BLACPMA ISSN 0717 7917

Comunicaciónl | Communication

Chemical composition of the essential oil from the bark *Bursera tomentosa* (Jacq) Tr & Planch

[Composición química del aceite esencial de la corteza de *Bursera tomentosa* (Burseraceae) (Jacq) Tr & Planch]

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Abstract

The bark of *Bursera tomentosa* was collected at full flowering stage in September 2002 at Cabudare, Lara State. The essential oil was isolated by hydrodistillation and it was analyzed by GC and GC/MS. Twenty eight components were identified which made up 90.1 % of the oil. The main constituents of the essential oil were: spatulenol (11.4 %), globulol (8.9 %), epi-□-Cadinol (8.8 %) and *cis*-ocimene (7.3 %).

Keywords: *Bursera tomentosa*, Burseraceae, spatulenol, globulol.

Resumen

La corteza de *Bursera tomentosa*, fue recolectada en estado de floración en el mes de septiembre 2002 en Cabudare, Estado Lara. El aceite esencial fue obtenido por hidrodestilación y analizado por CG y CG/EM. Se identificó veinte y ocho compuestos que constituyen el 90.1% del aceite. Los constituyentes mayoritarios del aceite esencial fueron spatulenol (11.4%), globulol (8.9%), epi-*α*-cadinol (8.8 %) y *cis*-ocimeno (7.3%).

Palabras Clave**:** *Bursera tomentosa*, Burseraceae, spatulenol, globulol

Recibido | Received: November 3, 2010.
Aceptado en versión corregida | Accepted in revised form: 30 de Noviembre de 2010.
Publicado en línea | Published online: November 12, 2010.
Declaración de intereses | Declaration of interests: **F**inancial support of CDCHT-ULA (Project Fa-380-06-03-A) and CDCHT-UCLA (Project 018-ME-2005).
This article must be cited as: This article must be cited as: José MORENO, Luis B. ROJAS, Rosa APARICIO, Lue-Merú MARCÓ & Alfredo USUBILLAGA 2010. Chemical composition of the essential oil from the bark *Bursera tomentosa* (Jacq) Tr & Planch. Bol Latinoam Caribe Plant Med Aromat 9(6): 491 – 494.
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INTRODUCTION

The *Burseraceae* family is distributed in tropical and subtropical areas of the Word. It is divided into three tribes: *Protieae*, *Boswelieae* (*Bursereae*) y *Canarieae* (Perne, 1972). The genus *Bursera* comprises about 40 species (Ricardi, 1992; Young *et al*., 2007; Robles *et al*. 2005). It has been reported that plants of this genus produce balm type terpenoidal resins which contain monoterpenes, sesquiterpenes, and triterpenes, but rarely diterpenoides (Berry *et al*., 1997). *Bursera tomentosa* is a tree 5 to 8 meters high with oblong, deciduous leaves, small white flowers, clustered in panicles (Sugden, 1984). It is found in Central America, Colombia, and Venezuela (Langenheirm, 2003; Schnee, 1994) where it is known as "Bálsamo de incienso" and it is regarded a medicinal plant with antiinflammatory activity (Castillo *et al*., 2005; Gonzales, 1999). The essential oil composition of some species of this family have been reported to contain terpene type compounds. Spatulenol, cadinene, elemene, germacrene B, α-pineno, α-thujene, *cis*-ocimene, *n*-nonene and germacrene-D have been found in the wood of the *Bursera graveolens*, the leaves of *Protium spruceanum*, as well as in fruits of *Bursera tomentosa* (Yukawa *et al*., 2006; Machado, 2003; Moreno *et al*., 2010). The present study deals with the chemical composition of the essential oil obtained from the bark of *Bursera tomentosa.*

MATERIALS AND METHODS

Plant material

The bark of *Bursera tomentosa* was collected at the Experimental Station, University Lisandro Alvarado, at Cabudare, Lara State, during september 2002, at 570 m.a.s.l. A Voucher Specimen (Code N^o 7115) has been deposited at the UCOB "José A. Casa Diego" Herbarium. The plant was identified by Eng. Florangel Diaz, member of the staff of Decanato de Agronomía. It was compared with an already existing voucher (Code N^o 3503).

Isolation of essential oil

The bark of *Bursera tomentosa* (1Kg) was cut into small pieces and subjected to hydrodistillation for 3 h, using a Clevenger-type apparatus to yield 2.0 mL of oil. It was dried with anhydrous Na_2SO_4, and stored at 4 °C under N_2

Gas chromatography

The oil was analyzed on a Perkin Elmer Autosystem gas chromatograph equipped with split injector (50:1) using a 60 m x 0.25 mm fused-silica AT-5 Altech capillary column. Injector and detector temperature was 250 °C and a flow rate of 0.8 ml/min of Helium was used. After an initial temperature of 60 °C (1 min.) the temperature of the columns was raised at 4 °C/min up to 260 °C. The Kováts retention indices (RI) were determined relative to the retention times of a series of *n*-paraffin hydrocarbons (C_7-C_{22}) (Davies, 1990; Adams, 2007; Swigar *et al*., 1981).

Gas Chromatography-Mass Spectrometry

Samples were analyzed by GC/MS on an HP 5973 mass spectrometer system fitted with a 30 m long cross-linked 5 % phenylmethyl siloxane (HP-5MS, Hewlett Packard, USA) fused-silica column (0.25 mm diam., film thickness 0.25 μm). The initial oven temperature was 60 °C (1.0 min), the oven was subsequently heated at 3 °C/min to 200 °C and them to a final temperature of 280 °C at 10 °C/min; the transfer line temperature was held at 280 °C; source temperature 230 °C; quadrupole temperature, 150 °C; carrier gas, helium, adjusted to a linear velocity of 34 M/s; ionization energy, 70 eV; scan range, 40-500 amu; 3.9 scans/s. Samples (1.0 μl) were injected as 2 % solutions of the oils in *n*-heptane. A Hewlett-Packard ALS injector was used with split ratio 50:1. Identification of the oil components was established using a Wiley MS Data Library (6th edn), reference mass spectra from published sources, comparison with reference compounds, and retention indices (Adams, 2007; Sandra and Bichi, 1987).

RESULTS AND DISCUSSION

The bark of *Bursera tomentosa* yielded (2 ml, 0.2 %) of essential oil. GC/MS analyses performed on the oil showed permitted to identify twenty eight components, representing 90.1 % of the oil. A list of identified compounds, along with their percentage composition, is given on Table 1. The most abundant constituents were spatulenol (11.4 %), globulol (8.9 %), epi-□-Cadinol (8.8 %) and *cis*-ocimene (7.3 %). Other compounds identified were bicyclogermacrene (6.6 %), 1-nonane (6.4 %) and β-selinene (3.9%). According to Moreno *et al* (2010) the essential oil of the fruits of *Bursera tomentosa* has a different composition from that of the bark since it contains 98.2% hydrocarbons while the oil from the bark contains 46.6% hydrocarbons and 43.5% oxygenated compounds. According to the references consulted, there have been no studies on the chemical composition of the essential oil of the bark of *Bursera tomentosa*.

Acknowledgments

The authors wish to acknowledge the financial support of CDCHT-ULA (Project Fa-380-06-03-A) and CDCHT-UCLA (Project 018-ME-2005).

Table 1: Percentage composition of the oil from the bark of *Bursera tomentosa*.

Components	leaves (%)	RI
1-Nonane	6.4	902
***cis*-Ocimene**	**7.3**	**1038**
1-Undecene	0.9	1099
trans-carveol	0.4	1220
δ-Elemene	0.5	1353
β-Elemene	2.7	1404
α-Gurjunene	0.5	1423
Aromadendrene	1.3	1454
Neo-α-clovene	0.7	1468
seychellene	0.7	1483
Alloaromadendeno	1.2	1477
γ-Himachalene	3.4	1495
Germacrene D	0.6	1498
β-Selinene	3.9	1503
Viridiflorene	1.2	1503
Bicyclogermacrene	6.6	1513
β-himachalene	1.2	1515
7-epi-α-selinene	1.6	1517
δ-Cadinene	1.3	1540
Ledol	1.2	1580
Spathulenol	**11.4**	**1595**
Globulol	**8.9**	**1599**
Viridiflorol	4.4	1610
β-biotol	2.9	1619
1,10-di-epi-cubenol	1.7	1624
epi-*α*-Cadinol	**8.8**	**1630**
Himachalol	3.8	1634
α-Cadinol	4.6	1637

REFERENCIAS

Adams R. 2007. Identification of essential oil components by gas chromatography/mass spectrometry. 4Th Ed. Allured Publishing Corporation, Carol Stream IL, USA. p 804.

Berry, P. E.; Holst, K.; Yatskievych, K. 1997. Flora of the Venezuelan Guayana Vol III. Missouri Botanical Garden Scientific Publication. Missouri-USA., p 691 - 693.

Castillo, M.; Sanabria, M.E.; Hidalgo, C.; Perozo, Y. 2005. Características Anatómicas del Tallo de Bálsamo de incienso (*Bursera tomentosa* (Jacq) Tr. & Planch). *Bioagro* 17: 17 - 23.

Davies N. 1990. Gas chromatographic retention indices of monoterpenes and sesquiterpenes on methyl silicone and carbowax 20 M. phases. *J Chromatogr A*. 503: 1 - 24.

González, J.; Vásquez, M.E.; Gil, R.; Arbola, J.; Rojas, L. 1999. Caracterización Etnobotánica y Fitoquímica de *Bursera simaruba* (L.) Sarg. "Indio Desnudo". *Rev. Fac. Farm*. 36: 21 - 27.

Langenheim, J.H., 2003. Plants Resins: Chemistry, Evolution Ecology and Ethnobotanic. Timber press, Porland Or.USA. p 86 - 91.

Machado, L., Zoghbi, M.; Andrade, E. 2003. Seasonal Variation in the Composition of the Essential Oils from the Leaves, thin Branches and Resin of *Protium spruceanum*. *Flavour Fragr. J*. 18: 338 - 341.

Moreno J., Aparicio R., Velasco J., Rojas L. B., Usubillaga A. and Lue-Merú M**.** 2010. Chemical Composition and Antibacterial Activity of the Essential Oil from the Fruits of *Bursera tomentosa*. *Nat. Prod. Comun*. 4:1 - 3.

Pernet, R. 1972. Phytochimie des Burseracees. *Lloydia*, 35: 280 - 285.

Ricardi, M.H. 1992. Familias de Dicotiledóneas Venezolanas II. Subclase Rosidae y Asteridae. Evolution, Filogenia, Géneros. Ed. Plantula. Mérida-Venezuela.

Robles, J.; Torrenegra, R.; Gray A.; Piñeros, C.; Ortiz, L; Sierra, M. 2005. Triterpenos. Aislados de Corteza de *Bursera graveolens* (Burseraceae) y su Actividad Biológica. *Rev. bras. farmacogn*, 15: 283 - 286.

Sandra P and Bichi C. 1987. Capillary gas chromatography in essential oil analysis. Husething. Heidelberg

Scheen L. 1984. Plantas Comunes de Venezuela 3ra Ed. Editorial Universidad Central de Venezuela. Caracas- Venezuela. p 62 - 63.

Sugden, A. 1984. Diccionario Ilustrado de la Botánica. Edit. Everest S.A, Bogotá, Colombia.

Swigar AA, Silverstein RM. 1981. Monoterpenes: Infrared, Mass, ^{1}H-NMR and ^{13}C-NMR spectra and Kovats Indices. Aldrich. Milwaukee

Young, D.G.; Casablanca, H.; Bertrand, M. 2007 Essential oil of Bursera graveolens (Kunth)Triana et Planch from Ecuador. *J. Essent.Oil Res*.19: 525 - 526.

Yukawa, CH.; Iwabuchi, H.; Komemushi, S.; Sawabe, A. 2006. Chemical Composition of Three Extracts of Bursera graveolens. *Flavour Fragr. J*. 21: 234 - 238.