) are fatty acid

Table 1. Chemical composition of the leaf oil of *Peperomia hernandiifolia* from Costa Rica.

| Compound[a] | Percentage | Identification Method[c] |
|---|---|---|
| nonane | 0.2 | 1, 2, 3 |
| 1-octen-3-ol | 0.9 | 1, 2 |
| 3-octanol | 0.3 | 1, 2, 3 |
| (*E*)-β-ocimene | t[b] | 1, 2 |
| nonanal | 0.1 | 1, 2 |
| decanal | 85.0 | 1, 2 |
| decanoic acid | 12.6 | 1, 2, 3 |
| dodecanoic acid | 0.1 | 1, 2, 3 |

[a]Compounds are listed by elution order in a 5% phenyl methyl silicone column.
[b]t = Trace (<0.05%)
[c]Method: 1 = Retention Indices on 5% phenyl methyl silicone column; 2 = MS spectra; 3 = standard.

The chemical composition of the oils of several *Peperomia species* from South America (de Díaz *et al*. 1988, Bessiere *et al*. 1994, da Silva *et al*. 1999, Moreira *et al*. 1999, dos Santos *et al*. 2001) have been previously reported. From these results, at least two different types of oils can be distinguished in this genus:

(a) Oils containing arylpropanoid compounds (like apiol, elemicin and safrole)
(b) Oils rich in terpenoids (with monoterpenoids like pinenes, limonene and camphor; and with sesquiterpenoids like β-caryophyllene, germacrene D, hinesol and α-eudesmol).

The results obtained in our analysis showed that the oil of *Peperomia hernandiifolia* represents a different chemical type of essential oil within this genus of plants. This oil belongs to a new third group of oils composed mainly of fatty acid derivatives.

The occurrence of aldehydes and alcohols in this *Peperomia* oil, like in coriander (*Coriandrum sativum* L., Apiaceae) leaf oil (Potter 1996), is presumably responsible for the characteristic flavour of the analyzed plant.

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