

Date : January 24, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23A17-PTH02

Customer identification : Thyme Linalool - Bulgaria - TL0108R

Type : Essential oil

Source : *Thymus vulgaris* ct. Linalool

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-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 : Candide Morin, analyste

Analysis date : January 20, 2023

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.4669 ± 0.0003 (20 °C; method PC-MAT-016)

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	%	Class
Hashishene	0.01	Monoterpene
Tricyclene	0.11	Monoterpene
α -Thujene	1.69	Monoterpene
α -Pinene	1.00	Monoterpene
α -Fenchene	0.01	Monoterpene
Camphene	1.14	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
Sabinene	0.12	Monoterpene
β -Pinene	0.27	Monoterpene
Unknown	0.06	Monoterpene
Octen-3-ol	0.09	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
Myrcene	2.70	Monoterpene
Pseudolimonene	0.12	Monoterpene
α -Phellandrene	0.10	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
Δ^3 -Carene	0.05	Monoterpene
α -Terpinene	1.43	Monoterpene
para-Cymene	2.44	Monoterpene
Limonene	0.42	Monoterpene
β -Phellandrene	1.85	Monoterpene
(<i>Z</i>)- β -Ocimene	0.07	Monoterpene
(<i>E</i>)- β -Ocimene	0.33	Monoterpene
γ -Terpinene	3.46	Monoterpene
<i>cis</i> -Sabinene hydrate	0.39	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.04	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.08	Monoterpenic alcohol
Terpinolene	0.18	Monoterpene
para-Cymenene	0.01	Monoterpene
<i>trans</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	67.94	Monoterpenic alcohol
Hotrienol	0.02	Monoterpenic alcohol
endo-Fenchol	0.13	Monoterpenic alcohol
Chrysanthenone	0.01	Monoterpenic ketone
<i>cis</i> -para-Menth-2-en-1-ol	0.07	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.07	Monoterpenic alcohol
Camphor	0.50	Monoterpenic ketone
<i>trans</i> -para-Menth-2-en-1-ol	0.06	Monoterpenic alcohol
<i>cis</i> -Verbenol	0.02	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.06	Monoterpenic alcohol
Nerol oxide	0.02	Aliphatic ether
Borneol	1.71	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Terpinen-4-ol	4.80	Monoterpenic alcohol

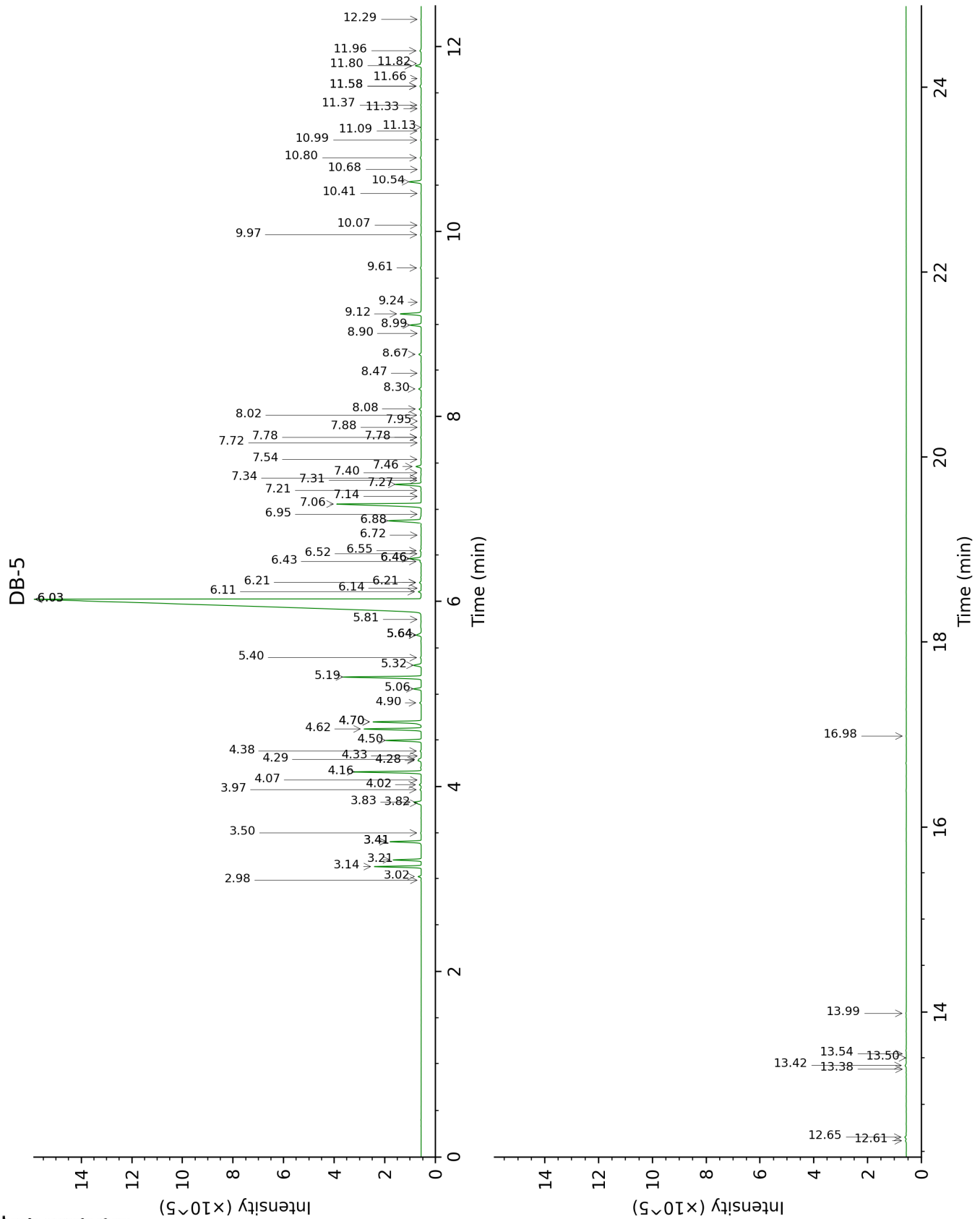
<i>trans</i> -Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	1.24	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
<i>cis</i> -Dihydrocarvone	0.05	Monoterpenic ketone
Methylchavicol	0.03	Phenylpropanoid
Verbenone	0.25	Monoterpenic ketone
<i>trans</i> -Piperitol	0.03	Monoterpenic alcohol
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Bornyl formate	0.02	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Nerol	0.01	Monoterpenic alcohol
Thymol methyl ether	0.02	Monoterpenic ether
Carvone	0.04	Monoterpenic ketone
Carvacrol methyl ether	0.10	Monoterpenic ether
Linalyl acetate	0.12	Monoterpenic ester
Unknown	0.02	Unknown
Bornyl acetate	0.11	Monoterpenic ester
Thymol analogue I (isothymol?)	0.02	Monoterpenic alcohol
Thymol	0.50	Monoterpenic alcohol
Carvacrol	0.99	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
α -Terpinyl acetate	0.04	Monoterpenic ester
α -Copaene	0.04	Sesquiterpene
β -Bourbonene	0.02	Sesquiterpene
α -Gurjunene	0.02	Sesquiterpene
β -Caryophyllene	0.59	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
Aromadendrene	0.06	Sesquiterpene
α -Humulene	0.03	Sesquiterpene
allo-Aromadendrene	0.03	Sesquiterpene
<i>cis</i> -Cadina-1(6),4-diene	0.01	Sesquiterpene
γ -Muurolene	0.02	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
Viridiflorene	0.06	Sesquiterpene
Bicyclogermacrene	tr	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
β -Bisabolene	0.28	Sesquiterpene
γ -Cadinene	0.04	Sesquiterpene
δ -Cadinene	0.08	Sesquiterpene
α -Elemol	0.02	Sesquiterpenic alcohol
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide	0.08	Sesquiterpenic ether
Isospathulenol	0.01	Sesquiterpenic alcohol
τ -Cadinol	0.07	Sesquiterpenic alcohol
β -Eudesmol	0.01	Sesquiterpenic alcohol
Unknown	0.01	Sesquiterpenic alcohol
α -Bisabolol	0.02	Sesquiterpenic alcohol
meta-Camphorene	0.02	Diterpene
Consolidated total	99.03%	

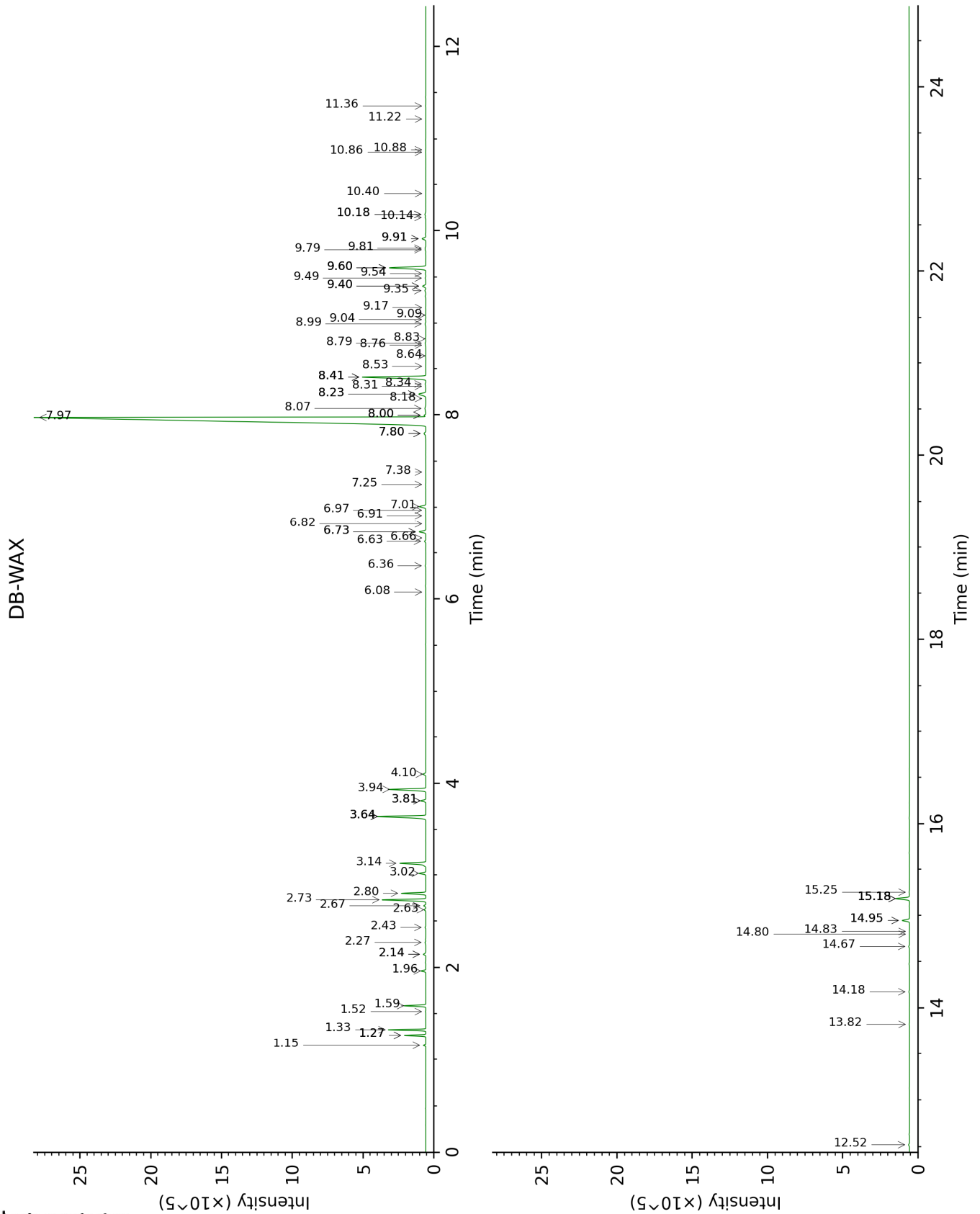
Note: no correction factor was applied

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.

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





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hashishene	2.98	916	0.01	1.27*	988	1.02
Tricyclene	3.02	918	0.11	1.15	968	0.11
α -Thujene	3.14	926	1.69	1.33	997	1.69
α -Pinene	3.21	930	1.00	1.27*	988	[1.02]
α -Fenchene	3.41*	943	1.16	1.52	1017	0.01
Camphene	3.41*	943	[1.16]	1.59	1024	1.14
Thuja-2,4(10)-diene	3.50	950	0.03	2.14*	1082	0.16
Sabinene	3.82†	970	0.42	2.14*	1082	[0.16]
β -Pinene	3.83†	971	[0.42]	1.96	1063	0.27
Unknown [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	3.97	980	0.06	2.27	1095	0.05
Octen-3-ol	4.02	984	0.09	6.63	1422	0.09
Octan-3-one	4.07	987	0.02	3.81*	1219	0.33
Myrcene	4.16	993	2.70	2.73	1132	2.72
Pseudolimonene	4.28†	1001	0.24	2.67	1127	0.12
α -Phellandrene	4.29†	1001	[0.24]	2.63	1124	0.10
<i>cis</i> -Dehydroxylinalool oxide	4.33	1004	0.01	3.64*	1206	3.54
Δ 3-Carene	4.38	1007	0.05	2.43	1108	0.04
α -Terpinene	4.50	1014	1.43	2.80	1138	1.44
para-Cymene	4.62	1022	2.44	3.94	1228	2.46
Limonene	4.70*	1027	2.27	3.02	1156	0.42
β -Phellandrene	4.70*	1027	[2.27]	3.14	1165	1.85
(<i>Z</i>)- β -Ocimene	4.90	1040	0.07	3.64*	1206	[3.54]
(<i>E</i>)- β -Ocimene	5.06	1049	0.33	3.81*	1219	[0.33]
γ -Terpinene	5.19	1057	3.46	3.64*	1206	[3.54]
<i>cis</i> -Sabinene hydrate	5.32	1065	0.39	6.73*	1430	0.47
<i>cis</i> -Linalool oxide (fur.)	5.40	1070	0.04	6.36	1403	0.04
<i>trans</i> -Linalool oxide (fur.)	5.64*	1086	0.28	6.73*	1430	[0.47]
Terpinolene	5.64*	1086	[0.28]	4.10	1241	0.18
para-Cymenene	5.64*	1086	[0.28]	6.08	1382	0.01
<i>trans</i> -Sabinene hydrate	5.81	1096	0.02	7.80*	1510	0.20
Linalool	6.03*†	1110	67.95	7.97†	1524	68.08
Hotrienol	6.03*†	1110	[67.95]	8.64	1576	0.02
endo-Fenchol	6.11	1115	0.13	8.23*	1544	0.70
Chrysanthenone	6.14	1117	0.01	6.97	1448	0.02
<i>cis</i> -para-Menth-2-en-1-ol	6.21*	1121	0.09	8.00*†	1526	[68.08]
α -Campholenal	6.21*	1121	[0.09]	6.82	1436	0.02
<i>trans</i> -Pinocarveol	6.43	1135	0.07	8.99	1603	0.06

Camphor	6.46*	1137	0.57	7.01	1451	0.50
<i>trans</i> -para-Menth-2-en-1-ol	6.46*	1137	[0.57]	8.76†	1585	0.07
<i>cis</i> -Verbenol	6.52	1141	0.02	9.09	1611	0.02
<i>trans</i> -Verbenol	6.55	1143	0.06	9.35	1633	0.08
Nerol oxide	6.72	1153	0.02	6.66	1425	0.01
Borneol	6.88	1164	1.71	9.60*	1653	2.90
Unknown [m/z 43, 71 (87), 95 (50), 81 (38), 109 (30), 41 (27)...152 (5)]	6.95	1168	0.02			
Terpinen-4-ol	7.06	1175	4.80	8.41*	1558	4.88
<i>trans</i> -Linalool oxide (pyr.)	7.14	1180	0.01	10.40	1719	0.01
para-Cymen-8-ol	7.20	1184	0.02	11.36	1800	0.02
α-Terpineol	7.27	1189	1.24	9.60*	1653	[2.90]
Myrtenal	7.31	1191	0.03	8.53	1567	0.01
<i>cis</i> -Dihydrocarvone	7.34	1193	0.05	8.34	1552	0.05
Methylchavicol	7.40	1197	0.03	9.17	1618	0.02
Verbenone	7.46	1201	0.25	9.40*	1637	0.25
<i>trans</i> -Piperitol	7.54	1206	0.03	10.18*	1700	0.08
<i>trans</i> -Carveol	7.72	1218	0.01	11.22	1788	0.01
Bornyl formate	7.78*	1222	0.04	7.80*	1510	[0.20]
Unknown [m/z 119, 43 (52), 59 (45), 91 (36), 79 (24), 134 (23)...]	7.78*	1222	[0.04]	10.86	1757	0.02
Nerol	7.88	1229	0.01	10.88	1760	0.01
Thymol methyl ether	7.95	1233	0.02	8.31	1550	0.03
Carvone	8.02	1238	0.04	9.80†	1668	0.09
Carvacrol methyl ether	8.08	1242	0.10	8.41*	1558	[4.88]
Linalyl acetate	8.30	1256	0.12	8.00*†	1526	[68.08]
Unknown [m/z 82, 109 (35), 135 (22), 127 (19), 54 (16), 43 (14)...]	8.47	1268	0.02			
Bornyl acetate	8.67	1281	0.11	8.07	1531	0.14
Thymol analogue I (isothymol?)	8.90	1297	0.02	14.83	2122	0.01
Thymol	9.00	1303	0.50	14.95*	2134	0.51
Carvacrol	9.12	1311	0.99	15.18*	2157	1.00
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)...170? (4)]	9.24	1320	0.01	14.80	2119	0.01
α-Terpinyl acetate	9.61	1346	0.04	9.54	1648	0.04
α-Copaene	9.97	1371	0.04	6.91	1444	0.02
β-Bourbonene	10.07	1378	0.02	7.25	1469	0.02
α-Gurjunene	10.41	1402	0.02	7.38	1479	0.02

β-Caryophyllene	10.54	1412	0.59	8.23*	1544	[0.70]
β-Copaene	10.68	1422	0.01	8.18	1540	0.01
Aromadendrene	10.80	1432	0.06	8.41*	1558	[4.88]
α-Humulene	11.00	1446	0.03	9.04	1607	0.03
allo-Aromadendrene	11.09	1453	0.03	8.83	1590	0.03
cis-Cadina-1(6),4-diene	11.13	1456	0.01	8.78†	1587	[0.07]
γ-Murolene	11.33	1471	0.02	9.40*	1637	[0.25]
Germacrene D	11.37	1474	0.03	9.60*	1653	[2.90]
Viridiflorene	11.58*	1489	0.08	9.49	1644	0.06
Bicyclogermacrene	11.58*	1489	[0.08]	9.92*	1678	0.28
α-Murolene	11.66	1495	0.02	9.81†	1670	[0.09]
β-Bisabolene	11.80	1505	0.28	9.92*	1678	[0.28]
γ-Cadinene	11.82	1507	0.04	10.14	1697	0.05
δ-Cadinene	11.96	1518	0.08	10.18*	1700	[0.08]
α-Elemol	12.30	1544	0.02	13.82	2024	0.02
Spathulenol	12.61	1569	0.05	14.18	2058	0.05
Caryophyllene oxide	12.65	1572	0.08	12.52	1903	0.07
Isospathulenol	13.38	1631	0.01	15.25	2164	0.03
τ-Cadinol	13.42	1634	0.07	14.67	2106	0.06
β-Eudesmol	13.50	1641	0.01	15.18*	2157	[1.00]
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.54	1644	0.01	14.95*	2134	[0.51]
α-Bisabolol	13.99	1681	0.02	15.18*	2157	[1.00]
meta-Camphorene	16.98	1947	0.02	15.18*	2157	[1.00]
Total identified		98.99%			98.82%	
Total reported		99.11%			98.90%	

*: 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