

**Date :** June 09, 2022

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 22F03-PTH02


**Customer identification :** May Chang - China - M30110R

**Type :** Essential oil

**Source :** *Litsea cubeba*

**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 :** Seydou Ka, Ph. D.

**Analysis date :** June 08, 2022

Checked and approved by :

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Alexis St-Gelais, Ph. D., Chimiste 2013-174

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Light yellow liquid

**Refractive index:**  $1.4849 \pm 0.0003$  (20 °C; method PC-MAT-016)

*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
Isovaleral	tr	Aliphatic aldehyde
Unknown	tr	Unknown
Unknown	tr	Unknown
2,6-Dimethyl-1,5-heptadiene	0.01	Normonoterpene
Tricyclene	0.01	Monoterpene
$\alpha$ -Thujene	0.04	Monoterpene
$\alpha$ -Pinene	1.46	Monoterpene
Camphene	0.29	Monoterpene
$\alpha$ -Fenchene	tr	Monoterpene
$\beta$ -Pinene	1.12	Monoterpene
Sabinene	1.81	Monoterpene
Dehydro-1,8-cineole	0.04	Monoterpenic ether
6-Methyl-5-hepten-2-one	0.65	Aliphatic ketone
Myrcene	0.72	Monoterpene
6-Methyl-5-hepten-2-ol	0.03	Aliphatic alcohol
$\alpha$ -Phellandrene	0.01	Monoterpene
$\alpha$ -Terpinene	0.02	Monoterpene
para-Cymene	0.04	Monoterpene
$\beta$ -Phellandrene	1.04*	Monoterpene
1,8-Cineole	1.04*	Monoterpenic ether
Limonene	13.89	Monoterpene
(Z)- $\beta$ -Ocimene	0.02	Monoterpene
(E)- $\beta$ -Ocimene	0.02	Monoterpene
$\gamma$ -Terpinene	0.05	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.08	Monoterpene
6,7-Epoxymyrcene	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Rosefuran	0.01	Monoterpenic ether
Linalool	1.16	Monoterpenic alcohol
cis-Chrysanthemal?	0.02	Monoterpenic aldehyde
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
cis-Limonene oxide	0.05	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
trans-Limonene oxide	0.03	Monoterpenic ether
trans-Chrysanthemal	0.01	Monoterpenic aldehyde
exo-Isocitral	0.10	Monoterpenic aldehyde
Citronellal	0.63	Monoterpenic aldehyde
Borneol	0.06	Monoterpenic alcohol
Isoneral	0.60	Monoterpenic aldehyde
$\delta$ -Terpineol	0.04	Monoterpenic alcohol
Rosefuran oxide	0.16	Monoterpenic ether
Terpinen-4-ol	0.02	Monoterpenic alcohol
Unknown	0.08	Oxygenated monoterpene

Isogeranial	1.13	Monoterpenic aldehyde
α-Terpineol	0.37	Monoterpenic alcohol
Methyl salicylate	0.04	Phenolic ester
Myrtenol	0.01	Monoterpenic alcohol
<i>trans</i> -Isopiperitenol	0.02	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.03	Monoterpenic alcohol
Nerol	0.59	Monoterpenic alcohol
Citronellol	0.17	Monoterpenic alcohol
Piperitone	0.09	Monoterpenic ketone
Neral	29.39	Monoterpenic aldehyde
Geraniol	1.00	Monoterpenic alcohol
Geranial	38.99	Monoterpenic aldehyde
Unknown	0.10	Oxygenated monoterpene
Neric acid	0.15	Monoterpenic acid
α-Terpinyl acetate	0.03	Monoterpenic ester
Unknown	0.09	Unknown
Geranic acid	0.30	Aliphatic acid
α-Copaene	0.08	Sesquiterpene
Unknown	0.18	Unknown
Geranyl acetate	0.06	Monoterpenic ester
β-Elemene	0.07	Sesquiterpene
β-Caryophyllene	0.86	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
α-Humulene	0.09	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
( <i>E</i> )-β-Farnesene	0.04	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Bicyclogermacrene	0.07	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
β-Bisabolene	0.04	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide	0.13	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Unknown	0.07	Unknown
<b>Consolidated total</b>	<b>98.87%</b>	

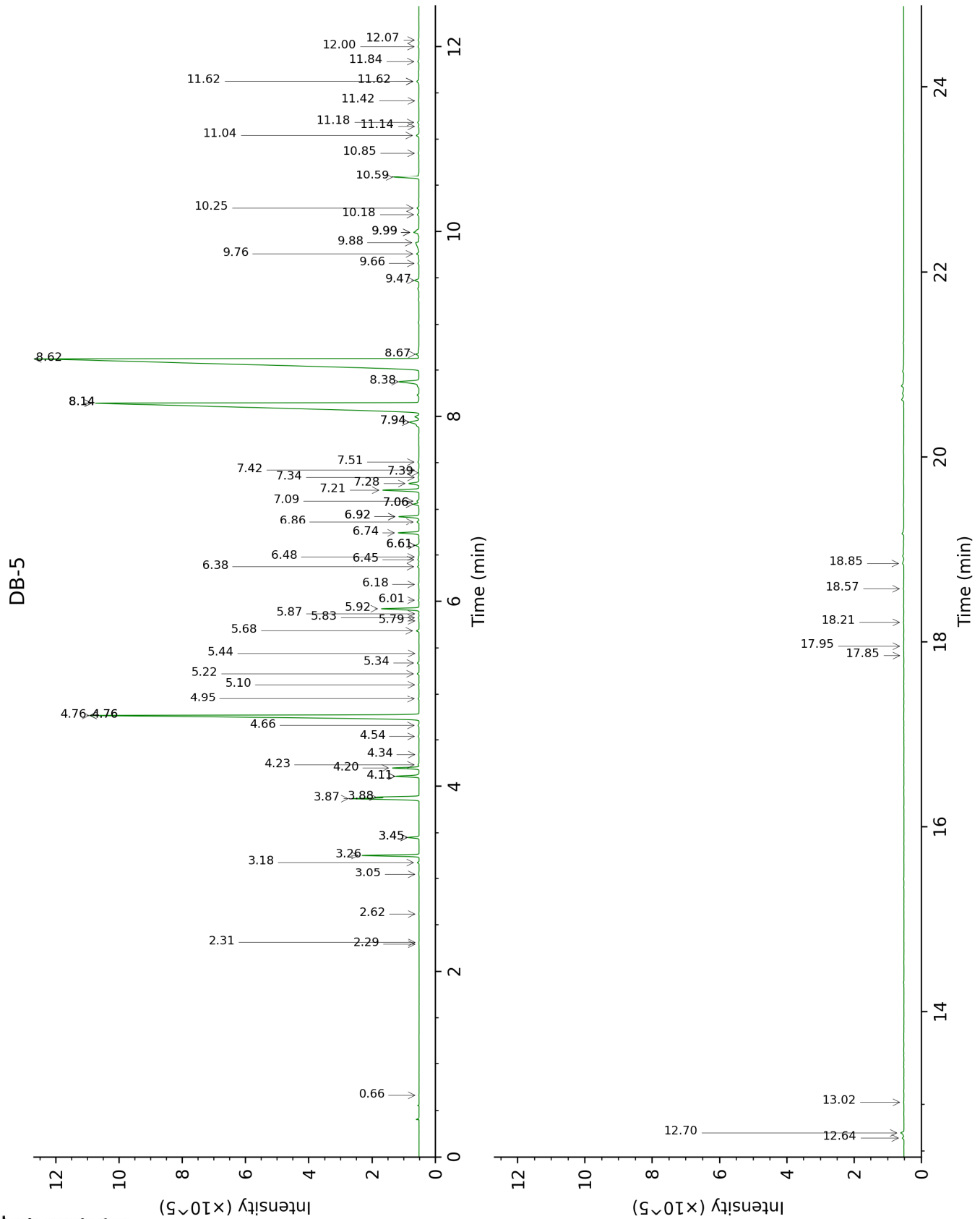
\*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered  
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total  
tr: The compound has been detected below 0.005% of total signal.

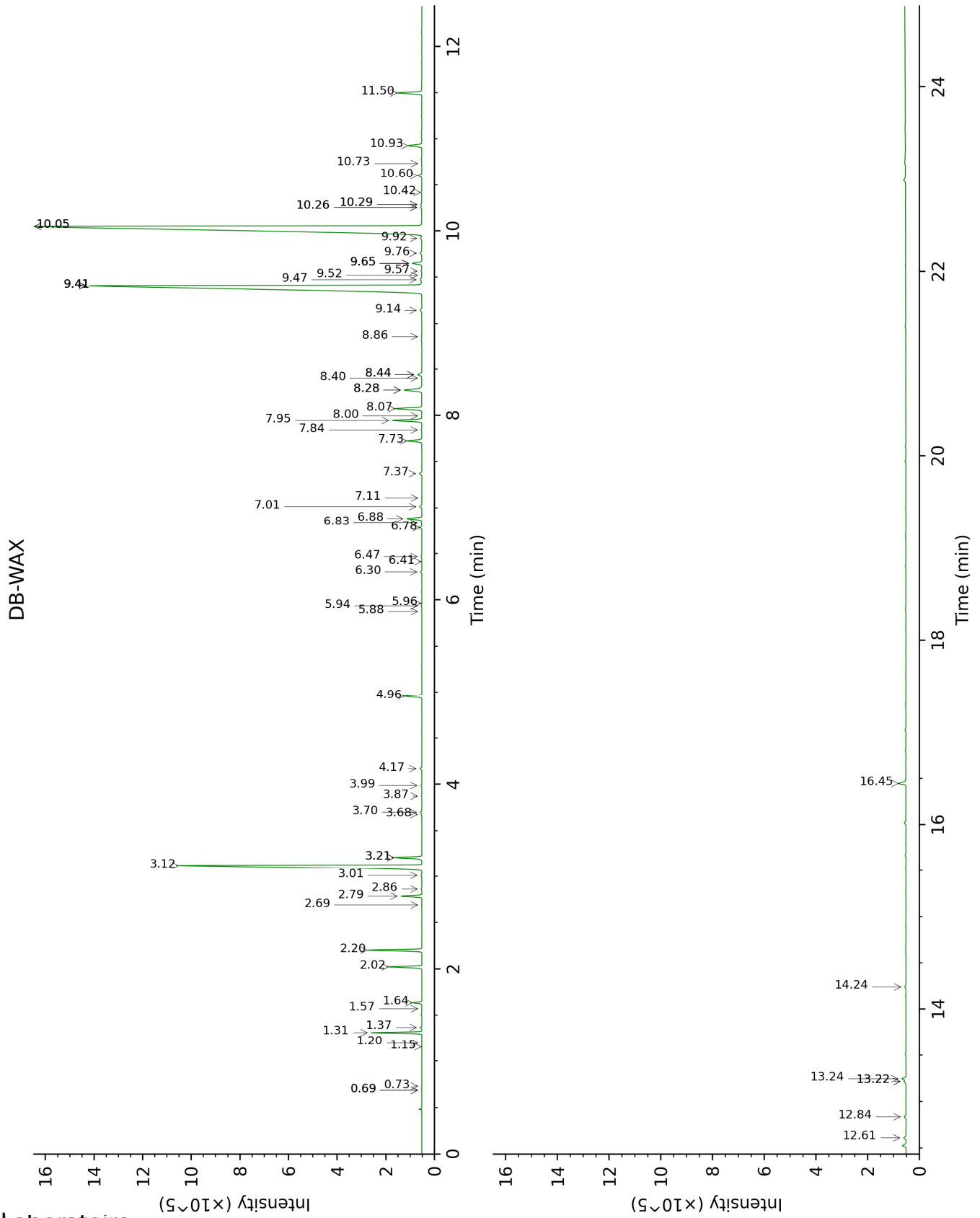
Note: no correction factor was applied

**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	%
Isovaleral	0.66	643	tr	0.73	887	tr
Unknown [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	2.29	859	tr	0.69*	871	0.01
Unknown [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	2.31	860	tr	0.69*	871	[0.01]
2,6-Dimethyl-1,5-heptadiene	2.62	885	0.01	1.15	965	tr
Tricyclene	3.05	917	0.01	1.20	972	0.01
$\alpha$ -Thujene	3.18	925	0.04	1.37	1000	0.05
$\alpha$ -Pinene	3.26	930	1.46	1.31	991	1.46
Camphene	3.45*	943	0.29	1.64	1027	0.29
$\alpha$ -Fenchene	3.45*	943	[0.29]	1.57	1021	tr
$\beta$ -Pinene	3.87†	971	2.94	2.02	1066	1.12
Sabinene	3.88†	972	[2.94]	2.20	1084	1.81
Dehydro-1,8-cineole	4.11*	986	0.68	3.01	1152	0.04
6-Methyl-5-hepten-2-one	4.11*	986	[0.68]	4.96	1299	0.65
Myrcene	4.20	992	0.72	2.79	1134	0.72
6-Methyl-5-hepten-2-ol	4.23	995	0.03	6.84	1433	0.03
$\alpha$ -Phellandrene	4.34	1002	0.01	2.69	1126	tr
$\alpha$ -Terpinene	4.54	1014	0.02	2.86	1140	0.02
para-Cymene	4.66	1022	0.04	3.99	1227	0.04
$\beta$ -Phellandrene	4.76*	1028	14.93	3.21*	1167	1.02
1,8-Cineole	4.76*	1028	[14.93]	3.21*	1167	[1.02]
Limonene	4.76*	1028	[14.93]	3.12	1160	13.89
(Z)- $\beta$ -Ocimene	4.95	1040	0.02	3.68	1204	0.03
(E)- $\beta$ -Ocimene	5.10	1050	0.02	3.87	1219	0.02
$\gamma$ -Terpinene	5.22	1057	0.05	3.70	1206	0.05
cis-Sabinene hydrate	5.34	1064	0.05	6.78	1429	0.07
cis-Linalool oxide (fur.)	5.44	1071	0.01	6.41	1402	0.01
Terpinolene	5.68	1086	0.08	4.17	1240	0.08
6,7-Epoxy-myrcene	5.79	1093	0.01	5.96	1369	0.01
trans-Sabinene hydrate	5.82	1095	0.02	7.84	1509	0.02
Rosefuran	5.87	1098	0.01	5.88	1363	0.01
Linalool	5.92	1101	1.16	7.95	1517	1.16
cis-Chrysanthemat?	6.02	1107	0.02	5.94	1367	0.02

<i>cis</i> -para-Menth-2-en-1-ol	6.18	1118	0.03	8.00	1521	0.01
<i>cis</i> -Limonene oxide	6.38	1130	0.05	6.30	1394	0.05
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.45	1135	0.04	9.41*	1632	29.43
<i>trans</i> -Limonene oxide	6.48	1137	0.03	6.47	1406	0.03
<i>trans</i> -Chrysanthemal	6.60*	1145	0.11	7.11	1454	0.01
exo-Isocitral	6.60*	1145	[0.11]	7.37	1473	0.10
Citronellal	6.74	1154	0.63	6.88	1437	0.62
Borneol	6.86	1162	0.06	9.65*	1652	0.41
Isoneral	6.92*	1166	0.64	7.73	1500	0.60
δ-Terpineol	6.92*	1166	[0.64]	9.41*	1632	[29.43]
Rosefuran oxide	7.06*	1174	0.18	8.44*	1555	0.19
Terpinen-4-ol	7.06*	1174	[0.18]	8.40	1552	0.02
Unknown [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	7.09	1177	0.08	9.47	1638	0.08
Isogeranial	7.21	1184	1.13	8.07	1527	1.12
α-Terpineol	7.28	1189	0.37	9.65*	1652	[0.41]
Methyl salicylate	7.34	1193	0.04	10.29*	1704	0.05
Myrtenol	7.39	1196	0.01	10.74	1742	0.01
<i>trans</i> -Isopiperitenol	7.42	1198	0.02	10.26*	1701	0.05
<i>trans</i> -Piperitol	7.51	1204	0.03	10.26*	1701	[0.05]
Nerol	7.94*†	1233	0.74	10.93	1759	0.59
Citronellol	7.94*†	1233	[0.74]	10.60	1731	0.17
Piperitone	8.14*	1247	29.48	9.76	1661	0.09
Neral	8.14*	1247	[29.48]	9.41*	1632	[29.43]
Geraniol	8.38	1263	1.00	11.50	1808	1.02
Geranial	8.62	1280	38.99	10.05*	1685	39.03
Unknown [m/z 43, 69 (77), 41 (70), 109 (54)... 152 (6)]	8.67	1283	0.10	12.84	1928	0.09
Neric acid	9.47	1334	0.15			
α-Terpinyl acetate	9.66	1347	0.03	9.57	1645	0.04
Unknown [m/z 110, 95 (98), 109 (40), 43 (35), 111 (32)... 153 (13)...]	9.76	1354	0.09	13.22*	1963	0.09
Geranic acid	9.88	1363	0.30	16.45	2284	0.35
α-Copaene	9.99*	1371	0.19	7.02	1446	0.08
Unknown [m/z 81, 59 (94), 41 (74), 85 (40), 43 (55)...]	9.99*	1371	[0.19]	13.24	1966	0.18
Geranyl acetate	10.18	1384	0.06	10.42	1715	0.04
β-Elemene	10.25	1389	0.07	8.28*	1542	0.91
β-Caryophyllene	10.59	1414	0.86	8.28*	1542	[0.91]
Aromadendrene	10.85	1433	0.02	8.44*	1555	[0.19]

α-Humulene	11.04	1448	0.09	9.14	1611	0.08
allo-Aromadendrene	11.14	1455	0.02	8.86	1588	0.01
(E)-β-Farnesene	11.18	1458	0.04	9.41*	1632	[29.43]
Germacrene D	11.42	1475	0.01	9.65*	1652	[0.41]
Bicyclogermacrene	11.62*	1491	0.09	9.92	1674	0.07
Viridiflorene	11.62*	1491	[0.09]	9.52	1642	0.02
β-Bisabolene	11.84	1507	0.04	10.05*	1685	[39.03]
δ-Cadinene	12.00	1520	0.03	10.29*	1704	[0.05]
Unknown [m/z 69, 41 (80), 82 (63), 43 (57), 98 (54)... 220 (t)]	12.07	1525	0.02			
Spathulenol	12.64	1570	0.05	14.24	2061	0.05
Caryophyllene oxide	12.70	1574	0.13	12.61	1907	0.10
Humulene epoxide II	13.02	1600	0.01	13.22*	1963	[0.09]
Unknown [m/z 69, 41 (90), 95 (49), 109 (43), 219 (43), 55 (30)...]	17.85	2031	0.01			
Unknown [m/z 69, 41 (94), 81 (42), 109 (39), 107 (33), 43 (31)...]	17.96	2041	0.01			
Unknown [m/z 69, 41 (73), 81 (55), 109 (26), 95 (25), 94 (20)...]	18.21	2067	0.01			
Unknown [m/z 69, 41 (64), 81 (32), 109 (23), 94 (19), 95 (18)...]	18.57	2103	0.02			
Unknown [m/z 69, 41 (38), 151 (36), 123 (34), 82 (24), 43 (23), 109 (21)...]	18.85	2131	0.07			
<b>Total identified</b>		<b>98.38%</b>			<b>98.09%</b>	
<b>Total reported</b>		<b>98.77%</b>			<b>98.44%</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