Date : January 18, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22A14-PTH06
Customer identification : Frankincense Serrata - India - F40109R
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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Analysis date : January 17, 2022

Checked and approved by :

Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4584 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

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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	tr	Alkene
Toluene	0.01	Simple phenolic
Unknown	tr	Unknown
Unknown	0.01	Monoterpene
Unknown	0.02	Unknown
Hashishene	0.11	Monoterpene
Tricyclene	tr	Monoterpene
α-Thujene	72.44	Monoterpene
α-Pinene	4.96	Monoterpene
Unknown	0.28	Monoterpene
Camphene	0.07	Monoterpene
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
meta-Cymene	0.03	Monoterpene
β-Pinene	0.33	Monoterpene
Sabinene	6.31	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	0.76	Monoterpene
2-Carene	0.01	Monoterpene
α-Phellandrene	0.90	Monoterpene
Δ3-Carene	2.68	Monoterpene
α-Terpinene	0.29	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
ortho-Cymene	0.07	Monoterpene
para-Cymene	1.35	Monoterpene
β-Phellandrene	0.55*	Monoterpene
1,8-Cineole	0.55*	Monoterpenic ether
Limonene	2.00	Monoterpene
(*Z*)-β-Ocimene	0.38	Monoterpene
Unknown	0.11	Unknown
(*E*)-β-Ocimene	0.21	Monoterpene
Unknown	0.01	Unknown
γ-Terpinene	0.61	Monoterpene
cis-Sabinene hydrate	0.12	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Terpinolene	0.21	Monoterpene
para-Cymenene	0.22	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
trans-Sabinene hydrate	0.11	Monoterpenic alcohol
Linalool	0.02	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
β-Thujone	tr	Monoterpenic ketone
Unknown	0.26	Oxygenated monoterpene
Dehydrosabinaketone	0.01	Normonoterpenic ketone

cis-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
Unknown	0.01	Unknown
allo-Ocimene	0.02	Monoterpene
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-Sabinol	0.06	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
trans-Verbenol	0.03	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Borneol	0.04	Monoterpenic alcohol
α-Phellandren-8-ol	0.01	Monoterpenic alcohol
cis-Sabinol	0.11	Monoterpenic alcohol
Terpinen-4-ol	0.45	Monoterpenic alcohol
meta-Cymen-8-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.02	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde
Methylchavicol	1.52	Phenylpropanoid
cis-α-Phellandrene epoxide (iPr vs Me)	0.03	Monoterpenic ether
Verbenone	0.02	Monoterpenic ketone
trans-Piperitol	0.02	Monoterpenic alcohol
trans-Carveol	0.01	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Piperitone	0.02	Monoterpenic ketone
Unknown	0.02	Unknown
Linalyl acetate	0.01	Monoterpenic ester
Unknown	0.03	Oxygenated monoterpene
Bornyl acetate	0.02	Monoterpenic ester
Carvacrol	0.01	Monoterpenic alcohol
α-Terpinyl acetate	0.04	Monoterpenic ester
α-Cubebene	0.01	Sesquiterpene
α-Ylangene	0.01	Sesquiterpene
α-Copaene	0.09	Sesquiterpene
1,5-diepi-β-Bourbonene	0.03	Sesquiterpene
β-Bourbonene	0.45	Sesquiterpene
β-Cubebene	0.01	Sesquiterpene
β-Elemene	0.01	Sesquiterpene
β-Longipinene	0.07	Sesquiterpene
Methyleugenol	0.10	Phenylpropanoid
β-Ylangene	0.06	Sesquiterpene
β-Copaene	0.05	Sesquiterpene
trans-α-Bergamotene	0.04	Sesquiterpene
Isogermacrene D	0.04	Sesquiterpene
cis-Muurola-4(15),5-diene	0.03	Sesquiterpene
γ-Muurolene	0.03	Sesquiterpene
Germacrene D	0.18	Sesquiterpene
Unknown	0.12	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene

γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.06	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Elemicin	0.03	Phenylpropanoid
Viridiflorol	0.01	Sesquiterpenic alcohol
α-Phellandrene dimer II	0.03	Diterpene
α-Phellandrene dimer III	0.01	Diterpene
(3*E*)-Cembrene A	0.03	Diterpene
Verticilla-4(20),7,11-triene	0.02	Diterpene
Cembrenol	0.02	Diterpenic alcohol
Serratol	0.09	Diterpenic alcohol
Consolidated total	**99.88%**	

*: 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.

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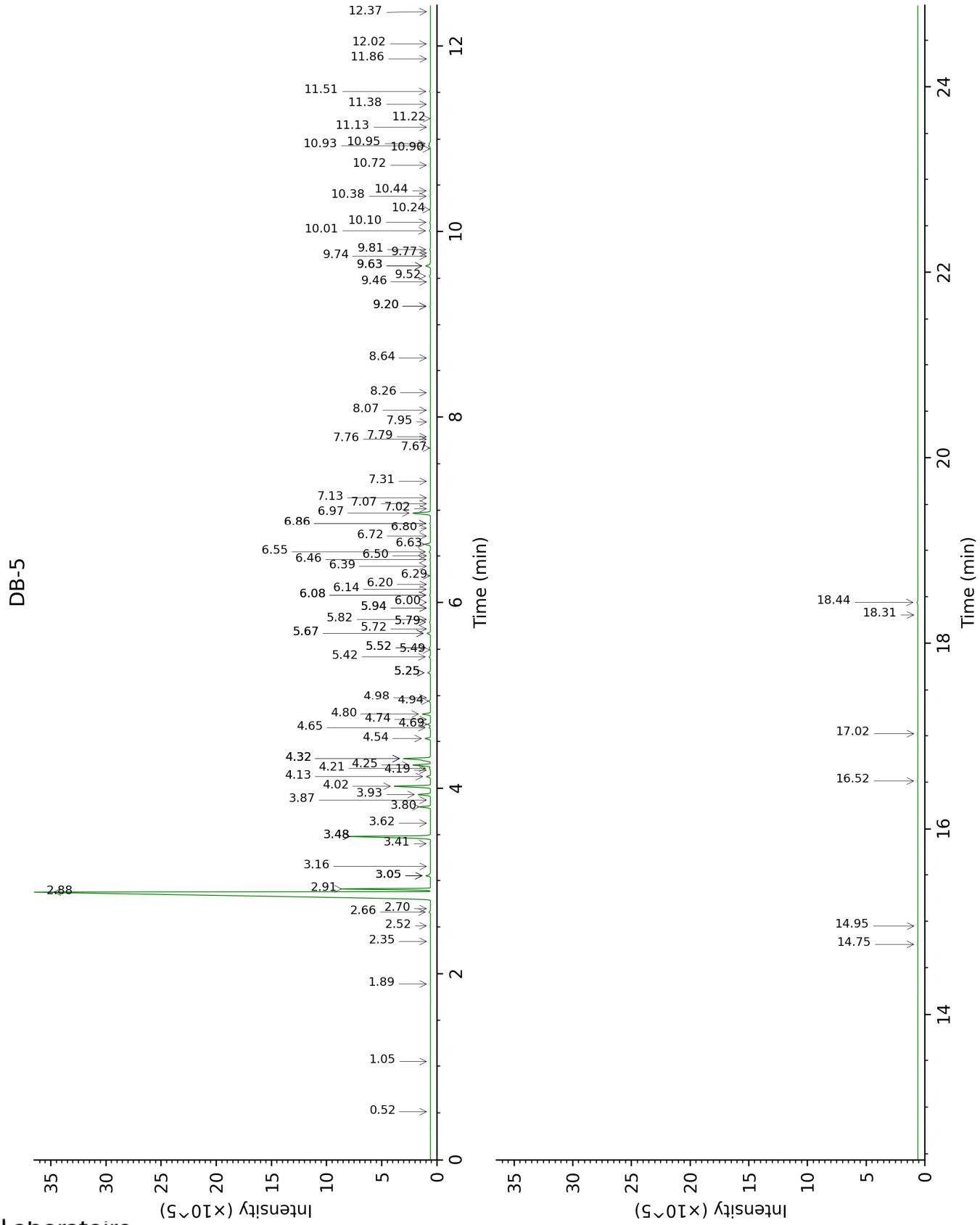
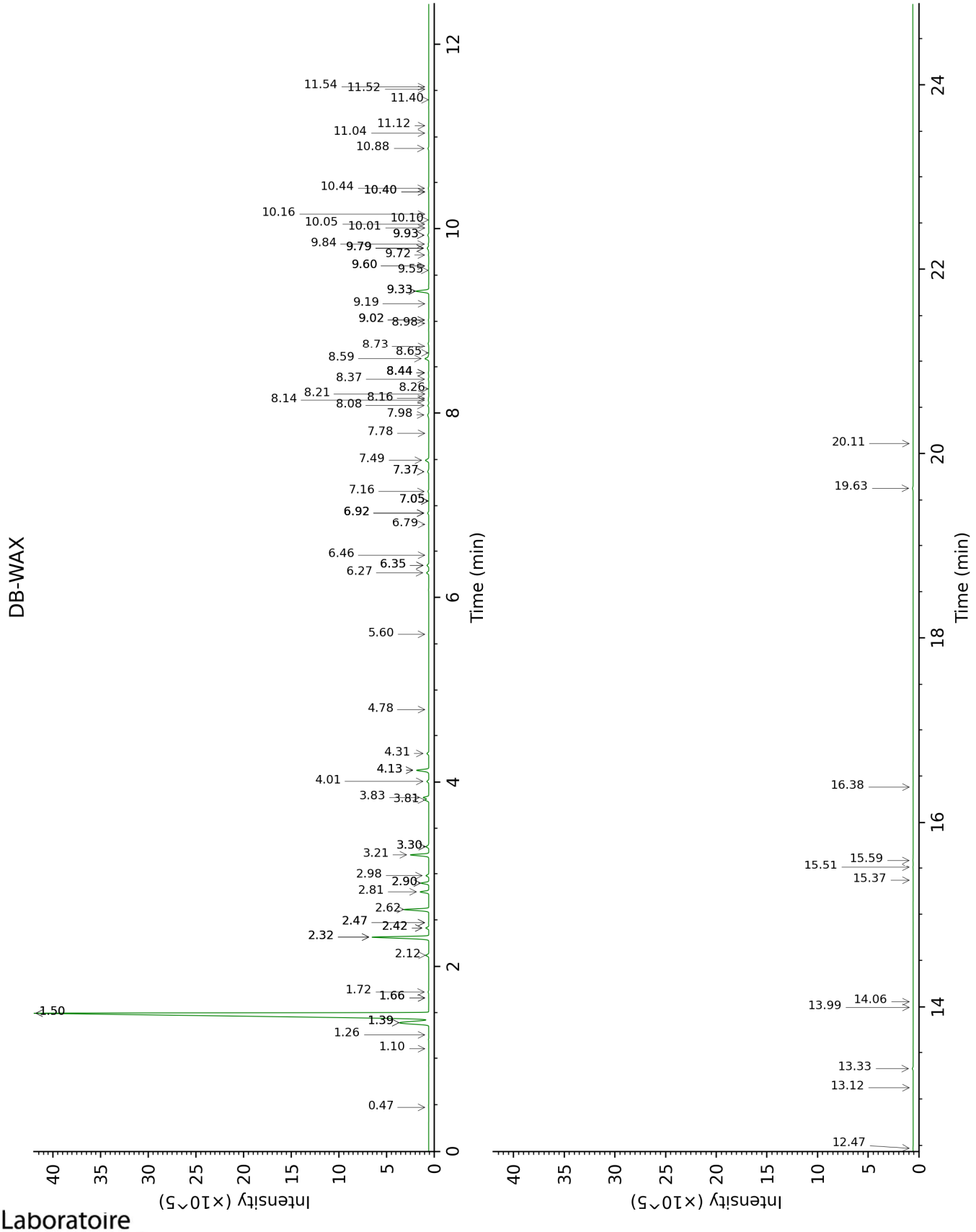

DB-5
12.37
12.02
11.86
11.51
11.38
11.22
11.13
10.93
10.95
10.90
10.72
10.38
10.44
10.24
10.10
10.01
9.74
9.81
9.77
9.63
9.52
9.46
9.20
8.64
8.26
8.07
7.95
7.76
7.79
7.67
7.31
7.13
7.07
7.02
6.97
6.86
6.80
6.72
6.63
6.55
6.46
6.50
6.39
6.29
6.08
6.14
6.20
6.00
5.94
5.82
5.79
5.72
5.67
5.52
5.49
5.42
5.25
4.98
4.94
4.80
4.74
4.69
4.65
4.54
4.32
4.21
4.25
4.19
4.13
4.02
3.93
3.87
3.80
3.62
3.48
3.41
3.16
3.05
2.91
2.88
2.66
2.70
2.52
2.35
1.89
1.05
0.52
Time (min)
Intensity (×10^5)
18.44
18.31
17.02
16.52
14.95
14.75
Time (min)
Intensity (×10^5)



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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	tr	0.48	765	tr
Toluene	1.05	757	0.01	1.50*	1004	72.39
Unknown [m/z 109, 43 (28), 124 (28), 41 (14), 55 (11), 79 (9), 81 (8)...]	1.89	851	tr	1.66*	1021	0.01
Unknown [m/z 93, 91 (75), 121 (61), 77 (58), 79 (38), 92 (26), 43 (24), 41 (23), 105 (22),107 (19), 136 (16)]	2.35	891	0.01	1.10	947	tr
Unknown [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20),107 (20), 41 (18), 136 (17), 92 (17)]	2.52	906	0.02			
Hashishene	2.66	916	0.11	1.39*	994	5.01
Tricyclene	2.70	918	tr	1.26	972	0.01
α-Thujene	2.88	930	72.44	1.50*	1004	[72.39]
α-Pinene	2.91	933	4.96	1.39*	994	[5.01]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.05*†	942	0.34	2.42*	1096	0.30
Camphene	3.05*†	942	[0.34]	1.72	1027	0.07
α-Fenchene	3.05*†	942	[0.34]	1.66*	1021	[0.01]
Thuja-2,4(10)-diene	3.16	950	0.01	2.32*	1086	6.32
meta-Cymene	3.41	966	0.03	2.90*	1134	0.78
β-Pinene	3.48*	971	6.65	2.12	1066	0.33
Sabinene	3.48*	971	[6.65]	2.32*	1086	[6.32]
Pseudolimonene isomer	3.62	981	0.01	2.47*	1100	0.02
Myrcene	3.80	993	0.76	2.90*	1134	[0.78]
2-Carene	3.87	998	0.01	2.42*	1096	[0.30]
α-Phellandrene	3.93	1002	0.90	2.81	1126	0.90
Δ3-Carene	4.02	1008	2.68	2.62	1111	2.68
α-Terpinene	4.13	1014	0.29	2.98	1140	0.29
Carvomenthene	4.19	1019	0.01	2.47*	1100	[0.02]
ortho-Cymene	4.22	1020	0.07	4.13*	1229	1.43
para-Cymene	4.25	1022	1.35	4.13*	1229	[1.43]
β-Phellandrene	4.32*	1026	2.55	3.30*	1166	0.33
1,8-Cineole	4.32*	1026	[2.55]	3.30*	1166	[0.33]
Limonene	4.32*	1026	[2.55]	3.21	1159	2.00
(*Z*)-β-Ocimene	4.54	1040	0.38	3.81	1205	0.38
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.65	1048	0.11	7.37*	1462	0.14

(*E*)-β-Ocimene	4.69	1050	0.21	4.01	1220	0.21
Unknown [m/z 109 , 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...]	4.74	1053	0.01	6.92*	1429	0.13
γ-Terpinene	4.80	1057	0.61	3.83	1207	0.61
cis-Sabinene hydrate	4.94	1066	0.12	6.92*	1429	[0.13]
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.98	1068	0.01	4.78	1278	0.01
Terpinolene	5.25*	1085	0.22	4.31	1242	0.21
para-Cymenene	5.25*	1085	[0.22]	6.35*	1387	0.22
trans-Linalool oxide (fur.)	5.25*	1085	[0.22]	6.92*	1429	[0.13]
trans-Sabinene hydrate	5.42	1096	0.11	7.98	1508	0.17
Linalool	5.49	1101	0.02	8.08	1516	0.10
Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	5.52*	1102	0.09	8.44*	1544	0.05
Unknown [m/z 43, 59 (37), 79 (33), 91 (32), 119 (31)...]	5.52*	1102	[0.09]	9.02*	1588	0.05
β-Thujone	5.67*	1112	0.26	6.35*	1387	[0.22]
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	5.67*	1112	[0.26]	6.27	1381	0.26
Dehydrosabinaketone	5.72	1116	0.01	8.65	1560	0.02
cis-para-Menth-2-en-1-ol	5.79*	1120	0.10	8.14	1521	0.05
α-Campholenal	5.79*	1120	[0.10]	7.05*	1439	0.03
Unknown [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...]	5.82	1122	0.01			
allo-Ocimene	5.94*	1130	0.02	5.60	1333	0.02
cis-Limonene oxide	5.94*	1130	[0.02]	6.46	1394	0.02
trans-Pinocarveol	6.00	1134	0.01	9.19	1602	0.01
trans-Sabinol	6.08*	1139	0.08	9.84	1654	0.06
trans-para-Menth-2-en-1-ol	6.08*	1139	[0.08]	8.98	1586	0.02
trans-Verbenol	6.14	1143	0.03	9.55	1632	0.03
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.20	1146	0.01	7.05*	1439	[0.03]
Unknown [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]	6.29	1152	0.01			

Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.39	1159	0.02			
Borneol	6.46	1163	0.04	9.79*	1651	0.24
α-Phellandren-8-ol	6.50	1166	0.01	10.16	1681	0.02
cis-Sabinol	6.55	1169	0.11	10.88	1741	0.10
Terpinen-4-ol	6.63	1174	0.45	8.59	1555	0.51
meta-Cymen-8-ol	6.72	1180	0.01	11.52	1795	0.01
para-Cymen-8-ol	6.80	1185	0.02	11.54	1798	0.02
α-Terpineol	6.86*	1189	0.05	9.79*	1651	[0.24]
Myrtenal	6.86*	1189	[0.05]	8.73	1566	0.01
Methylchavicol	6.97	1196	1.52	9.33*	1613	1.55
cis-α-Phellandrene epoxide (iPr vs Me)	7.02	1199	0.03	11.04	1755	0.03
Verbenone	7.07	1202	0.02	9.60*	1635	0.04
trans-Piperitol	7.13	1206	0.02	10.40*	1700	0.02
trans-Carveol	7.31	1218	0.01	11.40	1786	0.01
Carvone	7.67	1242	0.01	10.01	1669	0.01
Piperitone	7.76	1249	0.02	9.93*	1662	0.13
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.79	1251	0.02	11.12	1762	0.02
Linalyl acetate	7.95	1261	0.01	8.21	1526	0.01
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.08	1270	0.03			
Bornyl acetate	8.26	1282	0.02	8.26	1530	0.02
Carvacrol	8.64	1308	0.01	15.37	2156	0.01
α-Terpinyl acetate	9.20*	1347	0.05	9.72	1645	0.04
α-Cubebene	9.20*	1347	[0.05]	6.79	1419	0.01
α-Ylangene	9.46	1366	0.01	7.05*	1439	[0.03]
α-Copaene	9.52	1370	0.09	7.16	1446	0.10
1,5-diepi-β-Bourbonene	9.63*	1378	0.44	7.37*	1462	[0.14]
β-Bourbonene	9.63*	1378	[0.44]	7.49	1471	0.45
β-Cubebene	9.74	1386	0.01	7.78	1493	0.01
β-Elemene	9.77	1388	0.01	8.44*	1544	[0.05]
β-Longipinene	9.81	1390	0.07			
Methyleugenol	10.01	1405	0.10	13.33	1958	0.10
β-Ylangene	10.10	1412	0.06	8.16	1522	0.04
β-Copaene	10.24	1422	0.05	8.37	1538	0.06
trans-α-Bergamotene	10.38	1432	0.04	8.44*	1544	[0.05]
Isogermacrene D	10.44	1437	0.04	9.02*	1588	[0.05]
cis-Muurola-4(15),5-diene	10.72	1458	0.03	9.33*	1613	[1.55]
γ-Muurolene	10.90	1471	0.03	9.60*	1635	[0.04]
Germacrene D	10.93	1474	0.18	9.79*	1651	[0.24]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	10.95	1475	0.12	9.93*	1662	[0.13]
Bicyclogermacrene	11.13	1488	0.02	10.05	1672	0.03

α-Muurolene	11.22	1495	0.01	10.10	1676	0.01
γ-Cadinene	11.38	1507	0.01	10.40*	1700	[0.02]
δ-Cadinene	11.51	1518	0.06	10.44	1704	0.06
α-Elemol	11.86	1546	0.01	14.06	2027	0.01
Elemicin	12.02	1558	0.03	15.51	2170	0.02
Viridiflorol	12.37	1586	0.01	14.00	2021	0.01
α-Phellandrene dimer II	14.75	1786	0.03	12.47	1880	0.03
α-Phellandrene dimer III	14.95	1803	0.01	13.12	1940	0.01
(3*E*)-Cembrene A	16.52	1947	0.03	15.59	2178	0.03
Verticilla-4(20),7,11-triene	17.02	1996	0.02	16.38	2260	0.01
Cembrenol	18.31	2124	0.02	20.11	2679	0.02
Serratol	18.44	2138	0.09	19.63	2622	0.09
Total identified		**99.39%**			**99.25%**	
Total reported		**99.75%**			**99.54%**	

*: 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