

Composition of Essential Oils from *Schefflera myriocarpa* Harms (Araliaceae) from Vietnam

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Abstract: The aim of this research was to determine the chemical constituents of essential oils derived from the leaf, bark and stems of *Schefflera myriocarpa* Harms (Araliaceae) grown in Vietnam for the first. The essential oils were obtained by hydrodistillation and investigated through gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The principal compounds identified in the essential oils were mainly monoterpenes represented by α -pinene (17.1%-21.2%), α -phellandrene (9.2%-27.4%) and limonene (19.8%-36.8%). In addition, methyl eugenol (10.4%) was found in the bark.

Keywords: *Schefflera myriocarpa*; essential oil; monoterpenes. © 2018 ACG Publications. All rights reserved.

1. Plant Source

In the course of phytochemical studies of medicinal plants from Vietnam, we investigated and report herein the chemical compounds identified in the essential oils obtained by hydrodistillation from the leaf, bark and stem of *Schefflera myriocarpa* Harms (Araliaceae). The mature leaf, bark and stem of *S. myriocarpa* were collected from Pù Mát National park, Nghệ An Province, Vietnam, in August 2012. Botanical identification was achieved by Dr. Dai. A voucher specimen NDH 265 was deposited at the Botany Museum, Vinh University, Vietnam.

2. Previous Studies

The authors are not aware of any information related to the chemical compounds and biological activities of the essential oils of *S. myriocarpa* from Vietnam or any other parts of the world.

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Nevertheless, isolation of triterpenes, saponins, caffeoylquinic acid derivatives from *Schefflera* has been reported [1-4]

Table 1. Chemical constituents of essential oils of *S. myriocarpa*

Compounds ^b	RI ^c	RI ^d	MI	Percentage composition ^a		
				Leaf	Bark	Stem
α -Thujene	931	921	e	0.4	0.4	0.3
α -Pinene	939	932	f	17.1	21.2	15.0
Camphene	953	946	e	0.3	0.2	0.2
Sabinene	976	964	f	-	2.2	1.5
β -Pinene	980	978	e	5.7	2.7	2.4
β -Myrcene	990	988	f	3.6	1.5	3.1
α -Phellandrene	1006	1004	f	25.6	9.2	27.4
α -Terpinene	1017	1014	e	0.6	0.7	-
Limonene	1032	1030	f	30.7	19.8	36.8
(<i>E</i>)- β -Ocimene	1052	1044	f	0.8	4.1	1.7
γ -Terpinene	1061	0156	e	0.1	1.1	0.1
α -Terpinolene	1090	1089	e	0.5	0.7	1.3
Linalool	1100	1100	e	0.1	1.5	-
<i>allo</i> -Ocimene	1128	1128	e	0.1	0.1	0.1
Terpinene-4-ol	1177	1177	e	0.1	2.9	0.1
α -Terpineol	1189	1187	e	-	0.5	-
Methyl chavicol	1208	1196	f	-	0.1	-
Neral	1242	1249	f	-	0.4	-
Geranial	1270	1273	f	-	0.4	-
Bornyl acetate	1289	1287	e	t	-	0.1
Bicycloelemene	1327	1337	f	1.3	-	0.4
α -Cubebene	1351	1345	e	0.1	0.9	0.9
Eugenol	1363	1373	f	0.1	0.7	0.1
α -Copaene	1377	1374	e	0.1	1.3	1.2
β -Bourbonene	1385	1384	e	0.1	-	-
β -Cubebene	1388	1387	e	0.1	0.7	-
β -Elemene	1391	1389	e	0.3	-	-
Methyl eugenol	1402	1402	f	0.3	10.4	0.3
β -Caryophyllene	1419	1417	e	2.7	4.3	1.2
Aromadendrene	1441	1439	e	t	-	0.1
α -Humulene	1454	1452	e	1.0	0.7	-
Germacrene D	1485	1484	e	0.7	0.2	0.4
α -Amorphene	1485	1485	e	0.2	-	0.1
β -Selinene	1486	1486	f	-	1.4	-
<i>epi</i> -Bicyclosesquiphellandrene	1489	1489	f	0.1	0.1	-
Cadine-1,4-diene	1496	1494	e	0.1	-	-
Bicyclogermacrene	1500	1500	e	1.4	-	0.5
γ -Cadinene	1514	1513	e	0.2	-	-
δ -Cadinene	1525	1522	e	0.7	0.9	0.9
Caryophyllene oxide	1583	1581	f	0.1	-	0.1
τ -Muurolol	1646	1644	e	-	-	0.2
α -Cadinol	1654	1652	e	0.9	0.2	0.2
Benzyl benzoate	1760	1759	f	t	-	0.1
1,2-Benzenedicarboxylic acid	1917	1917	f	0.1	0.3	0.5
(<i>Z</i>)-9-Octadecanoic acid	2198	2195	f	0.3	0.5	-
(<i>Z</i>)-13-Docosenamide	2625	2625	f	1.9	3.0	0.2
Total			98.5	95.3	97.5	
Monoterpene hydrocarbons			85.5	63.9	89.9	
Oxygenated monoterpenes			0.6	16.9	0.6	
Sesquiterpene hydrocarbons			9.1	10.5	5.7	
Oxygenated sesquiterpenes			1.0	0.2	0.6	
Non-terpenes			2.3	3.8	0.7	

^a Standard deviation (SD \pm) were insignificant and were excluded from the Table; ^b Elution order on HP-5MS column; ^c Retention indices on HP-5MS column; ^d Literature retention indices; ^e Identification by mass spectra, GC retention indices and comparison with literature data; ^f Identification by mass spectra, GC retention indices, comparison with literature data and co-injection with authentic compounds; MI, mode of identification; - not identified; t, trace amount (< 0.1%)

However, the volatile constituents of some other species in the genus have been studied and reported. β -Caryophyllene (11.1%-19.2%), α -humulene (7.3%-15.4%), germacrene D (3.3%-14.4%), germacrene B (8.3%-21.7%) and *epi*- α -cadinol (5.6%-15.0%) were the major constituents in the oils of the roots, stem and leaf of *S. stellata* from India [5]. The leaf oil of *S. rodrigueziana* [6] was made up entirely of sesquiterpene hydrocarbons, mostly germacrene D (27.6%), β -cubebene (27.2%), β -caryophyllene (12.2%), α -cubebene (11.1%), and α -copaene (10.8%). The essential oil of *S. heptaphylla* and its major compound (-)- β -pinene and (+)- β -pinene showed significant antiproliferative activity against A375 cancer cell lines [7]. The leaf oil of *S. stellata* showed good antifungal activity against *Candida albicans* and *C. glabrata* [5] while the leaf oil of *S. rodrigueziana* displayed notable in-vitro cytotoxicity on MDA-MB-231 cells [6]. Biological results indicated that crude extracts of *S. vinosa* were active against *Schistosoma mansoni* adult worms [8]. Extracts from *S. umbellifera* have demonstrated potential anti-trypanosoma and anti-plasmodium activities [9].

3. Present Study

The essential oils were obtained in yields of 0.21%, 0.18% and 0.30% (v/w, leaf, bark and stem respectively), calculated on a dry weight basis. The hydrodistillation process afforded light yellow colored essential oils. The main volatile compounds were displayed in Table 1, along with their percentages and retention indices calculated on HP-5MS column. In *S. myriocarpa* 39, 43 and 32 components representing 98.6%, 95.3% and 97.5% of the total contents were identified in the leaf, bark and stem oils respectively. The main classes of compounds present in the oils were monoterpene hydrocarbons (63.9%-89.9%) and sesquiterpene hydrocarbons (5.7%-10.5%). The oxygenated monoterpene compounds were present in the bark (16.9%). The principal compounds identified in the essential oils were mainly monoterpenes represented by α -pinene (17.1%-21.2%), α -phellandrene (9.2%-27.4%) and limonene (19.8%-36.8%). In addition, β -pinene (5.7%) was present in the leaf while methyl eugenol (10.4%), (*E*)- β -ocimene (4.1%) and β -caryophyllene (4.3%) were the other significant compound in the bark oil.

A comparative analysis of the studied oils of *S. myriocarpa* with previous data [5-7] indicated that two forms of *Schefflera* oil samples exist namely: (i) oils dominated by monoterpene hydrocarbons as seen in *S. myriocarpa* and *S. heptaphylla* [7]; (ii) oils in which sesquiterpene hydrocarbons predominate observed in *S. stellata* [5], *S. rodrigueziana* [6] and *S. heptaphylla* [10].

In conclusion, for the first time, the compositions of the leaf, bark and stem essential oils of the Vietnamese specie of *S. myriocarpa* were elucidated. Due to the very limited amount of published data on the essential oil of the plants in the genus, comparison of the present results with other studies from Vietnam or other countries was limited.

Supporting Information

Supporting Information accompanies this paper on <http://www.acgpubs.org/RNP>

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