Date : October 06, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22I29-PTH02
Customer identification : Mandarin Green ORGANIC - Brazil - MI0104R
Type : Essential oil
Source : *Citrus reticulata* cv. Mandarine
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 : Amélie Simard, Analyste
Analysis date : October 05, 2022

Checked and approved by :

2022-10-06

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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PHYSICOCHEMICAL DATA

Physical aspect: Bright green liquid
Refractive index: 1.4758 ± 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
Nonane	tr	Alkane
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.72	Monoterpene
α-Pinene	1.96	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	tr	Monoterpene
β-Pinene	1.44	Monoterpene
Sabinene	0.25	Monoterpene
Myrcene	1.74	Monoterpene
α-Phellandrene	0.07	Monoterpene
Octanal	0.09	Aliphatic aldehyde
α-Terpinene	0.39	Monoterpene
meta-Cymene	0.02	Monoterpene
para-Cymene	0.57	Monoterpene
β-Phellandrene	0.21	Monoterpene
Limonene	70.10	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	17.76	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.81	Monoterpene
trans-Sabinene hydrate	0.06	Monoterpenic alcohol
Linalool	0.15	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
Epoxyterpinolene	0.02	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Unknown	0.02	Unknown
Terpinen-4-ol	0.08	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.19	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Decanal	0.10	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.02	Monoterpenic alcohol
Citronellol	0.03	Monoterpenic alcohol
Thymol methyl ether	0.01	Monoterpenic ether
Neral	0.01	Monoterpenic aldehyde
Geranial	0.02	Monoterpenic aldehyde
trans-Ascaridole glycol?	0.04	Oxygenated monoterpene
Isopiperitenone	0.01	Monoterpenic ketone

Thymol	0.09	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
Unknown	0.01	Monoterpenic alcohol
α-Copaene	0.02	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Dimethyl anthranilate	0.50	Phenolic ester
Dodecanal	0.03	Aliphatic aldehyde
β-Caryophyllene	0.15	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(2*E*)-Dodecenal	0.02	Aliphatic aldehyde
Germacrene D	0.02	Sesquiterpene
α-Selinene	0.09	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.35	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
(2*E*)-Tetradecenal	0.01	Aliphatic aldehyde
α-Sinensal	0.38	Sesquiterpenic aldehyde
Myristic acid	0.01	Aliphatic acid
meta-Camphorene	0.01	Diterpene
Palmitic acid	0.06	Aliphatic acid
para-Camphorene	0.04	Diterpene
Phytol	0.02	Diterpenic alcohol
Linoleic acid	0.03	Aliphatic acid
Oleic acid	0.01	Aliphatic acid
Stearic acid	0.01	Aliphatic acid
Tangeretin	0.30	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.04	Flavonoid
Nobiletin	0.09	Flavonoid
Consolidated total	**99.57%**	

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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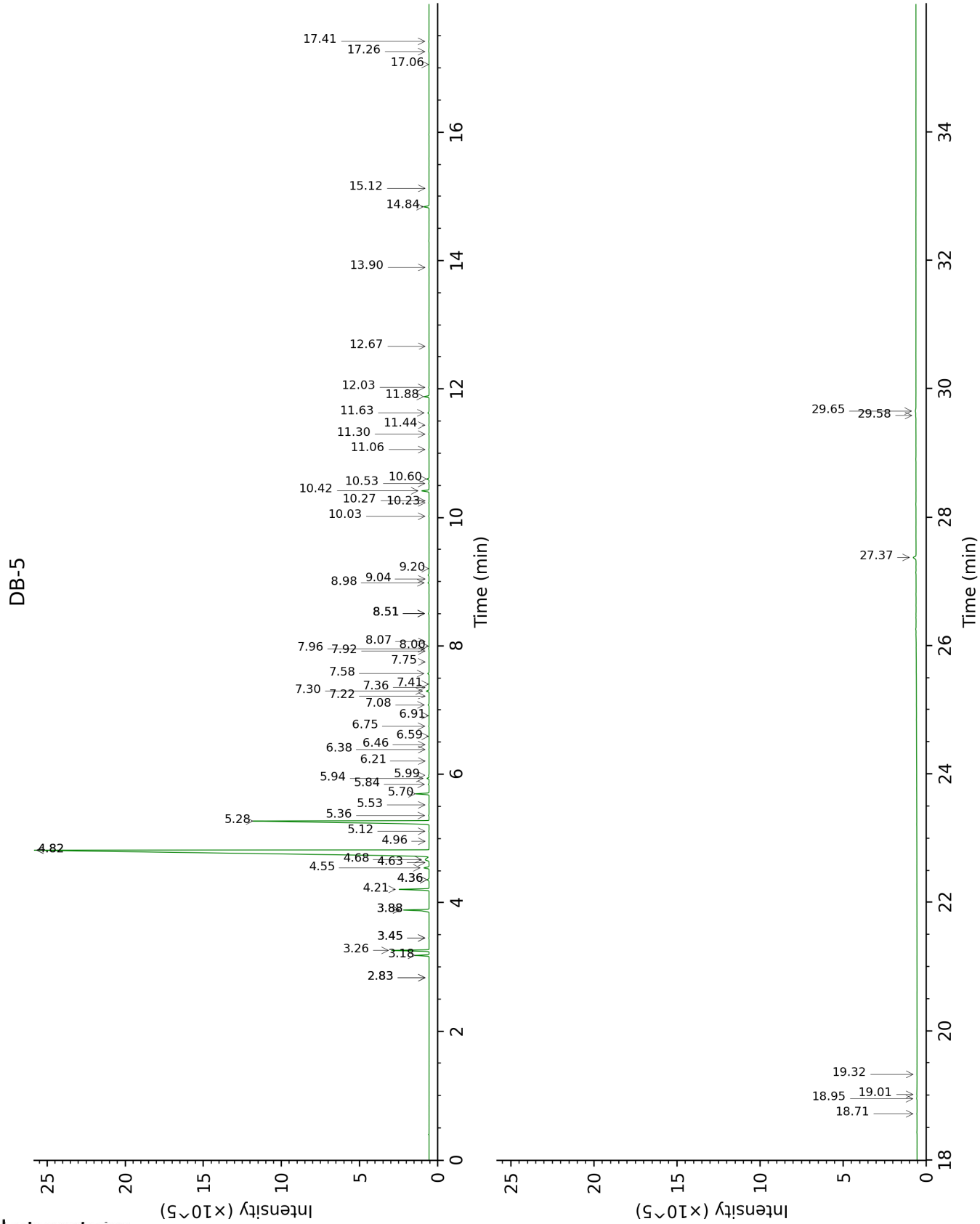
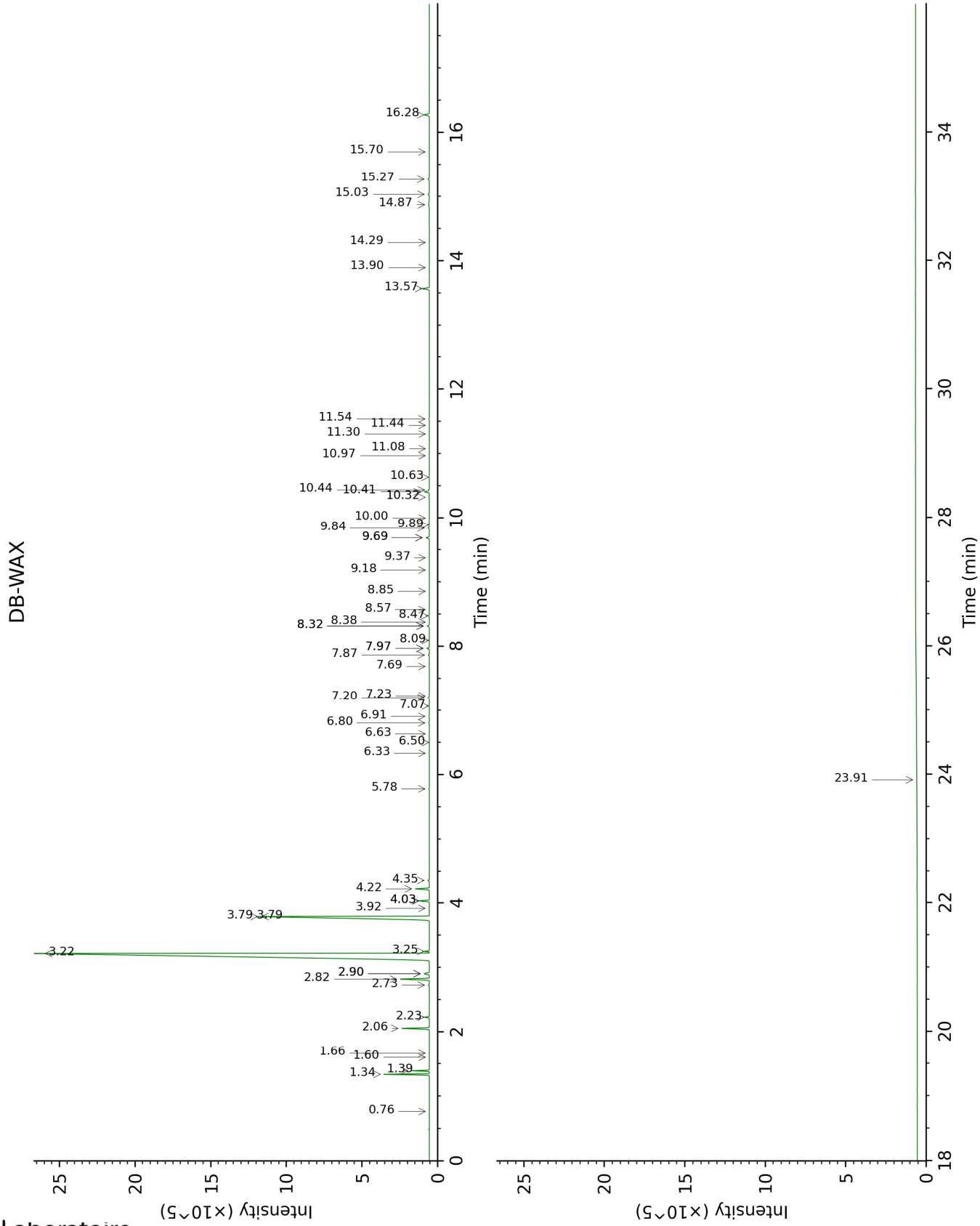

DB-5
17.41
17.26
17.06
15.12
14.84
13.90
12.67
12.03
11.88
11.63
11.44
11.30
11.06
10.60
10.53
10.42
10.27
10.23
10.03
9.20
9.04
8.98
8.51
8.07
8.00
7.96
7.92
7.75
7.58
7.41
7.36
7.30
7.22
7.08
6.91
6.75
6.59
6.46
6.38
6.21
5.99
5.94
5.84
5.70
5.53
5.36
5.28
5.12
4.96
4.82
4.68
4.63
4.55
4.36
4.21
3.88
3.45
3.26
3.18
2.83
Time (min)
Intensity (×10^5)
29.65
29.58
27.37
19.32
19.01
18.95
18.71
Time (min)
Intensity (×10^5)


DB-WAX
16.28
15.70
15.27
15.03
14.87
14.29
13.90
13.57
11.54
11.44
11.30
11.08
10.97
10.63
10.44
10.41
10.32
10.00
9.89
9.84
9.69
9.37
9.18
8.85
8.57
8.47
8.32
8.38
8.09
7.97
7.87
7.69
7.23
7.20
7.07
6.91
6.80
6.63
6.50
6.33
5.78
4.35
4.22
4.03
3.92
3.79
3.79
3.25
3.22
2.90
2.82
2.73
2.23
2.06
1.66
1.60
1.39
1.34
0.76
23.91
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Nonane	2.83*	904	0.02	0.76	896	tr
Heptanal	2.83*	904	[0.02]	2.90*	1140	0.38
α-Thujene	3.18	926	0.72	1.39	1000	0.72
α-Pinene	3.26	932	1.96	1.34	994	1.97
Camphene	3.45*	944	0.03	1.66	1027	0.02
α-Fenchene	3.45*	944	[0.03]	1.60	1021	tr
β-Pinene	3.88*	973	1.68	2.06	1067	1.44
Sabinene	3.88*	973	[1.68]	2.23	1084	0.25
Myrcene	4.20	994	1.74	2.82	1133	1.75
α-Phellandrene	4.36*	1004	0.16	2.73	1126	0.07
Octanal	4.36*	1004	[0.16]	4.35	1249	0.09
α-Terpinene	4.55	1016	0.39	2.90*	1140	[0.38]
meta-Cymene	4.63	1021	0.02	4.03*	1226	0.58
para-Cymene	4.68	1024	0.57	4.03*	1226	[0.58]
β-Phellandrene	4.82*	1033	70.03	3.25	1167	0.21
Limonene	4.82*	1033	[70.03]	3.22	1165	70.10
(*Z*)-β-Ocimene	4.96	1042	0.01	3.79*	1208	17.85
(*E*)-β-Ocimene	5.12	1051	0.02	3.92	1218	0.03
γ-Terpinene	5.28	1061	17.76	3.79*	1208	[17.85]
cis-Sabinene hydrate	5.36	1066	0.05	6.80	1428	0.04
Octanol	5.53	1077	0.03	8.09	1525	0.02
Terpinolene	5.70	1088	0.81	4.22	1240	0.81
trans-Sabinene hydrate	5.84	1097	0.06	7.87	1508	0.06
Linalool	5.94	1102	0.15	7.97*	1516	0.15
Nonanal	5.99	1106	0.04	5.78	1353	0.03
trans-para-Mentha-2,8-dien-1-ol	6.21	1120	0.01	8.85	1584	0.01
cis-Limonene oxide	6.38	1131	0.02	6.33	1393	0.02
trans-Limonene oxide	6.46	1136	0.01	6.50	1405	0.02
Epoxyterpinolene	6.59	1144	0.02	6.63	1415	0.02
Citronellal	6.75	1154	0.03	6.91	1436	0.03
Unknown [m/z 43, 109 (68), 67 (62), 81 (36), 41 (31), 137 (29), 79 (26)...]	6.91	1165	0.02	7.23	1460	0.01
Terpinen-4-ol	7.08	1175	0.08	8.48	1555	0.07
para-Cymen-8-ol	7.22	1185	0.01	11.44	1799	0.01
α-Terpineol	7.30	1190	0.19	9.69*	1652	0.22
Unknown [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.36	1193	0.01	7.69	1494	0.03
Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.41	1196	0.01	7.97*	1516	[0.15]
Decanal	7.58	1207	0.10	7.20	1458	0.09
trans-Carveol	7.76	1219	0.01	11.30	1787	tr

Nerol	7.92	1230	0.02	10.97	1758	0.01
Citronellol	7.96	1233	0.03	10.64	1730	0.04
Thymol methyl ether	8.00	1236	0.01	8.38	1547	0.01
Neral	8.07	1240	0.01	9.37	1626	0.01
Geranial	8.51*	1269	0.07	10.00	1677	0.02
trans-Ascaridole glycol?	8.51*	1269	[0.07]			
Isopiperitenone	8.51*	1269	[0.07]	11.08	1768	0.01
Thymol	8.98	1301	0.09	15.03	2132	0.09
Undecanal	9.04	1303	0.01	8.57	1562	0.01
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	9.20	1314	0.01	14.87	2116	0.16
α-Copaene	10.03	1372	0.02	7.07	1448	0.02
Geranyl acetate	10.23	1387	0.02	10.44	1713	0.04
β-Elemene	10.26	1389	0.01	8.32*	1542	0.16
Dimethyl anthranilate	10.42	1400	0.50	13.57	1991	0.51
Dodecanal	10.53	1409	0.03	9.89	1668	0.03
β-Caryophyllene	10.60	1414	0.15	8.32*	1542	[0.16]
α-Humulene	11.06	1448	0.02	9.18	1611	0.02
(2*E*)-Dodecenal	11.30	1466	0.02	11.54	1808	0.03
Germacrene D	11.44	1476	0.02	9.69*	1652	[0.22]
α-Selinene	11.63	1490	0.09	9.84	1664	0.09
(3*E*,6*E*)-α-Farnesene	11.88	1509	0.35	10.41	1711	0.35
δ-Cadinene	12.02	1520	0.03	10.32	1704	0.03
Spathulenol	12.67	1571	0.01	14.28	2059	0.01
(2*E*)-Tetradecenal	13.90	1670	0.01	13.90	2022	0.01
α-Sinensal	14.84	1750	0.38	16.28	2258	0.38
Myristic acid	15.12	1775	0.01			
meta-Camphorene	17.06	1950	0.01	15.27	2155	0.11
Palmitic acid	17.26	1969	0.06			
para-Camphorene	17.42	1984	0.04	15.70	2198	0.03
Phytol	18.71	2112	0.02			
Linoleic acid	18.94	2136	0.03	23.91	3201	0.01
Oleic acid	19.01	2142	0.01			
Stearic acid	19.32	2174	0.01			
Tangeretin	27.37	3126	0.30			
3,3',4',5,6,7,8-Heptamethoxyflavone	29.58	3304	0.04			
Nobiletin	29.65	3308	0.09			
Total identified		**99.24%**			**99.13%**	
Total reported		**99.30%**			**99.33%**	

*: Two or more compounds are coeluting on this column
[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
R.T.: Retention time (minutes)
R.I.: Retention index