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Essential oil of *Lepechinia schiedeana* (Lamiaceae) from Costa Rica

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Abstract. The composition of the essential oil isolated by steam distillation from aerial parts of the Costa Rican herb *Lepechinia schiedeana* (Schlecht) Vatke (Lamiaceae) collected in El Empalme, Costa Rica, was determined by capillary gas chromatography (GC) and coupled gas chromatography-mass spectrometry (GC-MS) analyses. Fifty-one components were identified corresponding *ca.* 93% of the oil. The major components were β-pinene (26.6%), *cis* -pinocamphone (25.1%), δ-3-carene (6.1%), *trans* -pinocamphone (4.0%), camphor (3.8%) and β-caryophyllene (3.7%).

Key words. *Lepechinia schiedeana*, Lamiaceae, essential oil composition, GC-MS, phytochemistry.

Lepechinia schiedeana (Schlecht) Vatke, (Syn. *Stachys schiedeana* Schlecht.), Lamiaceae is an aromatic, perennial, procumbent herb; the stems *ca.* 20-40 cm long, pubescent throughout; leaves elongated-deltoid, acute, the bases truncate-cordate 4-6 cm long and 2 cm wide, pubescent on both surfaces, the upper surface rugose-areolate; subsessile to petioles to 6 cm long on basal leaves. The flowers are lavender. The genus *Lepechinia* belongs to the family of Lamiaceae and is a predominantly New World genus of about 38 species (Nowicke and Epling 1969). The plant is native to dry forests, savannas and rocky hillsides from central Mexico to Chiriqui, Panamá, between 1 600 and 3 800 m elevation (Nowicke and Epling 1969, Morton 1981).

In Guatemala, the natives take the plant decoction as a remedy for stomachache and kidney infections (Morton 1981).

A litle is known about the chemical composition of the oils of this genus. Recently, Velasco-Negueruela *et al* (1994) reported borneol (21.4%), ledyl acetate (16.9%), β-caryophyllene (15.1%) and aromadendrene (5.4%) as a major components of *Lepechinia floribunda* from Argentina.

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

The plant was collected in october 1997 nearby Cedral (Empalme), San José, Costa Rica, at an elevation of 1 800 m in a life zone called "Very Wet Forest Lower Montane" (Holdridge 1987). A voucher specimen was deposited at the Herbarium of the University of Costa Rica at the School of Biology (USJ 67381).

The fresh aerial parts of the plant were subjected to hydrodistillation for 3 h using a modified Clevenger type apparatus. The oil yield was 0.1 % (v/w). The colourless isolated oil was dried over anhydrous sodium sulfate.

The essential oil was analyzed by gas chromatography (GC) with a flame ionization detector (FID) using a Hewlett-

Packard 5890 series II 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 column temperature was programmed from 80°C to 220°C at a rate of 4°C/min.

The GC-MS analyses were porformed using a Shimadzu QP-1100EX instrument. The 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. Operation conditions were: carrier gas: He linear velocity 32 cm/s; column oven temp. prog. 75°C (4 min), 75-200°C at 3°C/min, 200°C (8 min); sample inyection port temp. 250°C; jet separator temp. 250°C; ionization voltage: 70eV; ionization current: 60 µA; scanning speed 1 s over 30-400 amu range; split injection system, 1:100.

The components of the oil were identified by comparison of their retention indices on two columns (*vide supra*), and by comparison of their mass spectra with those published in the literature (McLafferty 1993, Adams 1995) or by using our own database.

Table 1 lists the compounds identified in the hydrodistillated essential oil from the aerial part of the plant *L. schiedeana*. Fify-one compounds (representing *ca.* 93% of the oil) were identified and the oil is characterized by the presence of large amounts of monoterpenic hydrocarbons (45.9%) and oxygenated monoterpenes (39.7%). The main components were β-pinene (26.6%), *cis* -pinocamphone (25.1%), δ-3-carene (6.1%), *trans* -pinocamphone (4.0%), camphor (3.8%) and β-caryophyllene (3.7%).

TABLE 1.

Essential oil composition of Lepechinia schiedeana.

Compound	Percentage (%)	Identification method
(*E*)-2-hexenal	tr[a]	GC-MS
3-hexen-1-ol[b]	tr	GC-MS
tricyclene	tr	GC-MS
α-thujene	0.5	GC-MS
α-pinene	3.0	GC-MS, S[c]
camphene	1.8	GC-MS
sabinene	1.2	GC-MS
1-octen-3-ol	tr	GC-MS
β-pinene	26.6	GC-MS, S
3-octanone	0.2	GC-MS
β-myrcene	0.7	GC-MS
3-octanol	0.1	GC-MS
α-phellandrene	0.2	GC-MS
δ-3-carene	6.1	GC-MS
α-terpinene	0.1	GC-MS, S
o -cymene	0.3	GC-MS
p -cymene	0.9	GC-MS, S
limonene+β-phellandrene	3.9	GC-MS, S
1,8-cineole	0.2	GC-MS, S
γ-terpinene	0.1	GC-MS, S
cis -sabinene hydrate	tr	GC-MS
1-octanol	tr	GC-MS, S
p -mentha-2,4(8)-diene	0.2	GC-MS
α-terpinolene	0.3	GC-MS, S
trans -sabinene hydrate	0.1	GC-MS
1-octen-3-yl acetate	tr	GC-MS
trans -pinocarveol	1.2	GC-MS
camphor	3.8	GC-MS, S
trans -pinocamphone	4.0	GC-MS
borneol	2.0	GC-MS, S
cis -pinocamphone	25.1	GC-MS
terpinen-4-ol	1.0	GC-MS, S
p -cymen-8-ol	0.1	GC-MS
cryptone (?)	0.1	GC-MS
α-terpineol	0.6	GC-MS, S
myrtenol	0.9	GC-MS
β-cyclocitral (?)	0.2	GC-MS
bornyl acetate	0.1	GC-MS
α-copaene	tr	GC-MS
β-bourbonene	0.1	GC-MS
β-cubebene	tr	GC-MS
β-elemene	tr	GC-MS
β-caryophyllene	3.7	GC-MS, S
α-humulene	0.2	GC-MS, S
geranyl acetone	0.2	GC-MS
germacrene D	0.6	GC-MS, S
bicyclogermacrene	0.2	GC-MS, S
δ-cadinene	0.1	GC-MS
(*E*)-nerolidol	0.1	GC-MS
spathulenol	0.6	GC-MS
caryophyllene oxide	1.0	GC-MS

[a] tr = Trace (<0.05%).
[b] Correct isomer not identified.
[c] S = standard.
(?) = tentatively identified.

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RESUMEN

Se estudiaron los constituyentes del aceite esencial de las partes aéreas de *Lepechinia schiedeana* (Lamiaceae) mediante el uso de cromatografía de gases (GC) y cromatografía de gases acoplada a espectrometría de masas (GC-MS). Se caracterizaron 51 compuestos (que representan *ca.* del 93% del aceite) . El aceite se caracteriza por la presencia de gran cantidad de hidrocarburos monoterpénicos (45.9%) y de monoterpenos oxigenados (39.7%). Los componentes mayoritarios fueron β-pineno (26.6%), *cis* -pinocanfona (25.1%), δ-3-careno (6.1%), *trans* -pinocanfona (4.0%), alcanfor (3.8%) y β-cariofileno (3.7%).

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