

Date : May 31, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19E22-PTH02-1-SCC

Customer identification : Elemi - Phillipines - EE010394R

Type : Essential oil

Source : *Canarium luzonicum*

Customer : Plant Therapy

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Alexis St-Gelais, M. Sc., chimiste

Analysis date : May 30, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4812 ± 0.0003 (20 °C)

ISO 10624:1998 - OIL OF ELEMI

Compound	Min. %	Max. %	Observed %	Complies?
Elemicin	0.5	8.0	4.8	Yes
α-Elemol	1	25	11	Yes
α-Terpineol	0.4	3.0	2.6	Yes
Limonene	40	72	51	Yes
α-Phellandrene	10	24	13	Yes
Sabinene	3	8	2	No
Refractive index	1.4720	1.4900	1.4812	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil marginally does not comply with the ISO standard for elemi oil.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Toluene	0.01	0.01	Simple phenolic
α -Thujene	0.11	0.10	Monoterpene
α -Pinene	0.44	0.43	Monoterpene
Camphene	0.02	0.01	Monoterpene
Sabinene	1.94*	1.71	Monoterpene
β -Pinene	[1.94]*	0.19	Monoterpene
3-Methyl-3-cyclohexenone	0.03	0.04	Aliphatic ketone
Myrcene	0.50	0.49	Monoterpene
Pseudolimonene	12.80*	0.04	Monoterpene
α -Phellandrene	[12.80]*	12.63	Monoterpene
Δ^3 -Carene	0.04	0.03	Monoterpene
α -Terpinene	0.40	0.40	Monoterpene
Carvomenthene	1.50*	0.01	Aliphatic alcohol
para-Cymene	[1.50]*	1.53	Monoterpene
Limonene	53.10*	50.55	Monoterpene
β -Phellandrene	[53.10]*	1.96*	Monoterpene
1,8-Cineole	[53.10]*	[1.96]*	Monoterpenic ether
(Z)- β -Ocimene	0.13	0.13	Monoterpene
(E)- β -Ocimene	0.09	0.09	Monoterpene
γ -Terpinene	0.23	0.23	Monoterpene
cis-Sabinene hydrate	0.03	0.03	Monoterpenic alcohol
para-Cymenene	2.53*	0.13	Monoterpene
Terpinolene	[2.53]*	2.41	Monoterpene
trans-Sabinene hydrate	0.01	0.01	Monoterpenic alcohol
Linalool	0.01	0.02	Monoterpenic alcohol
Unknown	0.02	0.31*	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.05*	0.02	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	[0.05]*	0.02	Monoterpenic alcohol
allo-Ocimene	0.03*	0.01	Monoterpene
cis-para-Mentha-2,8-dien-1-ol	[0.03]*	0.02*	Monoterpenic alcohol
trans-Pinocarveol	0.06*	0.05	Monoterpenic alcohol
trans-Limonene oxide	[0.06]*		Monoterpenic ether
Epoxyterpinolene	0.03	0.03	Monoterpenic ether
Unknown	0.01	0.04*	Oxygenated monoterpene
Unknown	0.15*	0.14	Oxygenated monoterpene
trans-2-Caren-4-ol?	[0.15]*		Monoterpenic alcohol
Unknown	0.22	0.22	Oxygenated monoterpene
Terpinen-4-ol	0.31	0.28	Monoterpenic alcohol
Cryptone	0.03	0.05	Normoterpenic ketone
para-Cymen-8-ol	0.26*	0.26	Monoterpenic alcohol
Unknown	[0.26]*	0.01	Oxygenated monoterpene
α -Terpineol	2.55	2.79*	Monoterpenic alcohol
α -Phellandrene epoxide	0.30	0.29	Monoterpenic ether
trans-Carveol	0.09	0.06	Monoterpenic alcohol
cis-Carveol	0.06	0.04	Monoterpenic alcohol
Carvone	0.06	0.08	Monoterpenic ketone
Carvotanacetone	0.03	[0.02]*	Monoterpenic ketone
Piperitone	0.15*	0.14	Monoterpenic ketone

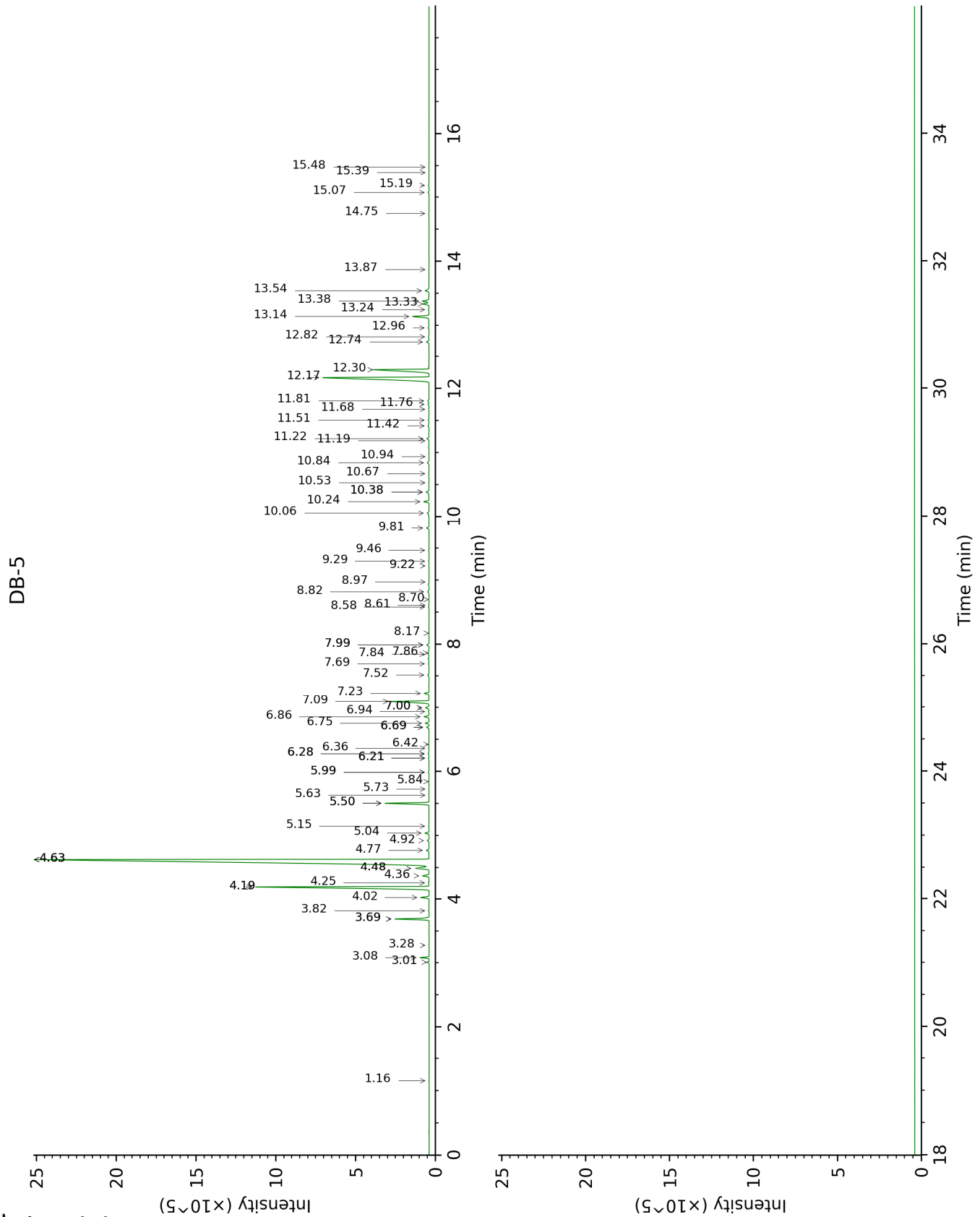
Unknown	[0.15]*	0.02	Unknown
Unknown	0.01	0.02	Unknown
Limonen-10-ol	0.04	0.04	Monoterpenic alcohol
Unknown	0.01		Monoterpenic ester
Thymol	0.03	0.02	Monoterpenic alcohol
Carvacrol	0.12	0.07	Monoterpenic alcohol
Unknown	0.01	0.02	Unknown
Unknown	0.02	0.01	
δ-Elemene	0.03	[0.04]*	Sesquiterpene
α-Cubebene	0.04	0.01	Sesquiterpene
α-Copaene	0.16	0.16	Sesquiterpene
β-Elemene	0.13	[0.31]	Sesquiterpene
Methyleugenol	0.33	0.33*	Phenylpropanoid
β-Caryophyllene	0.22*	[0.31]*	Sesquiterpene
(trans?)-6-Hydroxypiperitone	[0.22]*	0.04	Monoterpenic alcohol
β-Copaene	0.02	0.01	Sesquiterpene
α-Guaiene	0.04	[0.31]*	Sesquiterpene
α-Humulene	0.13	0.12	Sesquiterpene
allo-Aromadendrene	0.01	0.02	Sesquiterpene
γ-Murolene	0.01	0.02	Sesquiterpene
Germacrene D	0.14	[2.79]*	Sesquiterpene
Viridiflorene	0.09	0.06	Sesquiterpene
α-Murolene	0.07	0.09	Sesquiterpene
γ-Cadinene	0.03	0.05	Sesquiterpene
epi-Elemol?	0.08	0.08	Sesquiterpenic alcohol
δ-Cadinene	0.09	0.10	Sesquiterpene
α-Elemol	10.94	11.32*	Sesquiterpenic alcohol
Elemicin	4.84	5.14	Phenylpropanoid
Guaiol	0.18	0.25	Sesquiterpenic alcohol
5,7-diepi-α-Eudesmol	0.04	0.03	Sesquiterpenic alcohol
10-epi-γ-Eudesmol	0.07	[11.32]*	Sesquiterpenic alcohol
γ-Eudesmol	1.16	1.16	Sesquiterpenic alcohol
Unknown	0.06	0.05	Oxygenated sesquiterpene
β-Eudesmol	0.43	0.44	Sesquiterpenic alcohol
α-Eudesmol	0.48	0.43	Sesquiterpenic alcohol
Bulnesol	0.28		Sesquiterpenic alcohol
Juniper camphor	0.02	0.02	Sesquiterpenic alcohol
Cryptomeridiol analog	0.02		Sesquiterpenic alcohol
α-Phellandrene dimer II	0.07	0.07	Diterpene
Cryptomeridiol	0.05	0.05	Sesquiterpenic alcohol
Unknown	0.01		Oxygenated sesquiterpene
α-Phellandrene dimer IV	0.01	[0.33]*	Diterpene
Total identified	98.49%	97.83%	

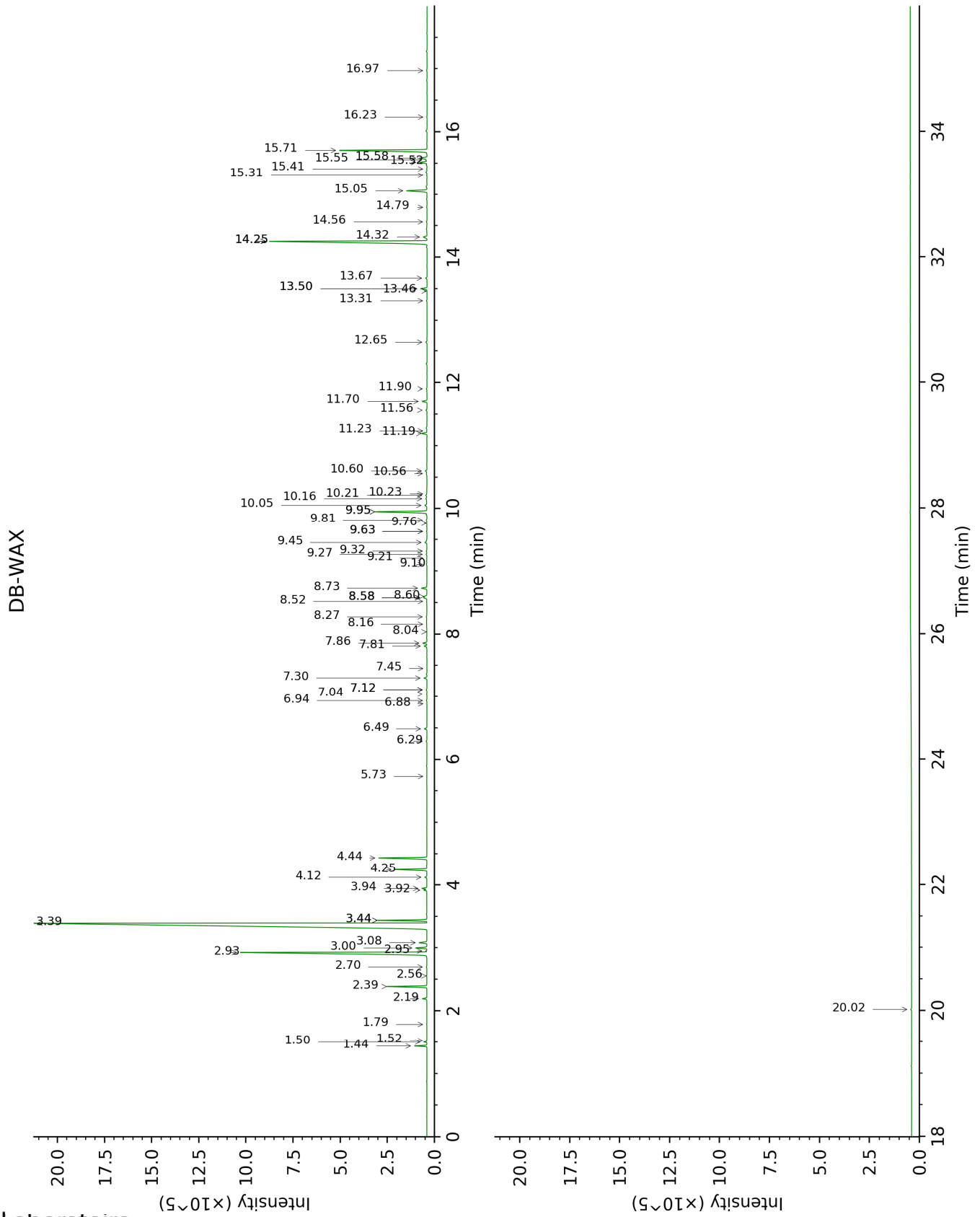
*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.16	760	0.01	1.52	1003	0.01
α -Thujene	3.01	925	0.11	1.50	1001	0.10
α -Pinene	3.08	930	0.44	1.44	993	0.43
Camphene	3.28	943	0.02	1.79	1028	0.01
Sabinene	3.69*	970	1.94	2.39	1086	1.71
β -Pinene	3.69*	970	[1.94]	2.19	1068	0.19
3-Methyl-3-cyclohexenone	3.82	978	0.03	6.29	1373	0.04
Myrcene	4.02	992	0.50	3.00	1136	0.49
Pseudolimonene	4.19*	1003	12.80	2.95	1132	0.04
α -Phellandrene	4.19*	1003	[12.80]	2.93	1130	12.63
Δ^3 -Carene	4.25	1007	0.04	2.70	1112	0.03
α -Terpinene	4.36	1014	0.40	3.08	1142	0.40
Carvomenthene	4.48*	1021	1.50	2.56	1102	0.01
para-Cymene	4.48*	1021	[1.50]	4.24	1230	1.53
Limonene	4.63*	1030	53.10	3.39	1166	50.55
β -Phellandrene	4.63*	1030	[53.10]	3.44*	1170	1.96
1,8-Cineole	4.63*	1030	[53.10]	3.44*	1170	[1.96]
(Z)- β -Ocimene	4.77	1039	0.13	3.92	1206	0.13
(E)- β -Ocimene	4.92	1049	0.09	4.12	1221	0.09
γ -Terpinene	5.04	1056	0.23	3.94	1208	0.23
cis-Sabinene hydrate	5.15	1063	0.03	7.04	1429	0.03
para-Cymenene	5.50*	1086	2.53	6.49	1388	0.13
Terpinolene	5.50*	1086	[2.53]	4.44	1244	2.41
trans-Sabinene hydrate	5.63	1094	0.01	8.04	1503	0.01
Linalool	5.73	1100	0.01	8.16	1512	0.02
Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	5.84	1107	0.02	8.58*†	1545	0.31
cis-para-Menth-2-en-1-ol	5.99*	1117	0.05	8.27	1521	0.02
trans-para-Mentha-2,8-dien-1-ol	5.99*	1117	[0.05]	9.10	1586	0.02
allo-Ocimene	6.21*	1131	0.03	5.73	1333	0.01
cis-para-Mentha-2,8-dien-1-ol	6.21*	1131	[0.03]	9.63*	1628	0.02
trans-Pinocarveol	6.28*	1135	0.06	9.32	1602	0.05
trans-Limonene oxide	6.28*	1135	[0.06]			
Epoxyterpinolene	6.36	1141	0.03	6.94	1421	0.03
Unknown [m/z 95, 43 (74), 109 (72),	6.42	1145	0.01	7.12*	1434	0.04

82 (62), 110 (50)... 152 (14)]						
Unknown [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	6.69*	1162	0.15	7.81	1486	0.14
<i>trans</i> -2-Caren-4- ol?	6.69*	1162	[0.15]			
Unknown [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	6.76	1166	0.22	7.86	1489	0.22
Terpinen-4-ol	6.86	1173	0.31	8.73	1557	0.28
Cryptone	6.94	1178	0.03	9.26	1598	0.05
<i>para</i> -Cymen-8-ol	7.00*	1182	0.26	11.70	1800	0.26
Unknown [m/z 109, 82 (77), 41 (56), 119 (55), 91 (54)... 152 (17)]	7.00*	1182	[0.26]	7.45	1459	0.01
α -Terpineol	7.09	1188	2.55	9.95*	1654	2.79
α -Phellandrene epoxide	7.23	1198	0.30	11.19	1757	0.29
<i>trans</i> -Carveol	7.52	1217	0.09	11.56	1788	0.06
<i>cis</i> -Carveol	7.69	1229	0.06	11.90	1818	0.04
Carvone	7.84	1239	0.06	10.21	1675	0.08
Carvotanacetone	7.86	1240	0.03	9.63*	1628	[0.02]
Piperitone	7.99*	1249	0.15	10.05	1662	0.14
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.99*	1249	[0.15]	11.23	1760	0.02
Unknown [m/z 43, 56 (54), 69 (40), 155 (40), 41 (35), 55 (33)...]	8.17	1262	0.01	10.24	1677	0.02
Limonen-10-ol	8.58	1290	0.04	13.31	1944	0.04
Unknown [m/z 93, 43 (60), 108 (58), 69 (36), 41 (35)... 150 (5), 184 (1)]	8.61	1292	0.01			
Thymol	8.70	1298	0.03	15.31	2136	0.02
Carvacrol	8.82	1306	0.12	15.55	2160	0.07
Unknown [m/z 111, 126 (93), 43 (90), 71 (60)...]	8.97	1313	0.01	15.41	2146	0.02
Unknown [m/z 43, 97 (99), 107 (47), 41 (35), 55 (30)...]	9.22	1330	0.02	13.46	1959	0.01
δ -Elemene	9.30	1336	0.03	7.12*	1434	[0.04]
α -Cubebene	9.46	1348	0.04	6.88	1417	0.01
α -Copaene	9.81	1372	0.16	7.30	1448	0.16
β -Elemene	10.06	1390	0.13	8.60†	1546	[0.31]
Methyleugenol	10.24	1402	0.33	13.50*	1962	0.33
β -Caryophyllene	10.38*	1413	0.22	8.58*†	1545	[0.31]

(<i>trans?</i>)-6-Hydroxypiperitone	10.38*	1413	[0.22]	16.97	2306	0.04
β-Copaene	10.53	1424	0.02	8.52	1540	0.01
α-Guaiene	10.67	1435	0.04	8.58*†	1545	[0.31]
α-Humulene	10.84	1448	0.13	9.45	1614	0.12
allo-Aromadendrene	10.94	1455	0.01	9.20	1594	0.02
γ-Murolene	11.19	1473	0.01	9.76	1638	0.02
Germacrene D	11.22	1476	0.14	9.95*	1654	[2.79]
Viridiflorene	11.42	1491	0.09	9.82	1643	0.06
α-Murolene	11.51	1497	0.07	10.16	1671	0.09
γ-Cadinene	11.68	1510	0.03	10.56	1703	0.05
epi-Elemol?	11.76	1516	0.08	13.67	1978	0.08
δ-Cadinene	11.81	1521	0.09	10.60	1707	0.10
α-Elemol	12.17	1549	10.94	14.25*	2033	11.32
Elemicin	12.30	1559	4.84	15.71	2176	5.14
Guaiol	12.74	1594	0.18	14.32	2040	0.25
5,7-diepi-α-Eudesmol	12.82	1600	0.04	14.79	2085	0.03
10-epi-γ-Eudesmol	12.96	1612	0.07	14.25*	2033	[11.32]
γ-Eudesmol	13.14	1626	1.16	15.06	2110	1.16
Unknown [m/z 59, 161 (53), 81 (47), 204 (40), 107 (36), 95 (33), 93 (33)... 222 (1)]	13.24	1635	0.06	14.56	2063	0.05
β-Eudesmol	13.33	1642	0.43	15.58	2163	0.44
α-Eudesmol	13.38	1646	0.48	15.52	2156	0.43
Bulnesol	13.54	1660	0.28			
Juniper camphor	13.87	1687	0.02	16.24	2230	0.02
Cryptomeridiol analog	14.75	1762	0.02			
α-Phellandrene dimer II	15.07	1790	0.07	12.65	1884	0.07
Cryptomeridiol	15.18	1800	0.05	20.02	2650	0.05
Unknown [m/z 159, 93 (87), 146 (72), 43 (72), 119 (48), 121 (48), 59 (25)... 220 (31)]	15.40	1819	0.01			
α-Phellandrene dimer IV	15.48	1827	0.01	13.50*	1962	[0.33]
Total identified		98.49%			97.83%	
Total reported		98.85%			98.32%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified 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