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Óleos essenciais de *Sextonia rubra* (Mez) van der Werff (Lauraceae)

Joelma Moreira ALCÂNTARA[1], Klenicy Kazumi YAMAGUCHI[1], Valdir Florêncio da VEIGA JUNIOR[1]

RESUMO
Os óleos essenciais das folhas e galhos de *Sextonia rubra* foram obtidos por hidrodestilação e analisados por cromatografia em fase gasosa com detectores de ionização de chama e espectrometria de massas. O α-pineno (21,7%), β-pineno (15,4%), α-copaeno (12,5%) e o germacreno D (12,1%) foram identificados como constituintes majoritários no óleo essencial das folhas. No óleo essencial dos galhos foram identificados como constituintes majoritários o α-copaeno (22,9%), β-selineno (7,9%) e o β-elemeno (7,2%). A composição química destes óleos essenciais está sendo relatada pela primeira vez neste trabalho.

PALAVRAS-CHAVE: Amazônia, pineno, copaeno, cariofileno, louro gamela.

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ABSTRACT
The essential oils of the leaves and branches of *Sextonia rubra* were obtained by hydrodistillation and analyzed by GC-FID and GC-MS. In the leaves were identified as the major constituents α-pinene (21.7%), β-pinene (15.4%), α-copaene (12.5%) and germacrene D (12.1%). In the branches essential oil, α-copaene (22.9%), β-selinene (7.9%) and β-elemene (7.2%) were identified as the most abundant constituents. This paper describes for the first time the composition of these essential oils.

KEYWORDS: Amazonia, pinene, copaene, caryophyllene, louro gamela.

[1] Departamento de Química, ICE - Universidade Federal do Amazonas. Av. Gal. Rodrigo Octávio Jordão Ramos, 6.200 – Japiim, 69079-000, Manaus-AM.
E-mails: jomalc@yahoo.com.br, klenicy@yahoo.com.br, valdirveiga@ufam.edu.br.

The Lauraceae is a pantropical family, with few representatives in temperate regions, about 52 genus and 2,000-3,000 species, trees typically (Cronquist 1981; Burger and van der Werff 1990; Chanderbali *et al*. 2001).

Lauraceae trees are essential oil rich species, some of them with great importance in worldwide perfumes and cosmetics industries, as *Aniba rosaeodora*, *Aniba canelilla, Cinnamomum camphora and Cinnamomum zeylanicum* (Gottlieb & Magalhães 1960; Morais *et al*. 1972).

Sextonia genus has only two species: *S. rubra* (found in the northern states of Brazil) and *S. pubescens* (endemic only in Peru). This genus is dedicated to the late A.J.G.H. Kostermans, an eminent specialist of Lauraceae. The translation of this name in English is sexton, upon which the name *Sextonia* is based (van der Werff 1997). This genus is easily recognized by having clustered leaves and flowers with unequal tepals, characters already mentioned by Rohwer (1993). Large trees, to 45 m tall, alternate leaves, clustered near the tips of the branches (van der Werff 1997). *Sextonia rubra* was first identified as *Ocotea rubra* Mez and subsequently classified as *Nectandra rubra* (Mez) CK Allen. The name of currently accepted by botanical community was identified by Henk van der Werff. *Sextonia rubra* (Mez) van der Werff is popularly known in the Amazon region as *louro gamela*, *gamela* and *louro vermelho*. It is a hermaphroditic species with geographic distribution in the Guyana highlands and the Amazon (van der Werff 1997).

Lauraceae essential oils have been systematically studied in the search of new aromas and the huge Amazonian biodiversity is considered one of the most interesting hot spots to find new benchmarks to new perfumes and cosmetics. The key place to search is obviously those species never studied before or poorly chemically analyzed, especially to their essential oils. *Sextonia rubra* is one of these species. It already has a considerable economic value by the widely used on wood industry. This interest may lead to its extinction, even before it has a complete chemical and pharmacological study.

Branches and leaves are the plant parts where the sustainability takes place when extractivism based development is not oriented to fruits, flowers or naturally exsudated resins. Those plant parts can be seasonally obtained by pruning the trees, turning the extraction not aggressive to the environment. Especially to the species already explored to the logging industry, branches and leaves have no interest; they are actually a environmental problem. So, their use tends to be really welcome.

This report presents the chemical composition of the essential oils obtained from fresh leaves and branches of *Sextonia rubra*.

The plant material was collected in March, 2008 at the Ducke Reserve, from the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil, was identified in the Ducke Reserve Flora Project from INPA herbarium, where a voucher specimen is deposited (Ribeiro *et al*. 1999). Leaves and branches was chopped and submitted to hydrodistillation (4 h) by using a modified Clevenger-type apparatus and the distilled oils were collected and analyzed using a previously reported methodology (Alcântara *et al*. 2010a).

Essential oils from leaves and branches from *S. rubra* yielded 0.14% and 0.01%, respectively. The whole chemical composition is presented at Table 1, with about 95% of the content identified by using retention indexes on gas chromatography and mass spectra comparison with literature, electronic database and patterns (β-caryophyllene).

The chemical analysis of leaf oil showed that the major classes of constituents were monoterpene hydrocarbons and sesquiterpenes (44.6% and 47.7% respectively). Among the 24 compounds identified (Table 1), major constituents were a mixture of α-pinene and β-pinene (21.7 and 15.4%), and the sesquiterpenes α-copaene (12.5%), germacrene D (12.1%), β-caryophyllene (7.1%) and δ-cadinene (5.0%). Oxygenated monoterpenes were also detected with percentage of only 3.2%.

The essential oil obtained from branches showed to be constituted by several substances, 1.2% of monoterpenes and the majority of sesquiterpenes (93.5%). The main sesquiterpenes were α-copaene (22.9%), β-selinene (7.9%) and β-elemene (7.2%), while δ-cadinene and *epi*-α-cadinol had their percentage content about 6%.

The percentage composition of essential oil of the branches is almost exclusively of sesquiterpenes, while the percentage composition of monoterpenes and sesquiterpenes is almost the same for the leaf oil. The oxygenated compounds were more abundant on the branches (26.7%) than in leaves, but of these substances had sesquiterpene skeleton.

This is the very first study performed with essential oils from *Sextonia* species. The chemical profile obtained from other Lauraceae essential oils obtained from the same place, the Ducke Reserve, from Instituto Nacional de Pesquisas da Amazonia, showed a high content of β-caryophyllene (Silva *et al*. 2009; Alcântara *et al*. 2010a,b). At the present study, in both essential oils obtained from *S. rubra* this sesquiterpene were detected, but only in low amounts 7.1% in leaves and 1.0% in branches.

Pinene is a bicyclic monoterpene chemical compound with two structural isomers, which often occur together in many essential oils: α-pinene and β-pinene. In *Sextonia rubra* the mixture of pinenes was found at 37.1% in leaf essential oil,

Table 1 - Percentage composition of Sextonia rubra essential oils

Composition	RI	Leaves	Branches
1. a-pinene	932	21.7	0.4
2. camphene	943	1.4	0.2
3. β-pinene	974	15.4	-
4. mircene	986	1.5	-
5. *p*-cimene	1020	0.3	0.3
6. limonene	1025	4.3	0.3
7. linalool	1100	1.0	-
8. camphor	1141	0.5	-
9. α-terpineol	1186	1.7	-
10. α-copaene	1376	12.5	22.9
11. β-elemene	1388	-	7.2
12. β-caryophyllene	1408	7.1	1.0
13. *E*-α-bergamotene	1434	1.8	2.7
14. α-humulene	1451	1.1	-
15. α-amorphene	1476	2.5	5.6
16. germacrene D	1478	12.1	-
17. β-selinene	1484	-	7.9
18. bicyclogermacrene	1494	0.6	3.8
19. α-muurolene	1497	1.8	3.0
20. β-bisabolene	1502	-	2.0
21. (*E*,*E*)-α-farnesene	1505	0.4	-
22. γ-cadinene	1509	1.7	-
23. *E*-calamenene	1513	1.1	2.7
24. δ-cadinene	1520	5.0	6.2
25. *E*-cadina-1,4-diene	1537	-	1.8
26. viridiflorol	1587	-	2.2
27. rosifoliol	1596	-	4.4
28. *epi*-cedrol	1614	-	3.6
29. 10-*epi*-γ-eudesmol	1622	-	2.0
30. γ-eudesmol	1629	-	1.1
31. *epi*-α-cadinol	1637	-	6.1
32. *epi*-α-muurolol	1640	-	3.1
33. α-cadinol	1642	-	4.2
34. ni	1681	-	0.9
35. ni	1695	-	0.8
36. ni	1777	0.6	1.3
37. ni	1791	1.7	-
38. ni	1800	2.2	2.3
Monoterpene hydrocarbons		44.6	1.2
Oxygenated monoterpenes		3.2	-
Sesquiterpene hydrocarbons		47.7	66.8
Oxygenated sesquiterpenes		-	26.7

RI = retention index, ni = not identified

but only 0.4% of α-pinene was detected at branch essential oil. Several biological activities were already described to pinenes, as bactericide and insecticide (Leite *et al*. 2007). *S. rubra* is a species with great interest to logging industries since it is resistant to termite-induced degradation. This activity has been recently attributed to a substance rubrynolide, but also to the ethyl acetate bark extract (Rodrigues *et al*. 2011). Based on the present study, this effect could be at least partially also assigned to the presence of these pinenes.

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