Date : 2025-10-03

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25H20-PTH19
Customer Identification : Mandarin Green - Brazil - M10112R
Type : Essential Oil
Source : *Citrus reticulata cv. Mandarine*
Customer : Plant Therapy

Checked an approved by:

Sylvain Mercier, M. Sc., Chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

This report is an update from the first version issued on 2025-08-27 to correct the customer identification.

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

Gas Chromatographic Analysis

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID
ISO
Results : See analysis summary (next page)
Analyst : Jean-Christophe Fortin, M. Sc.
Date : 2025-08-26

Physicochemical data

Refractive index : 1.4757 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Kassandra Baker
Date : 2025-08-21

Conclusion

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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

Analysis Summary - Consolidated Contents

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

Identification	%	Class
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.80	Monoterpene
α-Pinene	2.16	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.26	Monoterpene
β-Pinene	1.62	Monoterpene
Myrcene	1.74	Monoterpene
α-Phellandrene	0.06	Monoterpene
Octanal	0.09	Aliphatic aldehyde
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.39	Monoterpene
para-Cymene	1.06	Monoterpene
β-Phellandrene	0.21	Monoterpene
Limonene	67.86	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	18.54	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.82	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Sabinene hydrate	0.11	Monoterpenic alcohol
Linalool	0.14	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.03	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Epoxyterpinolene	0.03	Monoterpenic ether
Citronellal	0.02	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.05	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α-Terpineol	0.23	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	tr	Unknown
Decanal	0.05	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.02	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
Neral	0.02	Monoterpenic aldehyde

trans-Ascaridole glycol	0.01	Monoterpenic alcohol
Isopiperitenone	0.01	Monoterpenic ketone
Geranial	0.01	Monoterpenic aldehyde
Thymol	0.13	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
α-Copaene	0.02	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Dimethyl anthranilate	0.58	Phenolic ester
Dodecanal	0.02	Aliphatic aldehyde
β-Caryophyllene	0.12	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
(2*E*)-Dodecenal	0.02	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.35	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
(2*E*)-Tetradecenal	0.01	Aliphatic aldehyde
α-Sinensal	0.32	Sesquiterpenic aldehyde
Myristic acid	0.03	Aliphatic acid
Palmitic acid	0.18	Aliphatic acid
Linoleic acid	0.12	Aliphatic acid
Oleic acid	0.12	Aliphatic acid
cis-Vaccenic acid?	0.01	Aliphatic acid
Stearic acid	0.03	Aliphatic acid
Tangeretin	0.27	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.05	Flavonoid
Nobiletin	0.14	Flavonoid
Consolidated total	**99.38**	

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

Note: no correction factor was applied

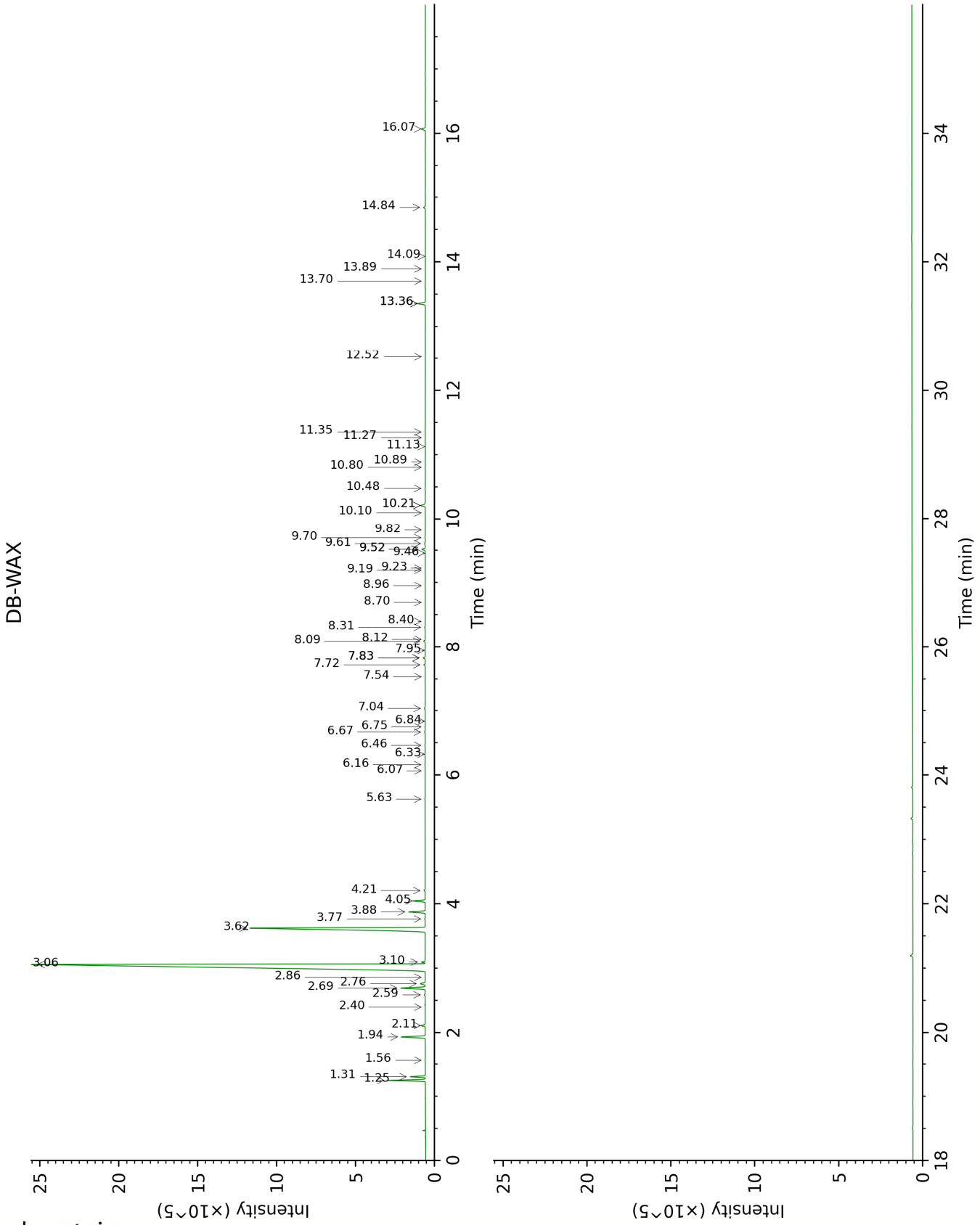
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

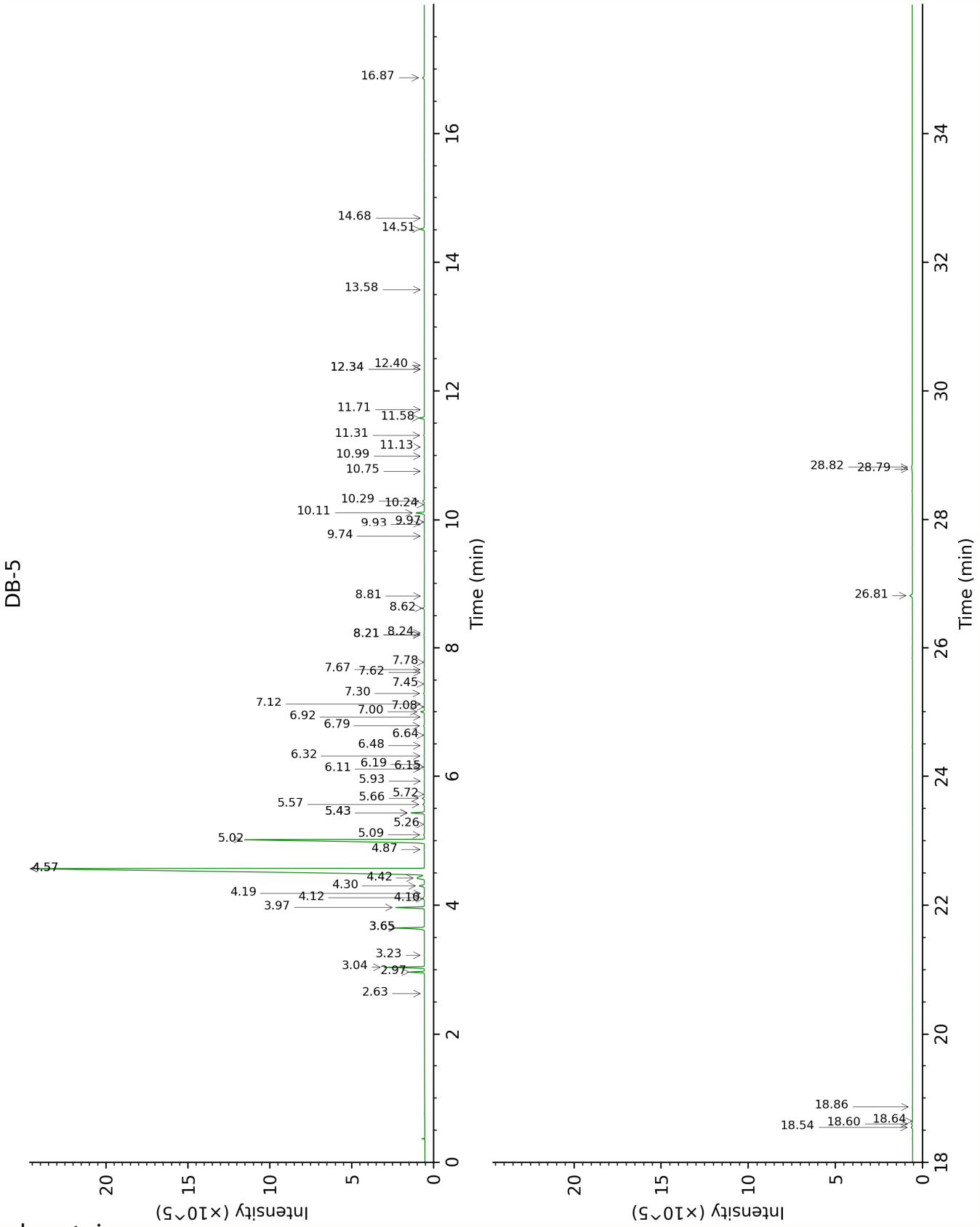
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-WAX
Intensity (×10^5)
Time (min)
16.07
14.84
14.09
13.89
13.70
13.36
12.52
11.35
11.27
11.13
10.80
10.89
10.48
10.21
10.10
9.82
9.70
9.61
9.52
9.46
9.19
9.23
8.96
8.70
8.40
8.31
8.12
8.09
7.95
7.83
7.72
7.54
7.04
6.84
6.75
6.67
6.46
6.33
6.16
6.07
5.63
4.21
4.05
3.88
3.77
3.62
3.10
3.06
2.86
2.76
2.69
2.59
2.40
2.11
1.94
1.56
1.31
1.25


DB-5
16.87
14.68
14.51
13.58
12.34
12.40
11.71
11.58
11.31
11.13
10.99
10.75
10.29
10.24
10.11
9.93
9.97
9.74
8.81
8.62
8.21
8.24
7.67
7.78
7.62
7.45
7.30
7.12
7.08
7.00
6.92
6.79
6.64
6.48
6.32
6.11
6.19
6.15
5.93
5.72
5.66
5.57
5.43
5.26
5.09
5.02
4.87
4.57
4.42
4.30
4.19
4.12
4.10
3.97
3.65
3.23
3.04
2.97
2.63
Time (min)
Intensity (×10^5)
28.82
28.79
26.81
18.86
18.54
18.60
18.64
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Heptanal	2.86	1147.1	tr	2.63	902.8	0.01
α-Thujene	1.31	999.0	0.80	2.97	925.5	0.80
α-Pinene	1.25	989.3	2.17	3.04	930.4	2.16
Camphene	1.56	1025.7	0.02	3.23	942.8	0.02
Sabinene	2.11	1083.2	0.26	3.65*	971.3	[1.89]
β-Pinene	1.94	1064.8	1.62	3.65*	971.3	[1.89]
Myrcene	2.69	1133.7	1.74	3.97	992.7	1.74
α-Phellandrene	2.59	1125.2	0.06	4.10	1001.7	0.06
Octanal	4.21	1250.2	0.08	4.12	1002.8	0.09
Δ3-Carene	2.40	1109.9	0.01	4.19	1007.1	0.01
α-Terpinene	2.76	1139.2	0.39	4.30	1014.5	0.39
para-Cymene	3.88	1225.9	1.10	4.42	1022.2	1.06
β-Phellandrene	3.10	1166.0	0.21	4.57*	1031.5	[68.00]
Limonene	3.06	1163.2	67.86	4.57*	1031.5	[68.00]
(*E*)-β-Ocimene	3.77	1217.9	0.04	4.87	1050.2	0.04
γ-Terpinene	3.62	1207.5	18.59	5.02	1059.9	18.54
cis-Sabinene hydrate	6.67	1430.4	0.05	5.09	1064.7	0.05
Octanol	7.95	1527.2	0.03	5.26	1075.1	0.03
Terpinolene	4.05	1238.4	0.82	5.44*	1086.3	[0.83]
para-Cymenene	6.07	1385.9	0.01	5.44*	1086.3	[0.83]
trans-Sabinene hydrate	7.72	1509.6	0.10	5.57	1094.6	0.11
Linalool	7.83*	1518.1	[0.14]	5.66	1100.6	0.14
Nonanal	5.63	1354.1	0.02	5.72	1104.6	0.03
trans-para-Mentha-2,8-dien-1-ol	8.70	1585.2	0.01	5.93	1117.8	0.01
cis-Limonene oxide	6.16	1392.8	0.02	6.11	1129.9	0.03
cis-para-Mentha-2,8-dien-1-ol	9.23	1627.9	0.01	6.15	1132.0	0.01
trans-Limonene oxide	6.33	1404.8	0.02	6.19	1134.6	0.02
Epoxyterpinolene	6.46	1415.0	0.03	6.32	1143.0	0.03
Citronellal	6.75	1436.5	0.02	6.48	1153.4	0.02
Borneol	9.52*	1651.8	[0.24]	6.64	1163.9	0.02
Terpinen-4-ol	8.31	1555.1	0.05	6.78	1173.3	0.05
para-Cymen-8-ol	11.27	1798.5	0.02	6.92	1182.2	0.03
α-Terpineol	9.52*	1651.8	[0.24]	7.00	1187.4	0.23
Unknown MISC XXXI [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.54	1495.4	0.01	7.08	1192.3	0.01
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39),	7.83*	1518.1	[0.14]	7.12	1195.2	tr

84 (37)...]						
Decanal	7.04	1457.9	0.07	7.30	1206.6	0.05
trans-Carveol	11.13	1786.5	0.01	7.45	1216.5	0.01
Nerol	10.80	1759.1	0.02	7.62	1228.5	0.02
Citronellol	10.48	1731.2	0.02	7.67	1231.6	0.04
Neral	9.19	1625.2	0.01	7.78	1239.3	0.02
trans-Ascaridole glycol	13.89	2040.2	0.01	8.21*	1268.0	[0.04]
Isopiperitenone	10.89	1766.0	0.01	8.21*	1268.0	[0.04]
Geranial	9.82	1676.5	0.01	8.24	1270.1	0.01
Thymol	14.84	2133.6	0.13	8.62	1296.1	0.13
Undecanal	8.40	1562.1	0.01	8.81	1305.8	0.01
α-Copaene	6.84	1443.0	0.01	9.74	1372.1	0.02
Geranyl acetate	10.21*	1708.6	[0.38]	9.93	1385.7	0.01
β-Elemene	8.12	1540.5	0.01	9.97	1388.4	0.01
Dimethyl anthranilate	13.36*	1988.6	[0.59]	10.11	1398.4	0.58
Dodecanal	9.70	1666.5	0.02	10.24	1407.8	0.02
β-Caryophyllene	8.09	1538.3	0.12	10.29	1412.0	0.12
α-Humulene	8.96	1605.8	0.01	10.75	1446.5	0.01
(2*E*)-Dodecenal	11.35	1806.2	0.03	10.99	1464.1	0.02
Germacrene D	9.46	1646.9	0.01	11.13	1474.7	0.01
α-Selinene	9.61	1658.9	0.07	11.31	1488.3	0.07
(3*E*,6*E*)-α-Farnesene	10.21*	1708.6	[0.38]	11.58	1508.8	0.35
δ-Cadinene	10.10	1698.8	0.01	11.71	1518.9	0.01
Spathulenol	14.09	2058.9	0.01	12.34*	1568.5	[0.02]
Germacrene D-4-ol	13.36*	1988.6	[0.59]	12.34*	1568.5	[0.02]
Caryophyllene oxide	12.52	1911.1	0.01	12.40	1573.3	0.01
(2*E*)-Tetradecenal	13.70	2021.8	0.02	13.58	1669.7	0.01
α-Sinensal	16.07	2259.6	0.31	14.51	1749.6	0.32
Myristic acid				14.68	1764.2	0.03
Palmitic acid				16.87	1964.2	0.18
Linoleic acid				18.54	2130.0	0.12
Oleic acid				18.60	2135.6	0.12
cis-Vaccenic acid?				18.64	2140.2	0.01
Stearic acid				18.86	2162.9	0.03
Tangeretin				26.81	3126.1	0.27
3,3',4',5,6,7,8-Heptamethoxyflavone				28.78	3308.5	0.05
Nobiletin				28.82	3310.8	0.14
Total reported		98.48%			99.33%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com