Date : October 22, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21J08-PTH01
Customer identification : Frankincense Serrata Organic - India - F501082012R
Type : Essential oil
Source : *Boswellia serrata*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Pamela Lavoie, M.Sc., Chimiste
Analysis date : October 19, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., Chimiste 2013-174

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Méthode certifiée ISO 17025:2017 Certified method

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

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4598 ± 0.0003 (20 °C; method PC-MAT-016)

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
(*E*)-2-Methyl-1,3-pentadiene	0.01	Alkene
Toluene	0.01	Simple phenolic
Unknown	0.03	Unknown
Hashishene	0.15	Monoterpene
Tricyclene	0.01	Monoterpene
α-Thujene	68.62	Monoterpene
α-Pinene	5.77	Monoterpene
Unknown	0.43	Monoterpene
Camphene	0.09	Monoterpene
α-Fenchene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
meta-Cymene	0.04	Monoterpene
β-Pinene	0.37	Monoterpene
Sabinene	4.65	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	0.90	Monoterpene
2-Carene	0.02	Monoterpene
α-Phellandrene	1.64	Monoterpene
Δ3-Carene	4.10	Monoterpene
α-Terpinene	0.40	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
ortho-Cymene	0.08	Monoterpene
Unknown	0.02	Unknown
para-Cymene	1.53	Monoterpene
Limonene	1.70	Monoterpene
1,8-Cineole	0.57*	Monoterpenic ether
β-Phellandrene	[0.57]*	Monoterpene
Unknown	0.01	Unknown
(*Z*)-β-Ocimene	0.55	Monoterpene
Unknown	0.06	Unknown
(*E*)-β-Ocimene	0.29	Monoterpene
Unknown	0.02	Unknown
γ-Terpinene	0.81	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
para-Cymenene	0.02	Monoterpene
Terpinolene	0.27	Monoterpene
trans-Sabinene hydrate	0.07	Monoterpenic alcohol
α-Thujone	0.02	Monoterpenic ketone
Linalool	0.09	Monoterpenic alcohol
β-Thujone	0.07	Monoterpenic ketone
Unknown	0.15	Oxygenated monoterpene
Dehydrosabinaketone	0.01	Normonoterpenic ketone

cis-para-Menth-2-en-1-ol	0.08	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
Unknown	0.01	Unknown
allo-Ocimene	0.03	Monoterpene
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-Sabinol	0.08	Monoterpenic alcohol
trans-Verbenol	0.03	Monoterpenic alcohol
para-Menth-3-en-8-ol	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Borneol	0.04	Monoterpenic alcohol
α-Phellandren-8-ol	0.02	Monoterpenic alcohol
cis-Sabinol	0.10	Monoterpenic alcohol
Terpinen-4-ol	0.82	Monoterpenic alcohol
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α-Terpineol	0.07	Monoterpenic alcohol
Methylchavicol	1.57	Phenylpropanoid
cis-α-Phellandrene epoxide (IPP vs Me)	0.03	Monoterpenic ether
Verbenone	0.01	Monoterpenic ketone
trans-Piperitol	0.02	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Unknown	0.02	Unknown
Piperitone	0.02	Monoterpenic ketone
Linalyl acetate	0.01	Monoterpenic ester
Unknown	0.04	Oxygenated monoterpene
Bornyl acetate	0.02	Monoterpenic ester
Thymol	0.02	Monoterpenic alcohol
Carvacrol	0.02	Monoterpenic alcohol
para-Menth-5-en-1,2-diol isomer III	0.02	Monoterpenic alcohol
α-Terpinyl acetate	0.05	Monoterpenic ester
α-Copaene	0.11	Sesquiterpene
β-Bourbonene	0.61	Sesquiterpene
1,5-diepi-β-Bourbonene	0.05	Sesquiterpene
β-Cubebene	0.01	Sesquiterpene
β-Elemene	0.08	Sesquiterpene
Methyleugenol	0.15	Phenylpropanoid
β-Ylangene	0.09	Sesquiterpene
β-Copaene	0.08	Sesquiterpene
Isogermacrene D	0.06	Sesquiterpene
cis-Muurola-4(15),5-diene	0.04	Sesquiterpene
γ-Muurolene	0.04	Sesquiterpene
Germacrene D	0.23	Sesquiterpene
Unknown	0.14	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.20	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Elemicin	0.04	Phenylpropanoid
Guaiol	0.01	Sesquiterpenic alcohol
4,10-diepi-Guaiol	0.02	Sesquiterpenic alcohol

Unknown	0.01	Unknown
α-Phellandrene dimer II	0.09	Diterpene
α-Phellandrene dimer III	0.02	Diterpene
(3*E*)-Cembrene A	0.05	Diterpene
Verticilla-4(20),7,11-triene	0.03	Diterpene
Cembrenol	0.03	Diterpenic alcohol
Serratol	0.17	Diterpenic alcohol
Consolidated total	**99.38%**	

*: 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.

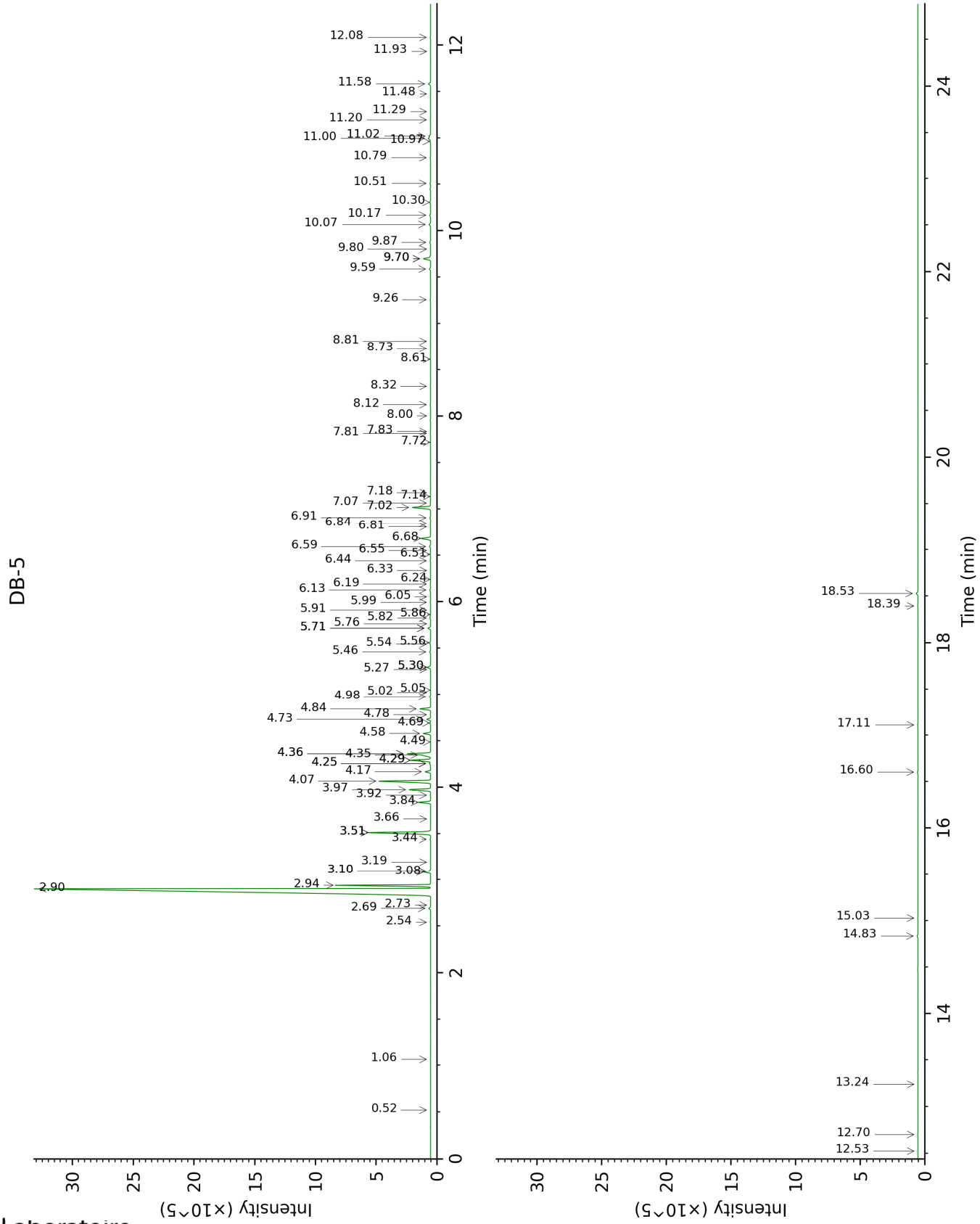
Note: no correction factor was applied

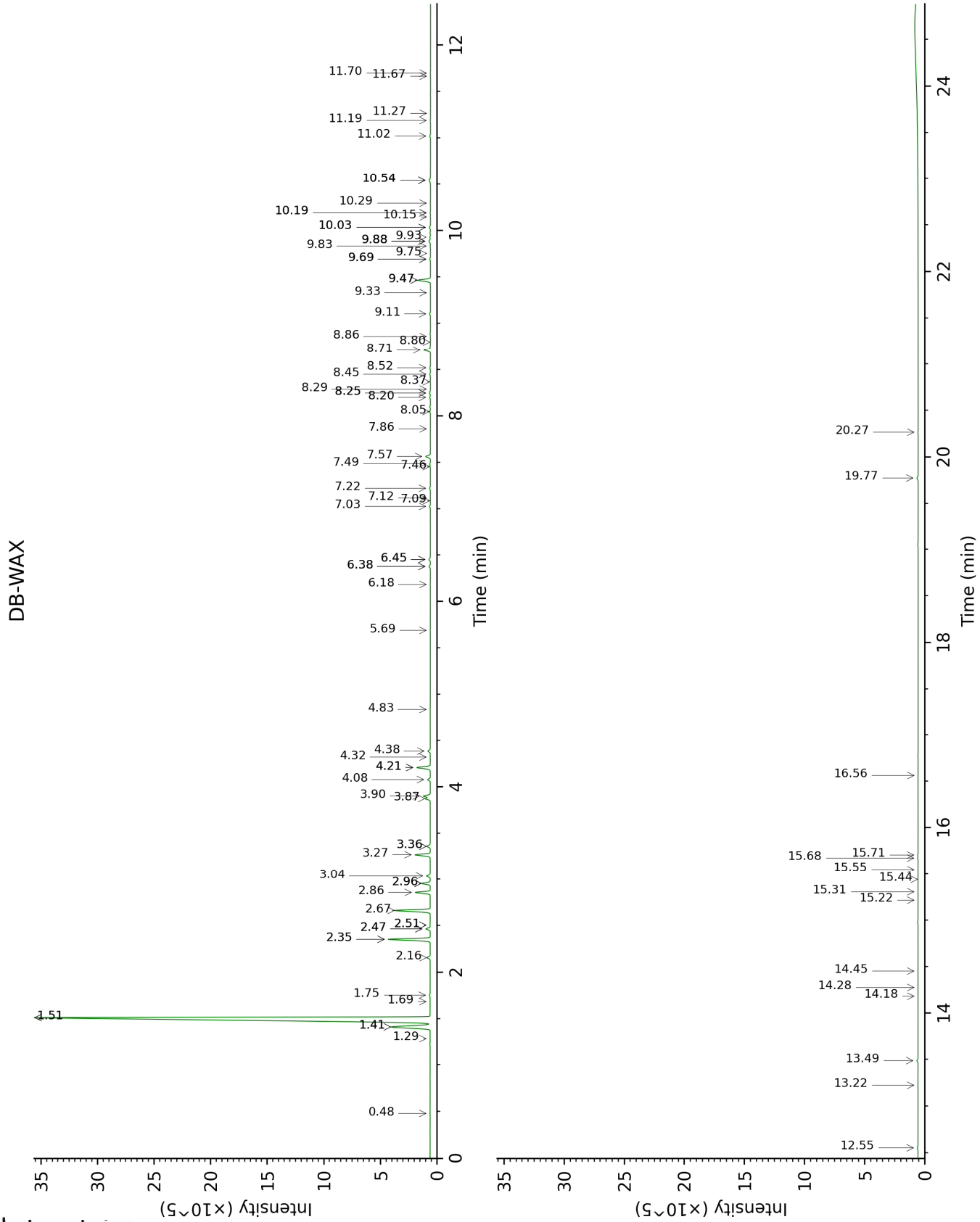
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

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


DB-5
Time (min)
Intensity (×10^5)
12.08
11.93
11.58
11.48
11.29
11.20
11.00
11.02
10.97
10.79
10.51
10.30
10.17
10.07
9.87
9.80
9.70
9.59
9.26
8.81
8.73
8.61
8.32
8.12
8.00
7.83
7.81
7.72
7.18
7.14
7.07
7.02
6.91
6.84
6.81
6.68
6.59
6.55
6.51
6.44
6.33
6.24
6.19
6.13
6.05
5.99
5.91
5.86
5.82
5.76
5.71
5.56
5.54
5.46
5.30
5.27
5.05
5.02
4.98
4.84
4.78
4.73
4.69
4.58
4.49
4.36
4.35
4.29
4.25
4.17
4.07
3.97
3.92
3.84
3.66
3.51
3.44
3.19
3.10
3.08
2.94
2.90
2.73
2.69
2.54
1.06
0.52
18.53
18.39
17.11
16.60
15.03
14.83
13.24
12.70
12.53


DB-WAX
Time (min)
Intensity (×10^5)
11.70
11.67
11.27
11.19
11.02
10.54
10.29
10.19
10.15
10.03
9.93
9.88
9.83
9.75
9.69
9.47
9.33
9.11
8.86
8.80
8.71
8.52
8.45
8.37
8.29
8.25
8.20
8.05
7.86
7.57
7.49
7.46
7.22
7.12
7.09
7.03
6.45
6.38
6.18
5.69
4.83
4.38
4.32
4.21
4.08
3.90
3.87
3.36
3.27
3.04
2.96
2.86
2.67
2.51
2.47
2.35
2.16
1.75
1.69
1.51
1.41
1.29
0.48
20.27
19.77
16.56
15.71
15.68
15.55
15.44
15.31
15.22
14.45
14.28
14.18
13.49
13.22
12.55

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
(*E*)-2-Methyl-1,3-pentadiene	0.52	628	0.01	0.48	758	0.01
Toluene	1.06	757	0.01	1.51*	1000	68.85
Unknown [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20),107 (20), 41 (18), 136 (17), 92 (17)]	2.54	905	0.03			
Hashishene	2.69	915	0.15	1.41*	990	5.87
Tricyclene	2.73	918	0.01	1.29	969	0.01
α-Thujene	2.90	929	68.62	1.51*	1000	[68.85]
α-Pinene	2.94	932	5.77	1.41*	990	[5.87]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.08†	942	0.53	2.47*	1093	0.46
Camphene	3.10*†	942	[0.53]	1.75	1023	0.09
α-Fenchene	3.10*†	942	[0.53]	1.68	1016	0.02
Thuja-2,4(10)-diene	3.19	949	0.01	2.36*	1083	4.66
meta-Cymene	3.44	966	0.04	2.96*	1132	0.92
β-Pinene	3.51*	970	5.05	2.16	1063	0.37
Sabinene	3.51*	970	[5.05]	2.36*	1083	[4.66]
Pseudolimonene isomer	3.66	980	0.01	2.51*	1096	0.02
Myrcene	3.84	992	0.90	2.96*	1132	[0.92]
2-Carene	3.92	998	0.02	2.47*	1093	[0.46]
α-Phellandrene	3.97	1002	1.64	2.86	1124	1.62
Δ3-Carene	4.07	1007	4.10	2.66	1109	4.04
α-Terpinene	4.17	1014	0.40	3.04	1138	0.40
Carvomenthene	4.25*	1019	0.10	2.51*	1096	[0.02]
ortho-Cymene	4.25*	1019	[0.10]	4.21*	1228	1.61
Unknown [m/z 109, 43 (58), 95 (26)... 137 (15)...]	4.29*	1022	1.55	6.38*	1380	0.17
para-Cymene	4.29*	1022	[1.55]	4.21*	1228	[1.61]
Limonene	4.35†	1025	2.27	3.27	1156	1.70
1,8-Cineole	4.36*†	1026	[2.27]	3.36*	1164	0.39
β-Phellandrene	4.36*†	1026	[2.27]	3.36*	1164	[0.39]
Unknown [m/z 67, 93 (70), 82 (70), 121 (42), 107 (39), 91 (33), 79 (28)...]	4.49	1034	0.01			
(*Z*)-β-Ocimene	4.58	1040	0.55	3.87	1204	0.55
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.69	1047	0.06	7.49	1462	0.07
(*E*)-β-Ocimene	4.73	1049	0.29	4.08	1218	0.29

Unknown [m/z 109 , 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...]	4.78	1052	0.02	7.12	1435	0.02
γ-Terpinene	4.84	1056	0.81	3.90	1206	0.79
cis-Sabinene hydrate	4.98	1065	0.08	7.03	1428	0.09
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.02	1068	0.01	4.83	1274	0.02
cis-Linalool oxide (fur.)	5.05	1070	0.01			
Isoterpinolene	5.27	1083	0.01	4.32	1236	0.01
para-Cymenene	5.30*	1085	0.29	6.45*	1386	0.19
Terpinolene	5.30*	1085	[0.29]	4.38	1241	0.27
trans-Sabinene hydrate	5.46	1095	0.07	8.05	1504	0.08
α-Thujone	5.54	1101	0.02	6.18	1366	0.02
Linalool	5.56	1102	0.09	8.20	1516	0.09
β-Thujone	5.72*	1112	0.22	6.45*	1386	[0.19]
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	5.72*	1112	[0.22]	6.38*	1380	[0.17]
Dehydrosabinaketone	5.76	1114	0.01	8.80	1562	0.01
cis-para-Menth-2-en-1-ol	5.82	1118	0.08	8.25*	1519	0.13
α-Campholenal	5.86	1121	0.01	7.09	1433	tr
Unknown [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...]	5.91	1124	0.01			
allo-Ocimene	5.99	1129	0.03	5.69	1331	0.02
trans-Pinocarveol	6.05	1133	0.01	9.33	1603	0.02
trans-Sabinol	6.13	1138	0.08	9.93	1651	0.07
trans-Verbenol	6.19	1142	0.03	9.69*	1632	0.09
para-Menth-3-en-8-ol	6.24	1145	0.01	8.86	1566	0.01
Unknown [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]	6.34	1151	0.01			
Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.44	1158	0.03			
Borneol	6.51	1162	0.04	9.88*	1647	0.24
α-Phellandren-8-ol	6.55	1165	0.02	10.29	1680	0.02
cis-Sabinol	6.59	1168	0.10	11.02	1741	0.09
Terpinen-4-ol	6.68	1173	0.82	8.71	1555	0.79
meta-Cymen-8-ol	6.81	1181	0.02	11.67	1795	0.01
para-Cymen-8-ol	6.84	1184	0.03	11.70	1798	0.03
α-Terpineol	6.91	1188	0.07	9.88*	1647	[0.24]
Methylchavicol	7.02	1195	1.57	9.47*	1614	1.59
cis-α-Phellandrene epoxide (IPP vs Me)	7.07	1198	0.03	11.19	1755	0.04

Verbenone	7.14	1202	0.01	9.75	1637	0.01
trans-Piperitol	7.18	1205	0.02	10.54*	1700	0.25
Carvone	7.72	1241	0.01	10.15	1668	0.02
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.81	1248	0.02	11.27	1761	0.02
Piperitone	7.84	1249	0.02	10.03*	1659	0.16
Linalyl acetate	8.00	1260	0.01	8.29	1522	0.01
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.12	1268	0.04			
Bornyl acetate	8.32	1282	0.02	8.37	1528	0.02
Thymol	8.61	1301	0.02	15.31	2130	0.01
Carvacrol	8.73	1309	0.02	15.55	2154	0.02
para-Menth-5-en-1,2-diol isomer III	8.81	1315	0.02	15.44	2144	0.02
α-Terpinyl acetate	9.26	1346	0.05	9.83	1643	0.05
α-Copaene	9.59	1370	0.11	7.22	1442	0.10
β-Bourbonene	9.70*	1377	0.67	7.56	1468	0.61
1,5-diepi-β-Bourbonene	9.70*	1377	[0.67]	7.46	1460	0.05
β-Cubebene	9.80	1385	0.01	7.86	1490	0.01
β-Elemene	9.87	1390	0.08	8.52	1540	0.08
Methyleugenol	10.07	1403	0.15	13.49	1957	0.14
β-Ylangene	10.17	1411	0.09	8.25*	1519	[0.13]
β-Copaene	10.30	1421	0.08	8.45	1535	0.08
Isogermacrene D	10.51	1436	0.06	9.10	1585	0.10
cis-Muurola-4(15),5-diene	10.79	1457	0.04	9.47*	1614	[1.59]
γ-Muurolene	10.97	1470	0.04	9.69*	1632	[0.09]
Germacrene D	11.00	1473	0.23	9.88*	1647	[0.24]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.02	1474	0.14	10.03*	1659	[0.16]
Bicyclogermacrene	11.20	1488	0.03	10.19*	1672	0.04
α-Muurolene	11.29	1494	0.01	10.19*	1672	[0.04]
γ-Cadinene	11.48	1508	0.01	10.54*	1700	[0.25]
δ-Cadinene	11.58	1517	0.20	10.54*	1700	[0.25]
α-Elemol	11.93	1544	0.01	14.18	2022	0.01
Elemicin	12.08	1556	0.04	15.68	2167	0.04
Guaiol	12.53	1591	0.01	14.28	2031	0.01
4,10-diepi-Guaiol	12.70	1605	0.02	14.45	2048	0.02
Unknown [m/z 214, 161 (86), 173 (82), 172 (79), 199 (75), 189 (75), 204 (70)...]	13.24	1649	0.01	15.22	2121	0.01
α-Phellandrene dimer II	14.83	1785	0.09	12.56	1873	0.09
α-Phellandrene dimer III	15.03	1801	0.02	13.22	1933	0.02
(3*E*)-Cembrene A	16.60	1946	0.05	15.71	2170	0.05

Verticilla-4(20),7,11-triene	17.11	1994	0.03	16.56	2257	0.01
Cembrenol	18.40	2123	0.03	20.27	2667	0.03
Serratol	18.53	2136	0.17	19.77	2610	0.17
Total identified		**98.51%**			**98.96%**	
Total reported		**99.44%**			**99.09%**	

*: 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

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