Date : June 18, 2019

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 19F10-PTH11-1-SCC
Customer identification : Frankincense Serrata Organic - India - F5010584R
Type : Essential oil
Source : *Boswellia serrata*
Customer : Plant Therapy

Analysis

Method: PC-PA-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 : June 16, 2019

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: 1.4598 ± 0.0003 (20 °C)

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	%	Classe
3-Methyl-2-butanone	tr	Aliphatic ketone
Toluene	0.01	Simple phenolic
Unknown	0.01	Monoterpene
Unknown	0.02	Unknown
Hashishene	0.13	Monoterpene
Tricyclene	0.01	Monoterpene
α-Thujene	68.26	Monoterpene
α-Pinene	5.17	Monoterpene
Unknown	0.53	Monoterpene
Camphene	0.06	Monoterpene
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
meta-Cymene	0.04	Monoterpene
Sabinene	5.47	Monoterpene
β-Pinene	0.33	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Myrcene	0.98	Monoterpene
2-Carene	0.01	Monoterpene
α-Phellandrene	1.93	Monoterpene
Δ3-Carene	3.61	Monoterpene
α-Terpinene	0.42	Monoterpene
ortho-Cymene	0.09	Monoterpene
para-Cymene	1.60	Monoterpene
Unknown	0.14	Unknown
Limonene	1.96	Monoterpene
1,8-Cineole	0.46*	Monoterpenic ether
β-Phellandrene	[0.46]*	Monoterpene
(*Z*)-β-Ocimene	0.48	Monoterpene
Unknown	0.07	Unknown
(*E*)-β-Ocimene	0.26	Monoterpene
γ-Terpinene	0.80	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Isoterpinolene	0.01	Monoterpene
para-Cymenene	0.02	Monoterpene
Terpinolene	0.28	Monoterpene
trans-Sabinene hydrate	0.06	Monoterpenic alcohol
Unknown	0.01	Unknown
Linalool	0.12	Monoterpenic alcohol
β-Thujone	0.19	Monoterpenic ketone
Unknown	0.05	Oxygenated monoterpene
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Dehydrosabinaketone	0.04	Normonoterpenic ketone
α-Campholenal	0.01	Monoterpenic aldehyde
allo-Ocimene	0.02	Monoterpene
trans-Pinocarveol	0.01	Monoterpenic alcohol

trans-Sabinol	0.07	Monoterpenic alcohol
trans-Verbenol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Borneol	0.04	Monoterpenic alcohol
α-Phellandren-8-ol	0.01	Monoterpenic alcohol
Umbellulone	0.02	Monoterpenic ketone
cis-Sabinol	0.08	Monoterpenic alcohol
Terpinen-4-ol	0.61	Monoterpenic alcohol
meta-Cymen-8-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.05	Monoterpenic alcohol
Methylchavicol	1.89	Phenylpropanoid
α-Phellandrene epoxide	0.02	Monoterpenic ether
Cuminal	0.02	Monoterpenic aldehyde
Carvotanacetone	0.01	Monoterpenic ketone
Linalyl acetate	0.03	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Thymol	0.01	Monoterpenic alcohol
Carvacrol	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
α-Terpinyl acetate	0.05	Monoterpenic ester
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.11	Sesquiterpene
β-Bourbonene	0.57	Sesquiterpene
1,5-diepi-β-Bourbonene	0.07	Sesquiterpene
β-Elemene	0.01	Sesquiterpene
Methyleugenol	0.13	Phenylpropanoid
β-Caryophyllene	0.03	Sesquiterpene
β-Ylangene	0.06	Sesquiterpene
β-Copaene	0.07	Sesquiterpene
trans-α-Bergamotene	0.06	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
cis-Muurola-4(15),5-diene	0.04	Sesquiterpene
γ-Muurolene	0.04	Sesquiterpene
Germacrene D	0.22	Sesquiterpene
Unknown	0.14	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.17	Sesquiterpene
Elemicin	0.03	Phenylpropanoid
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.01	Unknown
α-Phellandrene dimer II	0.06	Diterpene
α-Phellandrene dimer III	0.03	Diterpene
α-Phellandrene dimer IV	0.01	Diterpene
(3*E*)-Cembrene A	0.04	Diterpene
Verticilla-4(20),7,11-triene	0.04	Diterpene
Cembrenol	0.03	Diterpenic alcohol
Serratol	0.16	Diterpenic alcohol
Consolidated total	**99.05%**	

*: 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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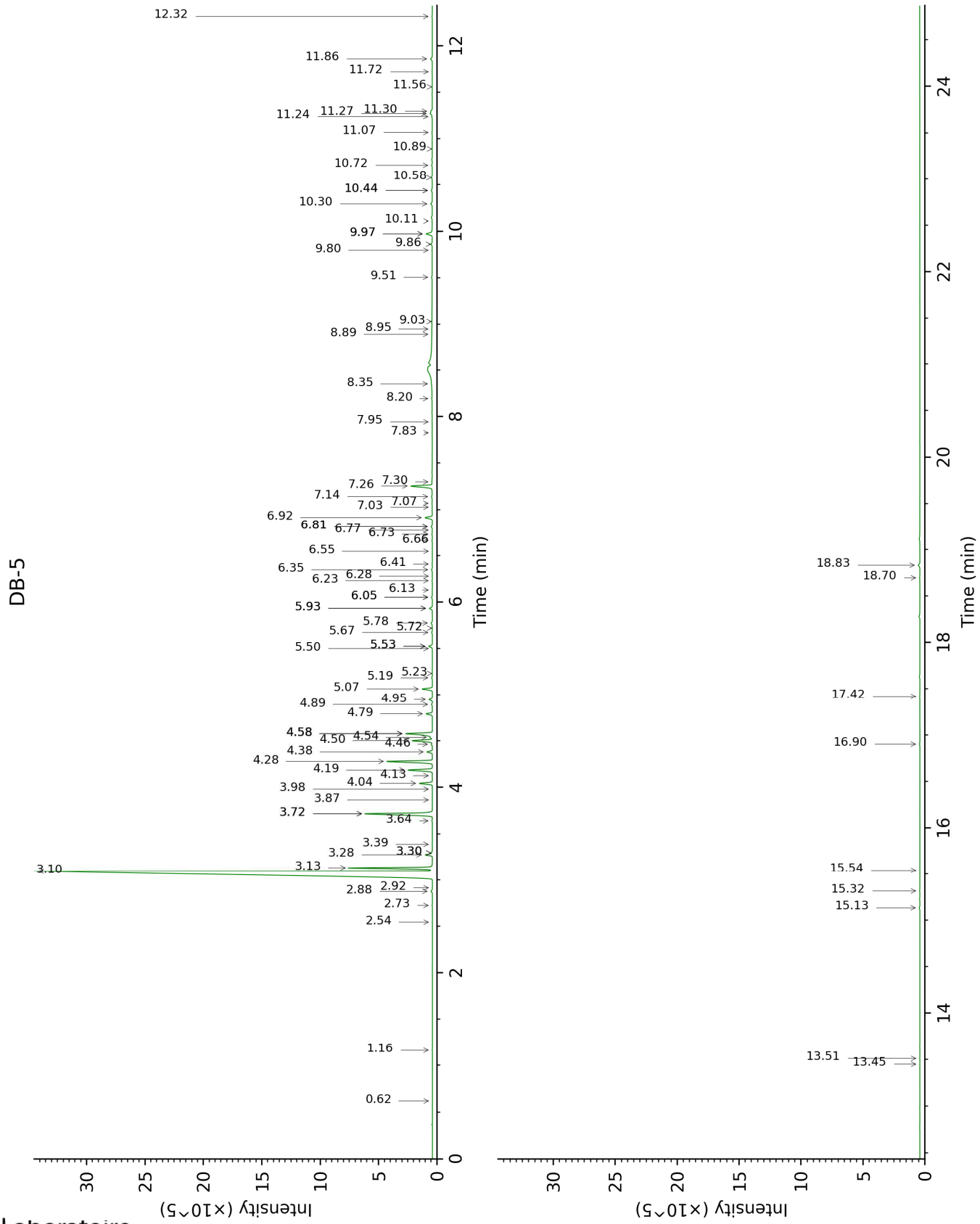
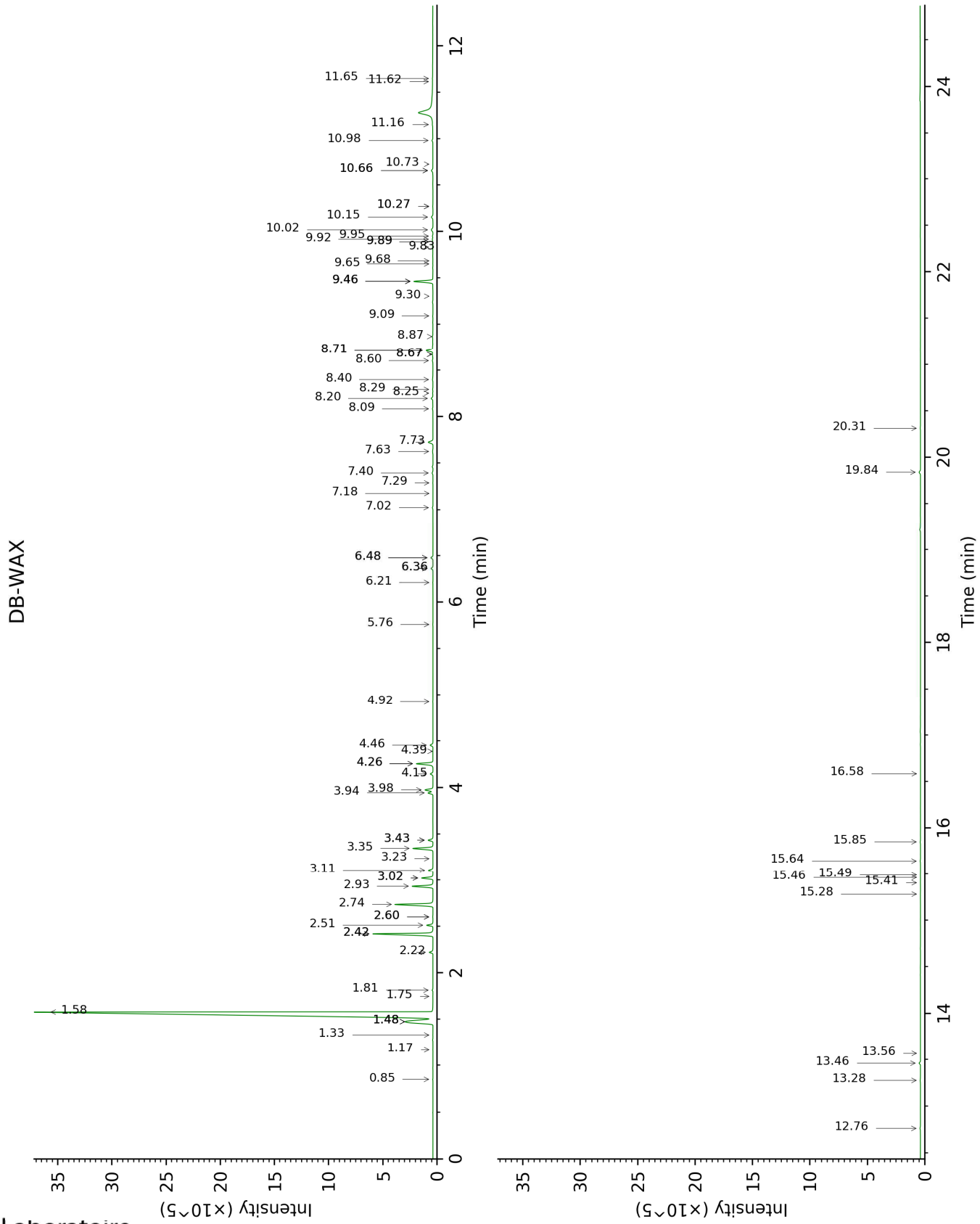

DB-5
12.32
11.86
11.72
11.56
11.24
11.27
11.30
11.07
10.89
10.72
10.58
10.44
10.30
10.11
9.97
9.86
9.80
9.51
9.03
8.95
8.89
8.35
8.20
7.95
7.83
7.30
7.26
7.14
7.07
7.03
6.92
6.81
6.77
6.73
6.66
6.55
6.41
6.35
6.28
6.23
6.13
6.05
5.93
5.78
5.72
5.67
5.53
5.50
5.23
5.19
5.07
4.95
4.89
4.79
4.58
4.54
4.50
4.46
4.38
4.28
4.19
4.13
4.04
3.98
3.87
3.72
3.64
3.39
3.30
3.28
3.13
3.10
2.92
2.88
2.73
2.54
1.16
0.62
Time (min)
Intensity (×10^5)
18.83
18.70
17.42
16.90
15.54
15.32
15.13
13.51
13.45
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
11.65
11.62
11.16
10.98
10.73
10.66
10.27
10.15
10.02
9.92
9.95
9.89
9.83
9.65
9.68
9.46
9.30
9.09
8.87
8.71
8.67
8.60
8.40
8.29
8.25
8.20
8.09
7.73
7.63
7.40
7.29
7.18
7.02
6.48
6.36
6.21
5.76
4.92
4.46
4.39
4.26
4.15
3.94
3.98
3.43
3.35
3.23
3.11
3.02
2.93
2.74
2.60
2.51
2.42
2.22
1.81
1.75
1.58
1.48
1.33
1.17
0.85
20.31
19.84
16.58
15.85
15.64
15.46
15.49
15.41
15.28
13.56
13.46
13.28
12.76

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
3-Methyl-2-butanone	0.62	645	tr	0.85	903	0.01
Toluene	1.16	760	0.01	1.48*	998	5.04
Unknown [m/z 93, 91 (75), 121 (61), 77 (58), 79 (38), 92 (26), 43 (24), 41 (23), 105 (22),107 (19), 136 (16)]	2.54	890	0.01	1.17	951	0.01
Unknown [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20),107 (20), 41 (18), 136 (17), 92 (17)]	2.72	904	0.02			
Hashishene	2.88	914	0.13	1.48*	998	[5.04]
Tricyclene	2.92	917	0.01	1.33	976	0.01
α-Thujene	3.10	929	68.26	1.58	1008	68.54
α-Pinene	3.14	931	5.17	1.48*	998	[5.04]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.28	941	0.53	2.51	1097	0.53
Camphene	3.30*	942	0.06	1.81	1030	0.06
α-Fenchene	3.30*	942	[0.06]	1.75	1024	tr
Thuja-2,4(10)-diene	3.39	948	0.02	2.42*	1088	5.50
meta-Cymene	3.64	965	0.04	3.02*	1137	1.02
Sabinene	3.72*	970	5.81	2.42*	1088	[5.50]
β-Pinene	3.72*	970	[5.81]	2.22	1069	0.33
Pseudolimonene isomer	3.87	979	0.01	2.60*	1104	0.02
Dehydro-1,8-cineole	3.98	987	0.01	3.23	1153	0.01
Myrcene	4.04	991	0.98	3.02*	1137	[1.02]
2-Carene	4.13	996	0.01	2.60*	1104	[0.02]
α-Phellandrene	4.19	1000	1.93	2.93	1130	1.94
Δ3-Carene	4.28	1006	3.61	2.74	1114	3.62
α-Terpinene	4.38	1013	0.42	3.11	1144	0.42
ortho-Cymene	4.46	1018	0.09	4.26*	1232	1.68
para-Cymene	4.50	1020	1.60	4.26*	1232	[1.68]
Unknown [m/z 109, 43 (58), 95 (26)... 137 (15)...]	4.54†	1022	2.55	6.36*	1376	0.19
Limonene	4.58*†	1025	[2.55]	3.35	1162	1.96
1,8-Cineole	4.58*†	1025	[2.55]	3.43*	1169	0.46
β-Phellandrene	4.58*†	1025	[2.55]	3.43*	1169	[0.46]
(*Z*)-β-Ocimene	4.79	1038	0.48	3.94	1208	0.47
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.89	1045	0.07			
(*E*)-β-Ocimene	4.95	1048	0.26	4.15	1224	0.26
γ-Terpinene	5.07	1055	0.80	3.98	1211	0.82

cis-Sabinene hydrate	5.19	1063	0.05	7.02	1425	0.07
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.23	1066	0.01	4.92	1282	0.02
Isoterpinolene	5.50	1083	0.01	4.39	1242	0.02
para-Cymenene	5.53*	1084	0.31	6.48*	1385	0.22
Terpinolene	5.53*	1084	[0.31]	4.46	1247	0.28
trans-Sabinene hydrate	5.67	1094	0.06	8.09	1505	0.05
Unknown [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	5.72	1097	0.01	6.21	1366	0.02
Linalool	5.78	1100	0.12	8.20	1514	0.17
β-Thujone	5.93*	1110	0.24	6.48*	1385	[0.22]
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	5.93*	1110	[0.24]	6.36*	1376	[0.19]
cis-para-Menth-2-en-1-ol	6.05*	1118	0.08	8.25	1518	0.02
Dehydrosabinaketone	6.05*	1118	[0.08]	8.87	1566	0.04
α-Campholenal	6.13	1123	0.01	7.18	1437	0.01
allo-Ocimene	6.23	1129	0.02	5.76	1333	0.02
trans-Pinocarveol	6.28	1132	0.01	9.30	1600	0.01
trans-Sabinol	6.35	1137	0.07	9.95	1653	0.06
trans-Verbenol	6.41	1141	0.02	9.68	1632	0.01
Unknown [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]	6.55	1150	0.01			
Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.66	1157	0.03			
Borneol	6.73	1162	0.04	9.89*†	1648	0.13
α-Phellandren-8-ol	6.77	1164	0.01	10.27*	1679	0.03
Umbellulone	6.81*	1167	0.09	9.09	1584	0.02
cis-Sabinol	6.81*	1167	[0.09]	10.98	1739	0.08
Terpinen-4-ol	6.92	1174	0.61	8.72*	1554	0.65
meta-Cymen-8-ol	7.03	1181	0.01	11.62	1793	0.01
para-Cymen-8-ol	7.07	1184	0.02	11.65	1796	0.02
α-Terpineol	7.14	1188	0.05	9.92†	1650	[0.13]
Methylchavicol	7.26	1196	1.89	9.46*	1614	1.91
α-Phellandrene epoxide	7.30	1198	0.02	11.16	1754	0.02
Cuminal	7.83	1234	0.02	10.73	1718	0.02
Carvotanacetone	7.94	1242	0.01	9.65	1629	0.01
Linalyl acetate	8.20	1259	0.03	8.29	1522	0.03
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.35	1270	0.02			
Thymol	8.89	1303	0.01	15.28	2134	0.01
Carvacrol	8.95	1306	0.01	15.49	2155	0.02

Unknown [m/z 111, 126 (93), 43 (90), 71 (60)...]	9.03	1312	0.01	15.41	2146	0.01
α-Terpinyl acetate	9.51	1346	0.05	9.89*†	1648	[0.13]
α-Ylangene	9.80	1366	0.02	7.29	1445	0.02
α-Copaene	9.86	1370	0.11	7.40	1453	0.10
β-Bourbonene	9.97*	1378	0.61	7.73	1478	0.57
1,5-diepi-β-Bourbonene	9.97*	1378	[0.61]	7.63	1471	0.07
β-Elemene	10.11	1388	0.01	8.67*	1551	0.06
Methyleugenol	10.30	1401	0.13	13.46	1959	0.13
β-Caryophyllene	10.44*	1412	0.09	8.67*	1551	[0.06]
β-Ylangene	10.44*	1412	[0.09]	8.40	1530	0.06
β-Copaene	10.58	1422	0.07	8.60	1546	0.06
trans-α-Bergamotene	10.72	1432	0.06	8.72*	1554	[0.65]
α-Humulene	10.89	1445	0.01	9.46*	1614	[1.91]
cis-Muurola-4(15),5-diene	11.07	1458	0.04	9.46*	1614	[1.91]
γ-Muurolene	11.24	1471	0.04	9.83	1643	0.06
Germacrene D	11.27	1473	0.22	10.02	1659	0.22
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.30	1475	0.14	10.15	1670	0.21
α-Muurolene	11.56	1494	0.02	10.27*	1679	[0.03]
γ-Cadinene	11.72	1507	0.03	10.66*	1712	0.20
δ-Cadinene	11.86	1518	0.17	10.66*	1712	[0.20]
Elemicin	12.32	1553	0.03	15.64	2170	0.04
Unknown [m/z 204, 161 (97), 59 (87), 189 (78), 105 (45)...]	13.45	1644	0.01	15.46	2152	0.01
Unknown [m/z 214, 161 (86), 173 (82), 172 (79), 199 (75), 189 (75), 204 (70)...]	13.51	1649	0.01			
α-Phellandrene dimer II	15.14	1786	0.06	12.76	1894	0.06
α-Phellandrene dimer III	15.32	1802	0.03	13.28	1942	0.05
α-Phellandrene dimer IV	15.54	1822	0.01	13.56	1968	0.01
(3*E*)-Cembrene A	16.90	1947	0.04	15.85	2190	0.04
Verticilla-4(20),7,11-triene	17.42	1996	0.04	16.58	2266	0.01
Cembrenol	18.70	2123	0.03	20.31	2683	0.02
Serratol	18.83	2137	0.16	19.84	2627	0.16
Total identified		**95.58%**			**98.23%**	
Total reported		**99.02%**			**99.04%**	

*: 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

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