

Date : October 31, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19J18-PTH07-1-SCC

Customer identification : Frankincense Serrata Organic - India - F50106810R

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 : Lindsay Girard, B. Sc.

Analysis date : October 25, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4592 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
(E)-2-Methyl-1,3-pentadiene	0.01	Alkene
Toluene	0.01	Simple phenolic
Hashishene	0.09	Monoterpene
α -Thujene	69.58	Monoterpene
α -Pinene	5.25	Monoterpene
Unknown	0.38	Monoterpene
Camphene	0.07	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
meta-Cymene	0.02	Monoterpene
β -Pinene	0.35	Monoterpene
Sabinene	5.65	Monoterpene
Myrcene	0.96	Monoterpene
α -Phellandrene	2.50	Monoterpene
Δ^3 -Carene	3.96	Monoterpene
α -Terpinene	0.32	Monoterpene
ortho-Cymene	0.06	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	1.62	Monoterpene
Unknown	0.07	Unknown
Limonene	1.91	Monoterpene
β -Phellandrene	0.63*	Monoterpene
1,8-Cineole	[0.63]*	Monoterpenic ether
(Z)- β -Ocimene	0.58	Monoterpene
Unknown	0.06	Unknown
(E)- β -Ocimene	0.26	Monoterpene
Unknown	0.08	Unknown
γ -Terpinene	0.63	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Terpinolene	0.24	Monoterpene
para-Cymenene	0.04	Monoterpene
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
α -Thujone	0.02	Monoterpenic ketone
Linalool	0.09	Monoterpenic alcohol
Unknown	0.08	Oxygenated monoterpene
β -Thujone	0.10	Monoterpenic ketone
cis-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
α -Campholenal	0.01	Monoterpenic aldehyde
allo-Ocimene	0.02	Monoterpene
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-Sabinol	0.04	Monoterpenic alcohol
trans-Verbenol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
Borneol	0.02	Monoterpenic alcohol
α -Phellandren-8-ol	0.02	Monoterpenic alcohol
cis-Sabinol	0.06	Monoterpenic alcohol

Terpinen-4-ol	0.33	Monoterpenic alcohol
meta-Cymen-8-ol	0.03	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.04	Monoterpenic alcohol
Methylchavicol	1.36	Phenylpropanoid
α -Phellandrene epoxide	0.03	Monoterpenic ether
Verbenone	0.03	Monoterpenic ketone
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Carvone	0.02	Monoterpenic ketone
Piperitone	0.07	Monoterpenic ketone
Linalyl acetate	0.03	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Bornyl acetate	0.03	Monoterpenic ester
Carvacrol	0.01	Monoterpenic alcohol
α -Terpinyl acetate	0.03	Monoterpenic ester
α -Copaene	0.09	Sesquiterpene
β -Bourbonene	0.34	Sesquiterpene
β -Elemene	0.02	Sesquiterpene
Methyleugenol	0.09	Phenylpropanoid
β -Ylangene	0.09	Sesquiterpene
β -Copaene	0.07	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.04	Sesquiterpene
Isogermacrene D	0.03	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene
γ -Muurolole	0.03	Sesquiterpene
Germacrene D	0.15	Sesquiterpene
Unknown	0.11	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.11	Sesquiterpene
Elemicin	0.02	Phenylpropanoid
α -Phellandrene dimer II	0.03	Diterpene
α -Phellandrene dimer III	0.01	Diterpene
(3 <i>E</i>)-Cembrene A	0.02	Diterpene
Verticilla-4(20),7,11-triene	0.01	Diterpene
Cembrenol	0.01	Diterpenic alcohol
Serratol	0.05	Diterpenic alcohol
Consolidated total	99.40%	

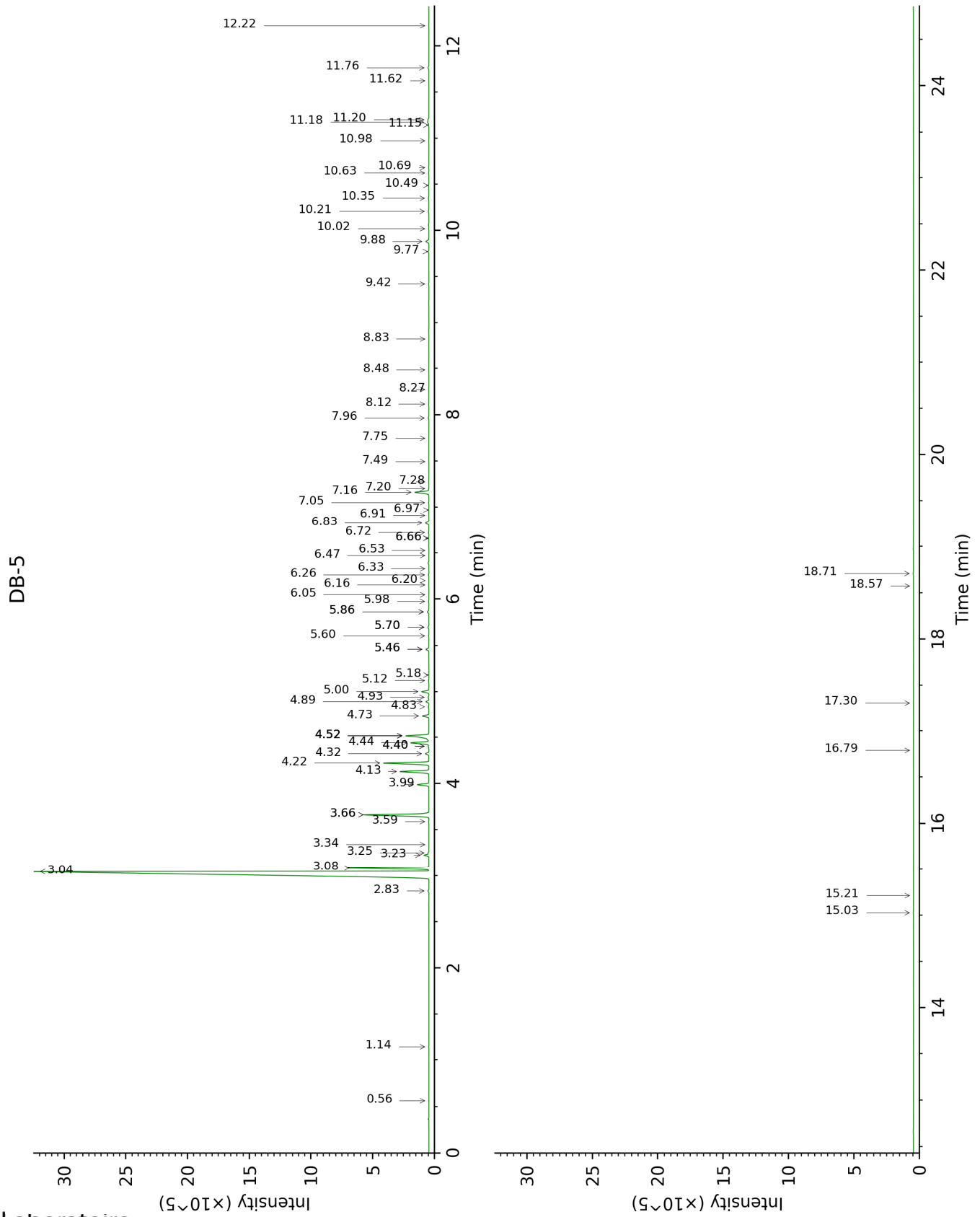
*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

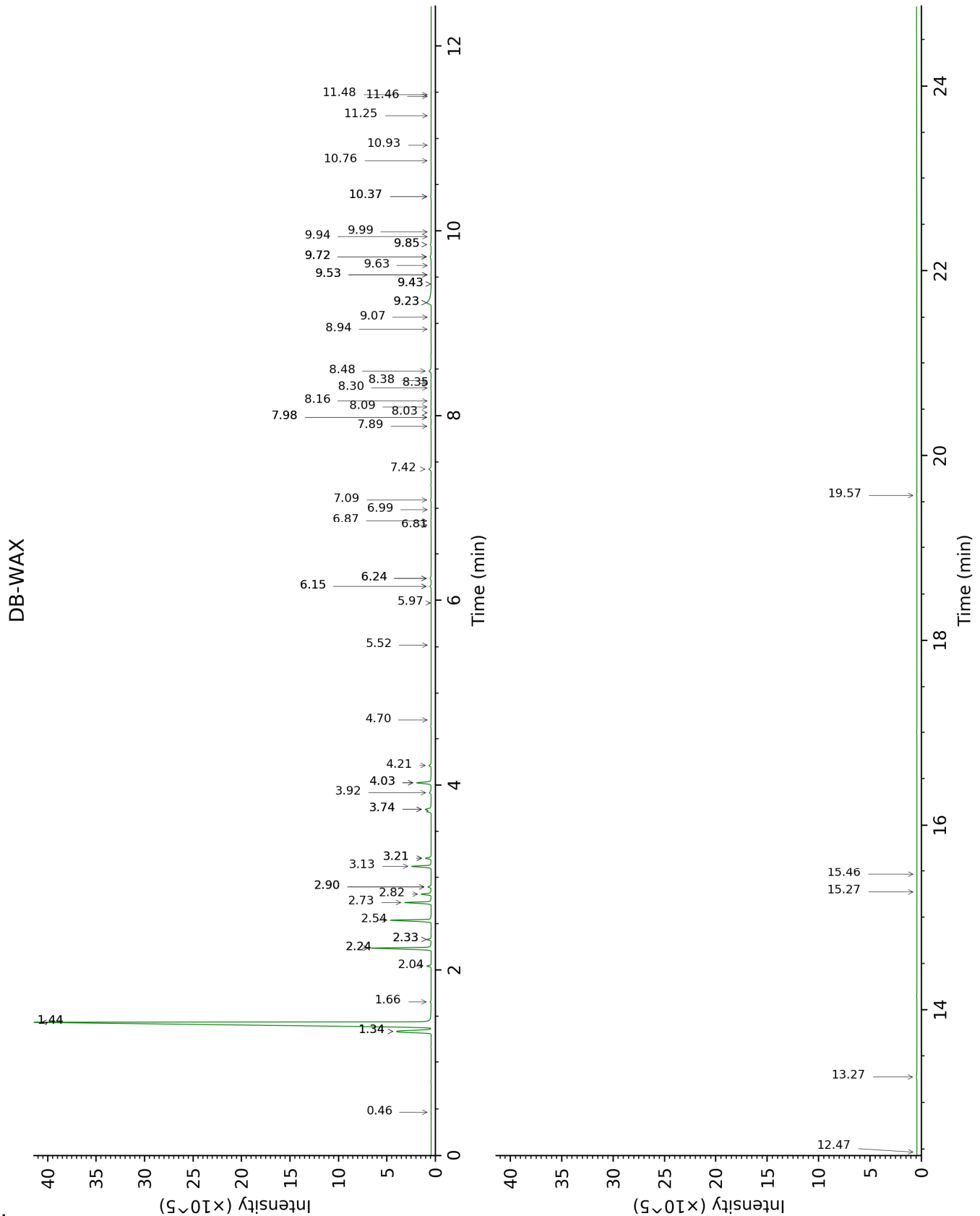
Note: no correction factor was applied

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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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
(E)-2-Methyl-1,3-pentadiene	0.56	629	0.01	0.46	772	0.01
Toluene	1.14	760	0.01	1.44*	1008	70.05
Hashishene	2.83	915	0.09	1.34*	995	5.32
α -Thujene	3.04	929	69.58	1.44*	1008	[70.05]
α -Pinene	3.08	932	5.25	1.34*	995	[5.32]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.23	941	0.38	2.33*	1096	0.39
Camphene	3.25	942	0.07	1.66	1030	0.07
Thuja-2,4(10)-diene	3.34	948	0.01	2.24*	1086	5.67
meta-Cymene	3.59	965	0.02	2.90*	1142	0.32
β -Pinene	3.66*	970	6.00	2.04	1068	0.35
Sabinene	3.66*	970	[6.00]	2.24*	1086	[5.67]
Myrcene	3.99	991	0.96	2.82	1136	0.95
α -Phellandrene	4.13	1001	2.50	2.73	1128	2.47
Δ^3 -Carene	4.22	1007	3.96	2.54	1114	3.92
α -Terpinene	4.32	1013	0.32	2.90*	1142	[0.32]
ortho-Cymene	4.40*	1018	0.07	4.03*	1230	1.59
Carvomenthene	4.40*	1018	[0.07]	2.33*	1096	[0.39]
para-Cymene	4.44	1020	1.62	4.03*	1230	[1.59]
Unknown [m/z 109, 43 (58), 95 (26)... 137 (15)...]	4.52*	1025	2.62	6.24*	1386	0.14
Limonene	4.52*	1025	[2.62]	3.13	1160	1.91
β -Phellandrene	4.52*	1025	[2.62]	3.21*	1167	0.57
1,8-Cineole	4.52*	1025	[2.62]	3.21*	1167	[0.57]
(Z)- β -Ocimene	4.73	1039	0.58	3.74*†	1208	1.17
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.83	1045	0.06			
(E)- β -Ocimene	4.89	1049	0.26	3.92	1222	0.23
Unknown [m/z 109, 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...]	4.93	1052	0.08	6.87	1432	0.05
γ -Terpinene	5.00	1056	0.63	3.74*†	1208	[1.17]
cis-Sabinene hydrate	5.12	1064	0.04	6.81	1428	0.03
Unknown [m/z	5.18	1067	0.01	4.70	1280	0.01

79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]						
Terpinolene	5.46*	1085	0.29	4.21	1244	0.24
para-Cymenene	5.46*	1085	[0.29]	6.15*	1379	0.14
trans-Sabinene hydrate	5.60	1094	0.03	7.89	1509	0.07
α-Thujone	5.70*	1100	0.10	5.97	1366	0.02
Linalool	5.70*	1100	[0.10]	7.98*	1517	0.07
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	5.86*	1111	0.18	6.24*	1386	[0.14]
β-Thujone	5.86*	1111	[0.18]	6.15*	1379	[0.14]
cis-para-Menth-2-en-1-ol	5.98	1118	0.05	8.03	1521	0.02
α-Campholenal	6.05	1123	0.01	6.99	1441	0.01
allo-Ocimene	6.16	1130	0.02	5.52	1333	0.01
trans-Pinocarveol	6.20	1133	0.01	9.07	1602	0.01
trans-Sabinol	6.26	1137	0.04	9.63	1648	0.01
trans-Verbenol	6.33	1142	0.02	9.43*	1632	0.02
Unknown [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]	6.47	1151	0.02			
Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.53	1155	0.01			
Borneol	6.66*	1163	0.04	9.72*	1656	0.20
α-Phellandren-8-ol	6.66*	1163	[0.04]	9.99	1678	0.02
cis-Sabinol	6.72	1167	0.06	10.76	1743	0.05
Terpinen-4-ol	6.83	1174	0.33	8.48	1556	0.30
meta-Cymen-8-ol	6.91	1180	0.03	11.46	1802	0.01
para-Cymen-8-ol	6.97	1184	0.02	11.48	1804	0.01
α-Terpineol	7.05	1189	0.04	9.72*	1656	[0.20]
Methylchavicol	7.16	1197	1.36	9.23*	1615	1.41
α-Phellandrene epoxide	7.20	1199	0.03	10.93	1757	0.02
Verbenone	7.28	1204	0.03	9.53*	1640	0.04
trans-Carveol	7.49	1219	0.01	11.25	1785	0.01
Carvone	7.75	1237	0.02	9.94	1674	0.02
Piperitone	7.96	1252	0.07	9.85*	1666	0.12
Linalyl acetate	8.12	1257	0.03	8.09	1526	0.03
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)...]	8.27	1268	0.02			

152 (4)]						
Bornyl acetate	8.48	1282	0.03	8.16	1531	0.02
Carvacrol	8.83	1305	0.01	15.27	2160	0.01
α -Terpinyl acetate	9.42	1347	0.03	9.53*	1640	[0.04]
α -Copaene	9.77	1372	0.09	7.09	1449	0.08
β -Bourbonene	9.88	1380	0.34	7.42	1474	0.31
β -Elemene	10.02	1390	0.02	8.35	1546	0.02
Methyleugenol	10.21	1403	0.09	13.27	1967	0.15
β -Ylangene	10.35	1414	0.09	7.98*	1517	[0.07]
β -Copaene	10.49	1424	0.07	8.30	1542	0.03
<i>trans</i> - α -Bergamotene	10.63	1435	0.04	8.38	1548	0.04
Isogermacrene D	10.69	1439	0.03	8.94	1592	0.03
<i>cis</i> -Muurolo-4(15),5-diene	10.98	1461	0.02	9.23*	1615	[1.41]
γ -Muurolole	11.15	1473	0.03	9.43*	1632	[0.02]
Germacrene D	11.18	1476	0.15	9.72*	1656	[0.20]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.20	1478	0.11	9.85*	1666	[0.12]
γ -Cadinene	11.62	1509	0.02	10.37*	1709	0.10
δ -Cadinene	11.76	1520	0.11	10.37*	1709	[0.10]
Elemicin	12.22	1556	0.02			
α -Phellandrene dimer II	15.03	1790	0.03	12.47	1892	0.02
α -Phellandrene dimer III	15.21	1806	0.01			
(3E)-Cembrene A	16.79	1952	0.02	15.46	2180	0.02
Verticilla-4(20),7,11-triene	17.30	2000	0.01			
Cembrenol	18.57	2127	0.01			
Serratol	18.71	2141	0.05	19.57	2630	0.04
Total identified		98.72%			98.93%	
Total reported		99.40%			98.98%	

*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index