CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23F13-PTH01
Customer identification : Organic Frankincense Serrata - India - F50111R
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 : June 19, 2023

Checked and approved by :

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

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MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4592 ± 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
Ethanol	tr	Aliphatic alcohol
(*E*)-2-Methyl-1,3-pentadiene	0.01	Alkene
Toluene	0.01	Simple phenolic
Unknown	tr	Unknown
Unknown	0.01	Monoterpene
Unknown	0.02	Unknown
Hashishene	0.12	Monoterpene
Tricyclene	0.01	Monoterpene
α-Thujene	69.76	Monoterpene
α-Pinene	5.45	Monoterpene
Unknown	0.37	Monoterpene
Camphene	0.07	Monoterpene
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.03	Monoterpene
β-Pinene	0.35	Monoterpene
Sabinene	5.23	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	0.85	Monoterpene
2-Carene	0.02	Monoterpene
α-Phellandrene	1.62	Monoterpene
Δ3-Carene	4.75	Monoterpene
α-Terpinene	0.36	Monoterpene
meta-Cymene	0.07	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	1.51	Monoterpene
Limonene	1.74	Monoterpene
β-Phellandrene	0.41	Monoterpene
Unknown	0.02	Unknown
(*Z*)-β-Ocimene	0.64	Monoterpene
Unknown	0.06	Unknown
(*E*)-β-Ocimene	0.32	Monoterpene
Unknown	0.05	Unknown
γ-Terpinene	0.73	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Terpinolene	0.29	Monoterpene
para-Cymenene	0.04	Monoterpene
Unknown	0.01	Unknown
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	0.09	Monoterpenic alcohol
α-Thujone	0.01	Monoterpenic ketone
Unknown	0.01	Monoterpenic alcohol
β-Thujone	0.02	Monoterpenic ketone
Unknown	0.16	Oxygenated monoterpene

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Unknown	0.04	Unknown
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
allo-Ocimene	0.04	Monoterpene
trans-Pinocarveol	0.02	Monoterpenic alcohol
trans-Sabinol	0.03	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
trans-Verbenol	0.01	Monoterpenic alcohol
Epoxyterpinolene	tr	Monoterpenic ether
Unknown	0.02	Unknown
Unknown	0.03	Oxygenated monoterpene
Borneol	0.03	Monoterpenic alcohol
α-Phellandren-8-ol	0.01	Monoterpenic alcohol
cis-Sabinol	0.05	Monoterpenic alcohol
Umbellulone	0.01	Monoterpenic ketone
Terpinen-4-ol	0.53	Monoterpenic alcohol
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde
α-Terpineol	0.03	Monoterpenic alcohol
Methylchavicol	1.23	Phenylpropanoid
cis-α-Phellandrene epoxide (iPr vs Me)	0.03	Monoterpenic ether
Unknown	0.02	Oxygenated monoterpene
Verbenone	0.02	Monoterpenic ketone
trans-Piperitol	0.02	Monoterpenic alcohol
Piperitone	0.03	Monoterpenic ketone
Linalyl acetate	0.03	Monoterpenic ester
Unknown	0.03	Oxygenated monoterpene
Bornyl acetate	0.03	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Carvacrol	0.02	Monoterpenic alcohol
para-Menth-5-en-1,2-diol isomer III	0.03	Monoterpenic alcohol
α-Terpinyl acetate	0.05	Monoterpenic ester
α-Ylangene	0.03	Sesquiterpene
α-Copaene	0.12	Sesquiterpene
β-Bourbonene	0.49	Sesquiterpene
1,5-diepi-β-Bourbonene	0.04	Sesquiterpene
β-Elemene	0.01	Sesquiterpene
β-Longipinene	0.08	Sesquiterpene
Sibirene	0.02	Sesquiterpene
Methyleugenol	0.07	Phenylpropanoid
α-Gurjunene	0.01	Sesquiterpene
β-Ylangene	0.05	Sesquiterpene
β-Caryophyllene	0.02	Sesquiterpene
β-Copaene	0.07	Sesquiterpene
trans-α-Bergamotene	0.05	Sesquiterpene
Isogermacrene D	0.05	Sesquiterpene
cis-Muurola-4(15),5-diene	0.02	Sesquiterpene
γ-Muurolene	0.04	Sesquiterpene
Germacrene D	0.15	Sesquiterpene
Unknown	0.10	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene

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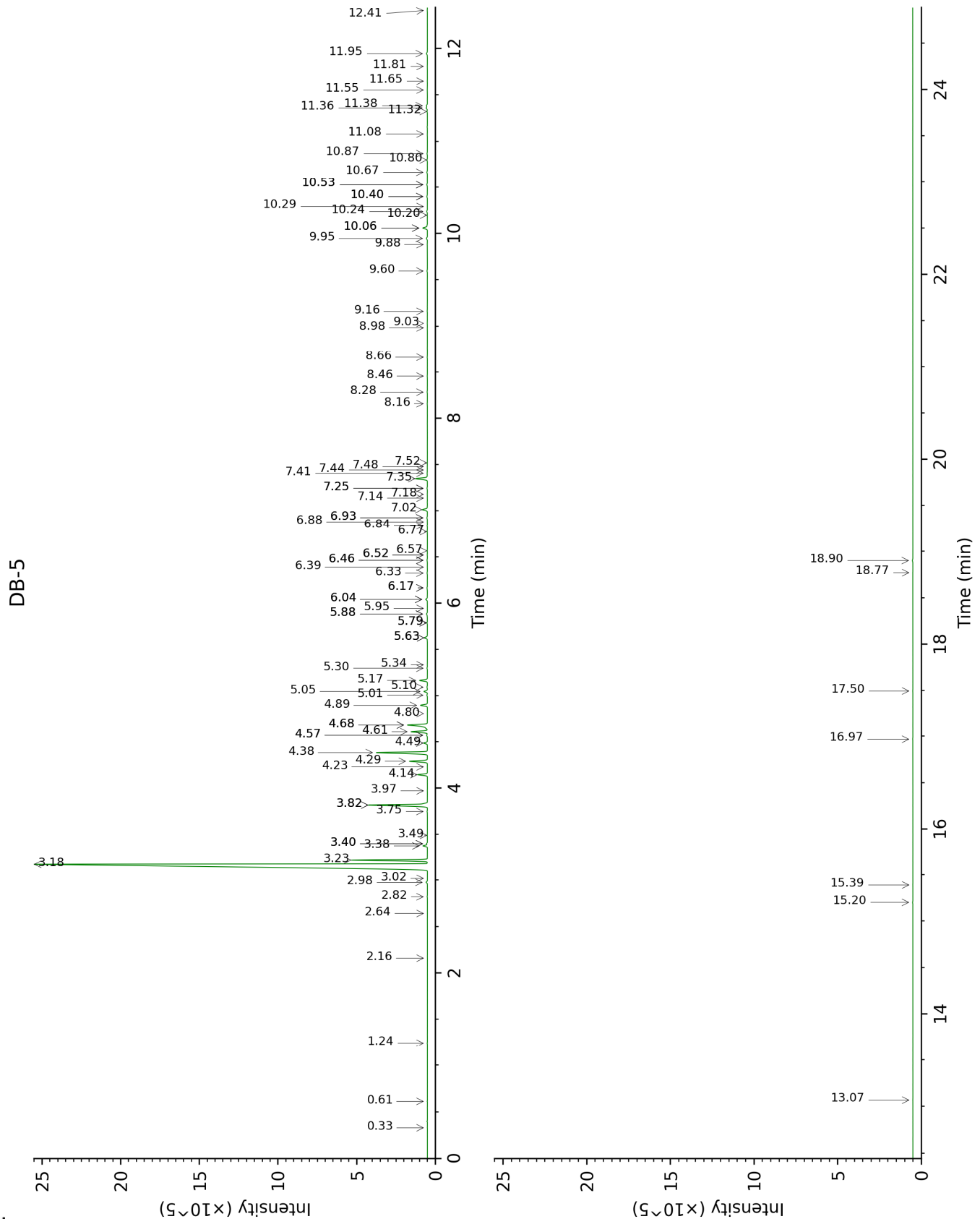|		
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.12	Sesquiterpene
Elemicin	0.02	Phenylpropanoid
4,10-diepi-Guaiol	0.01	Sesquiterpenic alcohol
α-Phellandrene dimer II	0.04	Diterpene
α-Phellandrene dimer III	0.02	Diterpene
(3*E*)-Cembrene A	0.03	Diterpene
Verticilla-4(20),7,11-triene	0.02	Diterpene
Cembrenol	0.01	Diterpenic alcohol
Serratol	0.07	Diterpenic alcohol
Consolidated total	**99.63%**	

tr: The compound has been detected below 0.005% of total signal.
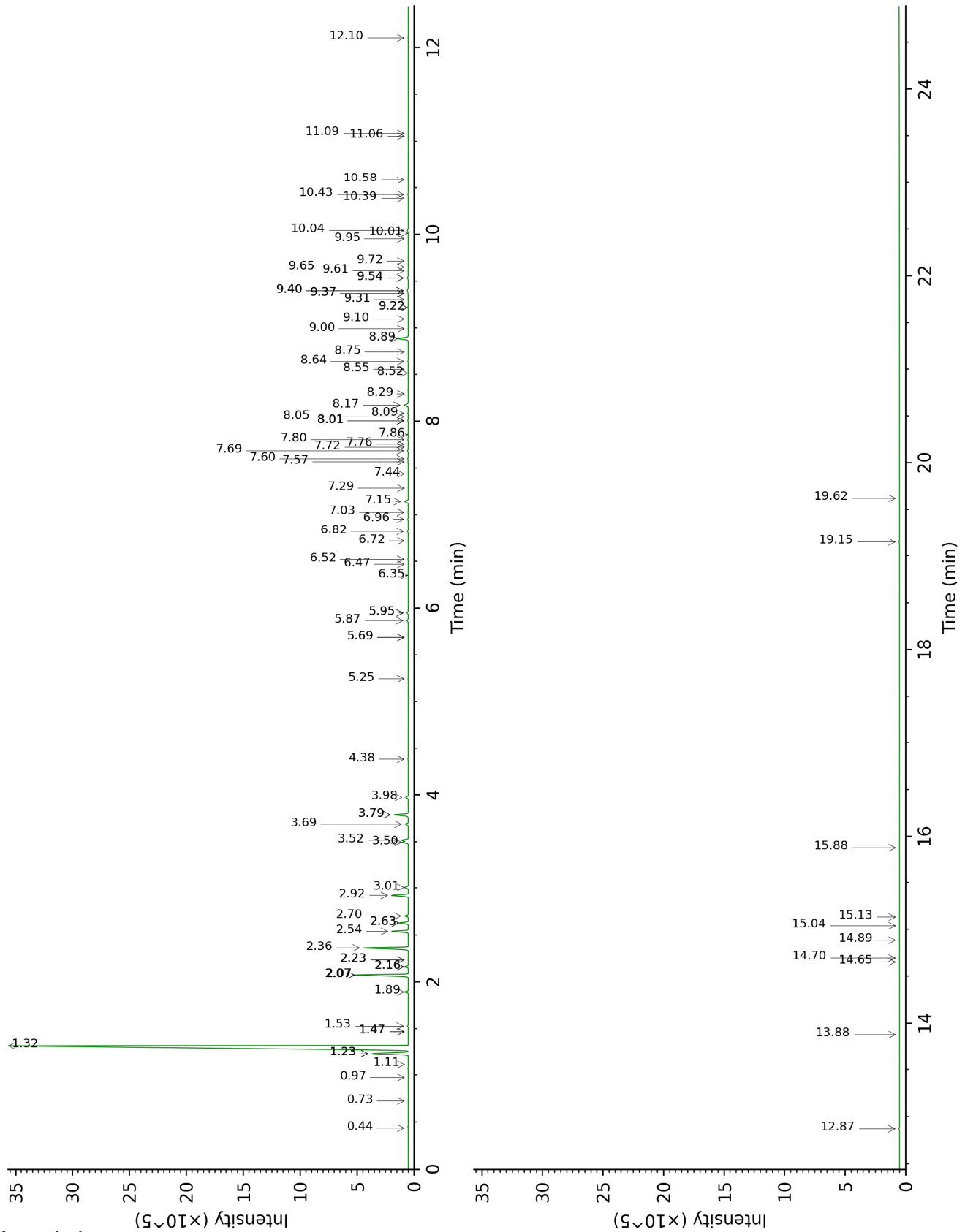
Note: no correction factor was applied

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

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DB-5

12.41
11.95
11.81
11.55 11.65
11.36 11.38 11.32
11.08
10.87 10.80
10.67
10.53
10.40
10.29 10.24 10.20
10.06
9.95 9.88
9.60
9.16
8.98 9.03
8.66
8.46
8.28
8.16
7.41 7.44 7.48 7.52
7.25 7.35
7.14 7.18
7.02
6.88 6.93 6.84
6.77
6.39 6.46 6.52 6.57
6.33
6.17
6.04
5.88 5.95
5.79
5.63
5.30 5.34
5.17
5.05 5.01 5.10
4.89
4.80
4.57 4.68 4.61
4.49
4.38
4.23 4.29
4.14
3.97
3.82 3.75
3.49
3.40 3.38
3.23
3.18
2.98 3.02
2.82
2.64
2.16
1.24
0.61
0.33

18.90
18.77
17.50
16.97
15.39
15.20
13.07

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DB-WAX

Time (min)

Intensity (×10^5)

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	%
Ethanol	0.33	499	tr	0.73	908	tr
(*E*)-2-Methyl-1,3-pentadiene	0.61	629	0.01	0.44	773	0.01
Toluene	1.24	759	0.01	1.23*	996	5.56
Unknown [m/z 109, 43 (28), 124 (28), 41 (14), 55 (11), 79 (9), 81 (8)...]	2.16	852	tr	1.47*	1024	tr
Unknown [m/z 93, 91 (75), 121 (61), 77 (58), 79 (38), 92 (26), 43 (24), 41 (23), 105 (22),107 (19), 136 (16)]	2.64	892	0.01	0.98	951	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)]	2.82	906	0.02			
Hashishene	2.98	916	0.12	1.23*	996	[5.56]
Tricyclene	3.02	919	0.01	1.11	975	0.01
α-Thujene	3.18	930	69.76	1.32	1009	70.04
α-Pinene	3.22	933	5.45	1.23*	996	[5.56]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.38	943	0.37	2.16*	1096	0.36
Camphene	3.40*	944	0.07	1.53	1030	0.07
α-Fenchene	3.40*	944	[0.07]	1.47*	1024	[tr]
Thuja-2,4(10)-diene	3.49	950	0.02	2.07*	1086	5.26
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.75	967	0.03	2.63*	1136	0.88
β-Pinene	3.82*	972	5.58	1.89	1068	0.35
Sabinene	3.82*	972	[5.58]	2.07*	1086	[5.26]
Pseudolimonene isomer	3.97	982	0.01	2.23*	1103	0.02
Myrcene	4.14	993	0.85	2.63*	1136	[0.88]
2-Carene	4.23	999	0.02	2.16*	1096	[0.36]
α-Phellandrene	4.29	1002	1.62	2.54	1128	1.62
Δ3-Carene	4.38	1008	4.75	2.36	1114	4.75
α-Terpinene	4.49	1015	0.36	2.70	1142	0.35
meta-Cymene	4.57*	1020	0.08	3.79*	1230	1.59
Carvomenthene	4.57*	1020	[0.08]	2.23*	1103	[0.02]
para-Cymene	4.61	1023	1.51	3.79*	1230	[1.59]
Limonene	4.68*	1027	2.30	2.92	1160	1.74
β-Phellandrene	4.68*	1027	[2.30]	3.01	1167	0.41
Unknown [m/z 67, 93 (70), 82 (70), 121 (42),	4.80	1035	0.02			

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Compound	RT	RI	%	RT	RI	%
107 (39), 91 (33), 79 (28)...]						
(*Z*)-β-Ocimene	4.89	1040	0.64	3.50	1207	0.66
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	5.01	1048	0.06	6.96	1461	0.05
(*E*)-β-Ocimene	5.05	1050	0.32	3.69	1222	0.32
Unknown [m/z 109 , 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...]	5.10	1053	0.05			
γ-Terpinene	5.17	1058	0.73	3.52	1209	0.70
cis-Sabinene hydrate	5.30	1066	0.04	6.52	1429	0.04
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.34	1068	0.01	4.38	1275	0.04
Terpinolene	5.63*	1086	0.33	3.98	1244	0.29
para-Cymenene	5.63*	1086	[0.33]	5.95*	1386	0.15
Unknown [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	5.79*	1096	0.05	5.69*	1367	0.02
trans-Sabinene hydrate	5.79*	1096	[0.05]	7.57	1507	0.03
Linalool	5.88*	1102	0.12	7.69	1516	0.09
α-Thujone	5.88*	1102	[0.12]	5.69*	1367	[0.02]
Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	5.94	1106	0.01	8.05†	1545	[0.12]
β-Thujone	6.04*	1112	0.18	5.95*	1386	[0.15]
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	6.04*	1112	[0.18]	5.87	1380	0.16
Unknown [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...]	6.17*	1120	0.06			
cis-para-Menth-2-en-1-ol	6.17*	1120	[0.06]	7.72	1520	0.02
allo-Ocimene	6.32	1130	0.04	5.25	1335	0.04
trans-Pinocarveol	6.39	1134	0.02	8.75	1600	0.01
trans-Sabinol	6.46*	1139	0.05	9.37*†	1651	0.21
trans-para-Menth-2-en-1-ol	6.46*	1139	[0.05]	8.56	1585	0.02
trans-Verbenol	6.52*	1143	0.02	9.10	1629	0.01
Epoxyterpinolene	6.52*	1143	[0.02]	6.35	1416	tr

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Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.57	1146	0.02	6.47	1425	0.02
Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.77	1159	0.03			
Borneol	6.84	1163	0.03	9.40*†	1653	[0.21]
α-Phellandren-8-ol	6.88	1166	0.01	9.72	1680	0.02
cis-Sabinol	6.93*	1169	0.06	10.43	1739	0.05
Umbellulone	6.93*	1169	[0.06]	8.52	1582	0.01
Terpinen-4-ol	7.02	1174	0.53	8.17	1555	0.56
meta-Cymen-8-ol	7.14	1182	0.02	11.06	1794	0.01
para-Cymen-8-ol	7.18	1185	0.02	11.09	1796	0.02
Myrtenal	7.25*	1189	0.04	8.29	1564	0.01
α-Terpineol	7.25*	1189	[0.04]	9.37*†	1651	[0.21]
Methylchavicol	7.35	1196	1.23	8.89	1611	1.28
cis-α-Phellandrene epoxide (iPr vs Me)	7.41	1199	0.03	10.58	1753	0.04
Unknown [m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)]	7.44	1202	0.02	10.39	1736	0.01
Verbenone	7.48	1204	0.02	9.22*	1638	0.04
trans-Piperitol	7.52	1206	0.02	10.01	1704	0.01
Piperitone	8.16	1249	0.03	9.54*	1665	0.13
Linalyl acetate	8.28	1257	0.03	7.76	1522	0.03
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.46	1269	0.03			
Bornyl acetate	8.66	1283	0.03	7.86	1530	0.03
Thymol	8.98	1304	0.01	14.65	2133	0.01
Carvacrol	9.03	1308	0.02	14.89	2157	0.01
para-Menth-5-en-1,2-diol isomer III	9.16	1317	0.03	14.70	2137	0.03
α-Terpinyl acetate	9.60	1347	0.05	9.31	1646	0.03
α-Ylangene	9.88	1367	0.03	6.72	1443	0.02
α-Copaene	9.95	1372	0.12	6.82	1451	0.11
β-Bourbonene	10.06*	1380	0.53	7.15	1476	0.49
1,5-diepi-β-Bourbonene	10.06*	1380	[0.53]	7.03	1467	0.04
β-Elemene	10.20	1390	0.01	8.01*†	1542	0.12
β-Longipinene	10.24	1392	0.08	7.60	1510	0.06
Sibirene	10.29	1396	0.02	7.44	1498	tr
Methyleugenol	10.40*	1404	0.08	12.87	1959	0.07
α-Gurjunene	10.40*	1404	[0.08]	7.29	1486	0.01
β-Ylangene	10.53*	1413	0.07	7.80	1526	0.05
β-Caryophyllene	10.53*	1413	[0.07]	8.01*†	1542	[0.12]
β-Copaene	10.67	1424	0.07	8.01*†	1542	[0.12]
trans-α-Bergamotene	10.80	1434	0.05	8.08†	1548	[0.12]
Isogermacrene D	10.87	1439	0.05	8.64	1592	0.05

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	R.T.	R.I.	%	R.T.	R.I.	%
cis-Muurola-4(15),5-diene	11.08	1454	0.02	9.00	1620	0.02
γ-Muurolene	11.32	1473	0.04	9.22*	1638	[0.04]
Germacrene D	11.36†	1475	0.25	9.40*†	1653	[0.21]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.38†	1477	[0.25]	9.54*	1665	[0.13]
Bicyclogermacrene	11.55	1490	0.02	9.61	1671	0.03
α-Muurolene	11.65	1497	0.01	9.65	1674	0.02
γ-Cadinene	11.81	1509	0.03	9.95	1699	0.02
δ-Cadinene	11.95	1520	0.12	10.04	1706	0.12
Elemicin	12.41	1556	0.02	15.04	2172	0.03
4,10-diepi-Guaiol	13.07	1608	0.01	13.88	2056	0.01
α-Phellandrene dimer II	15.20	1788	0.04	12.10	1887	0.03
α-Phellandrene dimer III	15.39	1804	0.02			
(3*E*)-Cembrene A	16.97	1950	0.03	15.13	2182	0.02
Verticilla-4(20),7,11-triene	17.50	2000	0.02	15.88	2261	tr
Cembrenol	18.77	2127	0.01	19.62	2693	0.01
Serratol	18.90	2140	0.07	19.15	2634	0.06
Total identified		**99.18%**			**99.34%**	
Total reported		**99.82%**			**99.63%**	

*: 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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