

**Date :** mai 28, 2021

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 21E20-PTH02

**Customer identification :** Elemi - Philippines - EE0105206R

**Type :** Essential oil

**Source :** *Canarium luzonicum*

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

**Analyst :** Sylvain Mercier, M. Sc., Chimiste

**Analysis date :** mai 26, 2021

Checked and approved by :

\_\_\_\_\_  
Alexis St-Gelais, M. Sc., chimiste 2013-174

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Faintly yellow liquid

**Refractive index:** 1.4781 ± 0.0003 (20 °C; method PC-MAT-016)

*ISO 10624:1998 - OIL OF ELEMI*

Compound	Min. %	Max. %	Observed %	Complies?
Sabinene	3	8	6	Yes
α-Phellandrene	10	24	24	Yes
Limonene	40	72	43	Yes
α-Terpineol	0.4	3.0	2.1	Yes
α-Elemol	1	25	7	Yes
Elemicin	0.5	8.0	2.9	Yes
<b>Refractive index</b>	1.4720	1.4900	1.4781	Yes

*CONCLUSION*

No adulterant, contaminant or diluent has been detected using this method.

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Toluene	0.02	Simple phenolic
$\alpha$ -Thujene	0.16	Monoterpene
$\alpha$ -Pinene	0.47	Monoterpene
Camphene	0.02	Monoterpene
$\alpha$ -Fenchene	tr	Monoterpene
$\beta$ -Pinene	0.24	Monoterpene
Sabinene	5.56	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
Myrcene	0.64	Monoterpene
$\alpha$ -Phellandrene	23.90	Monoterpene
Pseudolimonene	0.04	Monoterpene
$\Delta^3$ -Carene	0.06	Monoterpene
$\alpha$ -Terpinene	0.37	Monoterpene
para-Cymene	2.28	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
Limonene	42.69	Monoterpene
$\beta$ -Phellandrene	3.46	Monoterpene
(Z)- $\beta$ -Ocimene	0.29	Monoterpene
(E)- $\beta$ -Ocimene	0.38	Monoterpene
$\gamma$ -Terpinene	0.27	Monoterpene
cis-Sabinene hydrate	0.59	Monoterpenic alcohol
Terpinolene	1.78	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Sabinene hydrate	0.12	Monoterpenic alcohol
Linalool	0.01	Monoterpenic alcohol
1,3,8-para-Menthatriene	0.01	Monoterpene
trans-para-Mentha-2,8-dien-1-ol	0.09	Monoterpenic alcohol
allo-Ocimene	0.01	Monoterpene
cis-Limonene oxide	0.01	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.08	Monoterpenic ketone
Epoxyterpinolene	0.03	Monoterpenic ether
Unknown	0.06	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Terpinen-4-ol	0.44	Monoterpenic alcohol
Cryptone	0.04	Normonoterpenic ketone
para-Cymen-8-ol	0.09	Monoterpenic alcohol
$\alpha$ -Terpineol	2.08	Monoterpenic alcohol
cis-Piperitol	0.02	Monoterpenic alcohol
cis- $\alpha$ -Phellandrene epoxide (IPP vs Me)	0.20	Monoterpenic ether
trans-Piperitol	0.05	Monoterpenic alcohol
trans-Carveol	0.07	Monoterpenic alcohol
cis-Carveol	0.04	Monoterpenic alcohol

<i>trans</i> - $\alpha$ -Phellandrene epoxide (IPP vs Me)	0.03	Monoterpenic ether
Carvone	0.04	Monoterpenic ketone
Carvotanacetone	0.02	Monoterpenic ketone
Unknown	0.06	Unknown
Piperitone	0.08	Monoterpenic ketone
Unknown	0.02	Unknown
Limonen-10-ol	0.03	Monoterpenic alcohol
Perilla alcohol	0.02	Monoterpenic alcohol
<i>para</i> -Menth-5-en-1,2-diol isomer II	0.02	Monoterpenic alcohol
Carvacrol	0.02	Monoterpenic alcohol
<i>para</i> -Menth-5-en-1,2-diol isomer III	0.03	Monoterpenic alcohol
Unknown	0.02	
$\delta$ -Elemene	0.03	Sesquiterpene
$\alpha$ -Cubebene	0.03	Sesquiterpene
$\alpha$ -Copaene	0.11	Sesquiterpene
$\beta$ -Elemene	0.09	Sesquiterpene
Methyleugenol	0.26	Phenylpropanoid
$\beta$ -Caryophyllene	0.14	Sesquiterpene
( <i>trans</i> ?) <i>-6</i> -Hydroxy- <i>para</i> -menth-1-en-3-one	0.03	Monoterpenic alcohol
$\beta$ -Copaene	0.01	Sesquiterpene
$\alpha$ -Guaiene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.09	Sesquiterpene
Germacrene D	0.14	Sesquiterpene
10,11-Epoxyguai-1(5)-ene?	0.01	Sesquiterpenic ether
Viridiflorene	0.03	Sesquiterpene
$\alpha$ -Muurolene	0.04	Sesquiterpene
$\gamma$ -Cadinene	0.03	Sesquiterpene
<i>epi</i> -Elemol?	0.05	Sesquiterpenic alcohol
$\delta$ -Cadinene	0.02	Sesquiterpene
$\alpha$ -Elemol	6.78	Sesquiterpenic alcohol
Elemicin	2.86	Phenylpropanoid
Caryophyllene oxide	0.01	Sesquiterpenic ether
Guaiol	0.12	Sesquiterpenic alcohol
10- <i>epi</i> - $\gamma$ -Eudesmol	0.01	Sesquiterpenic alcohol
$\gamma$ -Eudesmol	0.09	Sesquiterpenic alcohol
Eudesmol analog?	0.02	Sesquiterpenic alcohol
$\beta$ -Asarone	0.02	Phenylpropanoid
$\beta$ -Eudesmol	0.20	Sesquiterpenic alcohol
$\alpha$ -Eudesmol	0.15	Sesquiterpenic alcohol
Unknown	1.06	Oxygenated sesquiterpene
Bulnesol	0.03	Sesquiterpenic alcohol
$\alpha$ -Phellandrene dimer II	0.04	Diterpene
Cryptomeridiol	0.01	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
$\alpha$ -Phellandrene dimer IV	0.01	Diterpene
<b>Consolidated total</b>	<b>99.71%</b>	

tr: The compound has been detected below 0.005% of total signal.

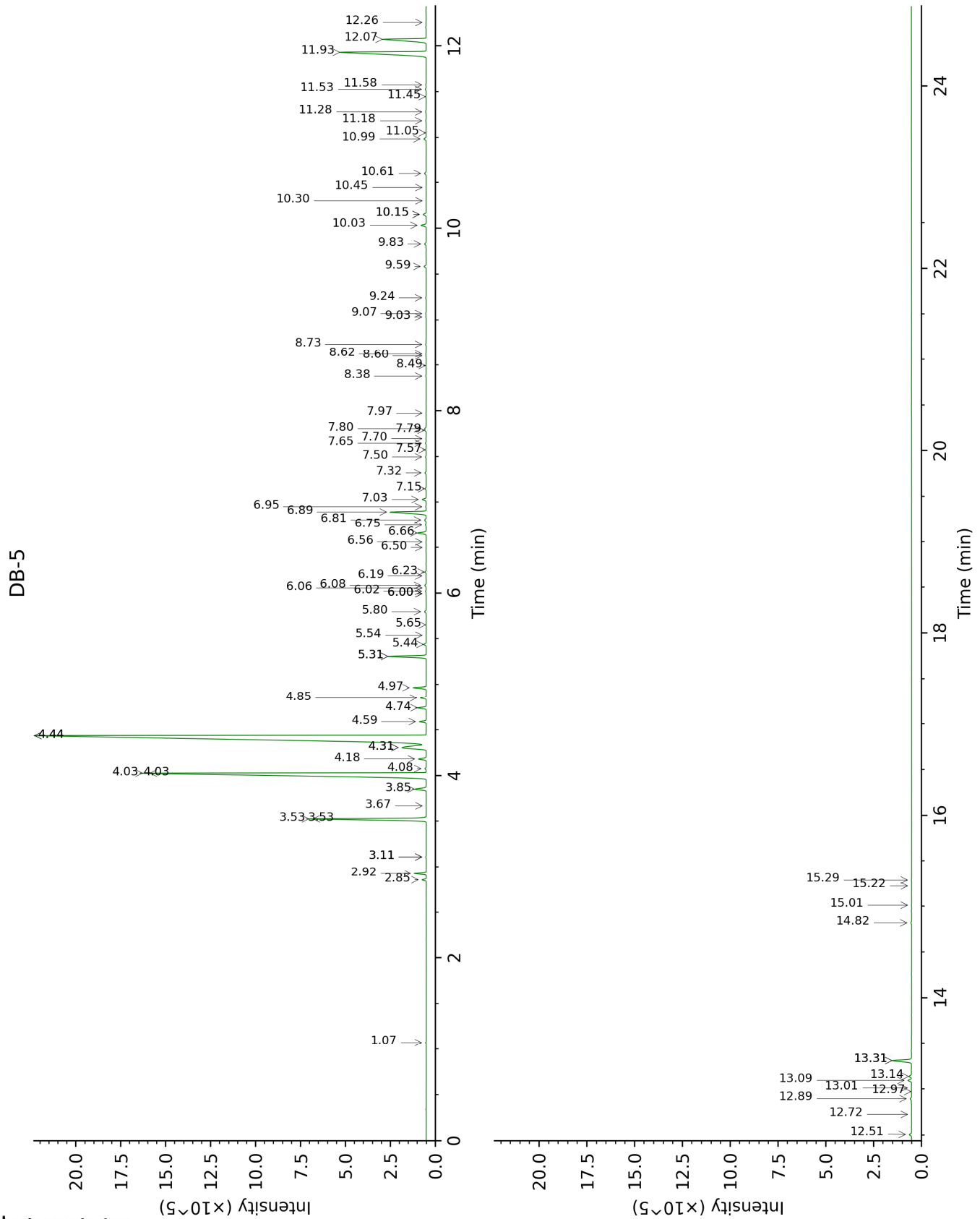
Note: no correction factor was applied

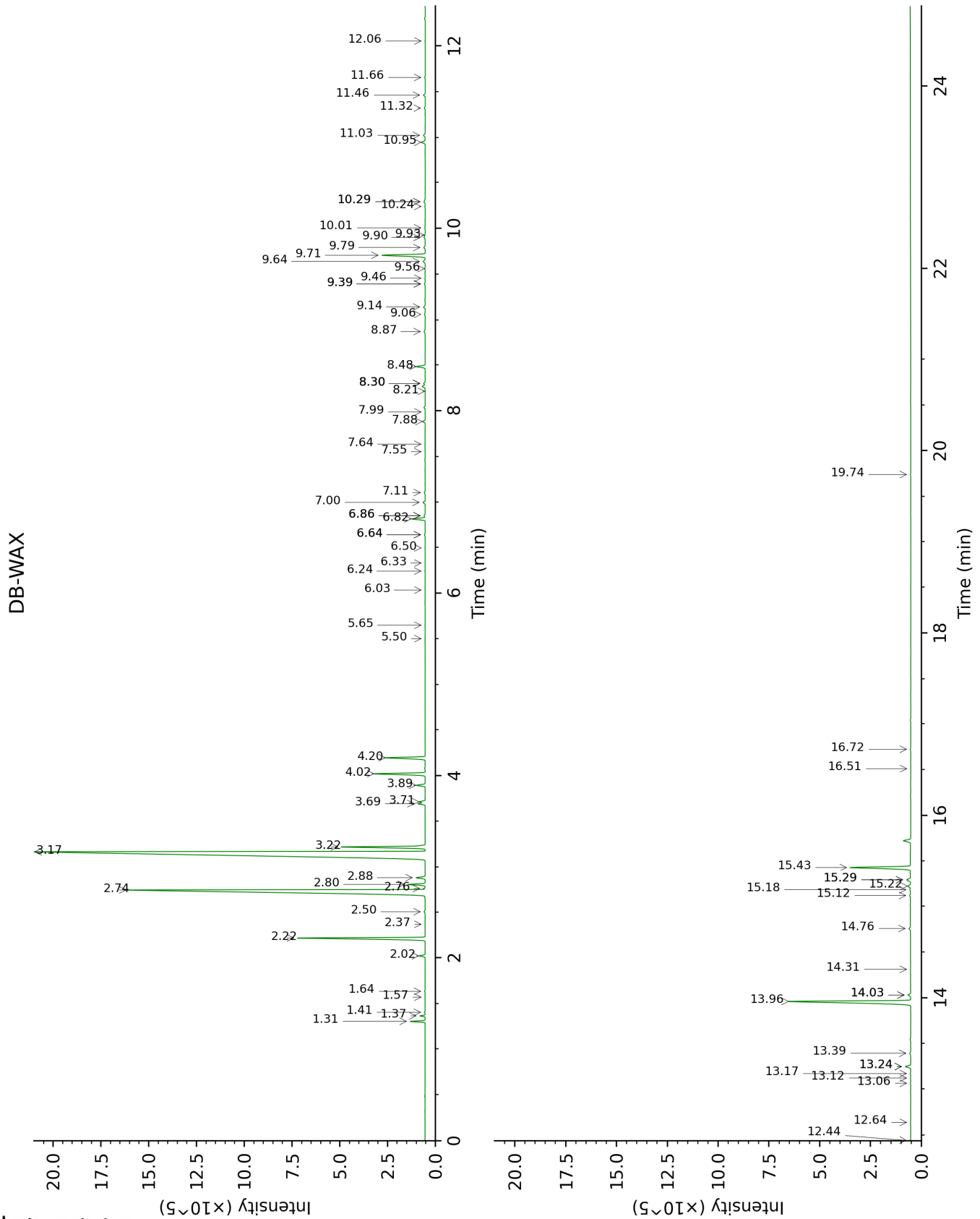
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid

overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

This page was intentionally left blank. The following pages present the complete data of the analysis.







FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.07	757	0.02	1.41	1001	0.02
$\alpha$ -Thujene	2.86	924	0.16	1.37	997	0.16
$\alpha$ -Pinene	2.92	929	0.47	1.31	989	0.47
Camphene	3.11*	942	0.02	1.64	1025	0.02
$\alpha$ -Fenchene	3.11*	942	[0.02]	1.57	1018	tr
$\beta$ -Pinene	3.53*	970	5.79	2.02	1064	0.24
Sabinene	3.53*	970	[5.79]	2.22	1084	5.56
3-Methyl-3-cyclohexenone	3.67	980	0.01	6.03	1372	0.01
Myrcene	3.85	992	0.64	2.80	1134	0.64
$\alpha$ -Phellandrene	4.03*	1004	23.84	2.74	1129	23.90
Pseudolimonene	4.03*	1004	[23.84]	2.76	1130	0.04
$\Delta^3$ -Carene	4.08	1007	0.06	2.50	1110	0.05
$\alpha$ -Terpinene	4.18	1014	0.37	2.88	1139	0.37
para-Cymene	4.31*	1021	2.22	4.02	1228	2.28
Carvomenthene	4.31*	1021	[2.22]	2.37	1099	0.01
Limonene	4.44*	1030	46.15	3.17	1163	42.69
$\beta$ -Phellandrene	4.44*	1030	[46.15]	3.22	1167	3.46
(Z)- $\beta$ -Ocimene	4.59	1040	0.29	3.69	1204	0.30
(E)- $\beta$ -Ocimene	4.74	1049	0.38	3.89	1219	0.38
$\gamma$ -Terpinene	4.85	1056	0.27	3.71	1206	0.24
cis-Sabinene hydrate	4.97	1064	0.59	6.82†	1430	0.69
Terpinolene	5.31*	1085	1.79	4.20	1241	1.78
para-Cymenene	5.31*	1085	[1.79]	6.24	1387	0.01
trans-Sabinene hydrate	5.44	1094	0.12	7.88	1510	0.12
Linalool	5.54	1100	0.01	7.99	1518	0.01
1,3,8-para-Menthatriene	5.65	1108	0.01	5.65	1345	0.01
trans-para-Mentha-2,8-dien-1-ol	5.80	1117	0.09	8.87	1586	0.08
allo-Ocimene	6.00*	1130	0.02	5.50	1334	0.01
cis-Limonene oxide	6.00*	1130	[0.02]	6.33	1394	0.01
cis-para-Mentha-2,8-dien-1-ol	6.02	1131	0.04	9.39*	1628	0.04
trans-Limonene oxide	6.06	1134	0.01	6.50	1406	0.01
Camphor	6.08	1136	0.08	7.11	1451	0.05
Epoxyterpinolene	6.19	1142	0.03	6.64*	1417	0.04
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.23	1145	0.06	6.86*†	1433	[0.69]
Unknown [m/z 95, 110 (38), 81	6.50	1162	0.01	7.55	1484	0.01

(21), 79 (16)... 152 (7)]						
Unknown [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	6.56	1166	0.02	7.64	1491	0.02
Terpinen-4-ol	6.66	1173	0.44	8.48	1556	0.42
Cryptone	6.75	1179	0.04	9.06	1601	0.04
para-Cymen-8-ol	6.81	1182	0.09	11.46	1800	0.09
$\alpha$ -Terpineol	6.89	1188	2.08	9.71	1653	2.14
cis-Piperitol	6.95	1192	0.02	9.46	1633	0.02
cis- $\alpha$ -Phellandrene epoxide (IPP vs Me)	7.03	1197	0.20	10.95	1756	0.21
trans-Piperitol	7.15	1205	0.05	10.29*	1701	0.09
trans-Carveol	7.32	1217	0.07	11.32	1788	0.05
cis-Carveol	7.50	1229	0.04	11.66	1817	0.03
trans- $\alpha$ -Phellandrene epoxide (IPP vs Me)	7.57	1234	0.03	12.06	1852	0.02
Carvone	7.65	1239	0.04	9.90	1669	0.07
Carvotanacetone	7.70	1242	0.02	9.39*	1628	[0.04]
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.79	1249	0.06	11.02	1763	0.11
Piperitone	7.80	1250	0.08	9.79	1660	0.08
Unknown [m/z 43, 56 (54), 69 (40), 155 (40), 41 (35), 55 (33)...]	7.98	1261	0.02	10.01	1677	0.02
Limonen-10-ol	8.38	1289	0.03	13.06	1943	0.01
Perilla alcohol	8.50	1297	0.02	13.17	1952	0.02
para-Menth-5-en-1,2-diol isomer II	8.60	1304	0.02	14.31	2060	tr
Carvacrol	8.62	1306	0.02	15.29*	2156	0.21
para-Menth-5-en-1,2-diol isomer III	8.73	1310	0.03	15.12	2139	0.05
Unknown [m/z 43, 97 (99), 107 (47), 41 (35), 55 (30)...]	9.03	1331	0.02	13.24*	1960	0.26
$\delta$ -Elemene	9.07	1334	0.03	6.86*†	1433	[0.69]
$\alpha$ -Cubebene	9.24	1346	0.03	6.64*	1417	[0.04]
$\alpha$ -Copaene	9.58	1370	0.11	7.00	1443	0.11
$\beta$ -Elemene	9.83	1388	0.09	8.30*†	1542	0.24
Methyleugenol	10.03	1402	0.26	13.24*	1960	[0.26]
$\beta$ -Caryophyllene	10.15*	1411	0.18	8.30*†	1542	[0.24]
(trans?)-6-Hydroxy-para-	10.15*	1411	[0.18]	16.72	2304	0.03

menth-1-en-3-one						
β-Copaene	10.30	1422	0.01	8.21	1535	0.01
α-Guaiene	10.45	1433	0.01	8.30*†	1542	[0.24]
α-Humulene	10.61	1445	0.09	9.14	1608	0.09
Germacrene D	10.99	1473	0.14	9.64	1648	0.13
10,11-Epoxyguai-1(5)-ene?	11.05	1478	0.01			
Viridiflorene	11.18	1488	0.03	9.56	1641	0.02
α-Muurolene	11.28	1495	0.04	9.93	1671	0.02
γ-Cadinene	11.45	1508	0.03	10.24	1696	0.03
epi-Elemol?	11.53	1514	0.05	13.39	1973	0.04
δ-Cadinene	11.58	1518	0.02	10.29*	1701	[0.09]
α-Elemol	11.93	1546	6.78	13.96	2027	6.98
Elemicin	12.07	1557	2.86	15.43	2170	2.96
Caryophyllene oxide	12.26	1572	0.01	12.64	1904	0.01
Guaiol	12.51	1591	0.12	14.03*	2034	0.12
10-epi-γ-Eudesmol	12.72	1609	0.01	14.03*	2034	[0.12]
γ-Eudesmol	12.90	1623	0.09	14.76	2104	0.07
Eudesmol analog?	12.97	1629	0.02			
β-Asarone	13.01	1632	0.02	16.51	2281	0.01
β-Eudesmol	13.09	1639	0.20	15.29*	2156	[0.21]
α-Eudesmol	13.14	1643	0.15	15.22	2150	0.13
Unknown [suspected m/z 59, 93 (79), 161 (61), 107 (47), 81 (44), 121 (37)...]	13.31*	1657	1.08			
Bulnesol	13.31*	1657	[1.08]	15.18	2146	0.03
α-Phellandrene dimer II	14.82	1786	0.04	12.44	1886	0.03
Cryptomeridiol	15.01	1803	0.01	19.74	2642	0.02
Unknown [m/z 159, 93 (87), 146 (72), 43 (72), 119 (48), 121 (48), 59 (25)... 220 (31)]	15.22	1822	0.01			
α-Phellandrene dimer IV	15.29	1828	0.01	13.12	1948	0.01
<b>Total identified</b>		<b>99.33%</b>			<b>98.64%</b>	
<b>Total reported</b>		<b>99.53%</b>			<b>98.80%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index