

Date : 2024-04-16

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24D02-PTH02

Customer Identification : Tangerine - USA - T10113R

Type : Essential Oil

Source : *Citrus reticulata* cv. Tangerine

Customer : Plant Therapy

Checked and approved by:

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

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GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

***ISO**

Results : See analysis summary (next page)

Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005

Date : 2024-04-10

PHYSICOCHEMICAL DATA

Refractive index : 1.4746 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2024-04-04

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
α -Thujene	0.04	Monoterpene
α -Pinene	0.50	Monoterpene
Camphene	tr	Monoterpene
β -Pinene	0.10	Monoterpene
Sabinene	0.22	Monoterpene
Myrcene	1.63	Monoterpene
α -Phellandrene	0.03	Monoterpene
Pseudolimonene	tr	Monoterpene
Octanal	0.11	Aliphatic aldehyde
Δ^3 -Carene	0.03	Monoterpene
α -Terpinene	0.02	Monoterpene
<i>para</i> -Cymene	0.13	Monoterpene
Limonene	91.67	Monoterpene
β -Phellandrene	0.24	Monoterpene
1,8-Cineole	tr	Monoterpenic ether
(<i>Z</i>)- β -Ocimene	0.01	Monoterpene
(<i>E</i>)- β -Ocimene	0.11	Monoterpene
γ -Terpinene	0.92	Monoterpene
<i>cis</i> -Sabinene hydrate	tr	Monoterpenic alcohol
Octanol	0.04	Aliphatic alcohol
Terpinolene	0.07	Monoterpene
<i>trans</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	0.52	Monoterpenic alcohol
Nonanal	0.05	Aliphatic aldehyde
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.02	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.04	Monoterpenic ether
Citronellal	0.05	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.13	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Decanal	0.15	Aliphatic aldehyde
Octyl acetate	0.04	Aliphatic ester
Nerol	0.03	Monoterpenic alcohol
Citronellol	0.03	Monoterpenic alcohol
Thymol methyl ether	0.02	Monoterpenic ether
Neral	0.04	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Perillaldehyde	0.02	Monoterpenic aldehyde

Geranial	0.03	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Limonen-10-ol	0.01	Monoterpenic alcohol
Thymol	0.02	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
<i>para</i> -Mentha-1,8-diene-4-hydroperoxide	0.03	Monoterpenic peroxide
α -Cubebene	0.01	Sesquiterpene
Unknown	0.02	Sesquiterpene
Neryl acetate	0.06	Monoterpenic ester
α -Copaene	0.05	Sesquiterpene
Geranyl acetate	0.05	Monoterpenic ester
β -Elemene	0.03	Sesquiterpene
Dodecanal	0.04	Aliphatic aldehyde
β -Caryophyllene	0.05	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.01	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.02	Sesquiterpene
Germacrene D	0.06	Sesquiterpene
Valencene	0.06	Sesquiterpene
α -Selinene	0.02	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.02	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.06	Sesquiterpene
α -Elemol	0.02	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
β -Sinensal	0.03	Sesquiterpenic aldehyde
α -Sinensal	0.04	Sesquiterpenic aldehyde
<i>meta</i> -Camphorene	0.07	Diterpene
Palmitic acid	0.01	Aliphatic acid
Linoleic acid	0.02	Aliphatic acid
Oleic acid	0.04	Aliphatic acid
Stearic acid	0.05	Aliphatic acid
Tangeretin	0.22	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.08	Flavonoid
Nobiletin	0.12	Flavonoid
Consolidated total	98.55	

tr: The compound has been detected below 0.005% of the total signal

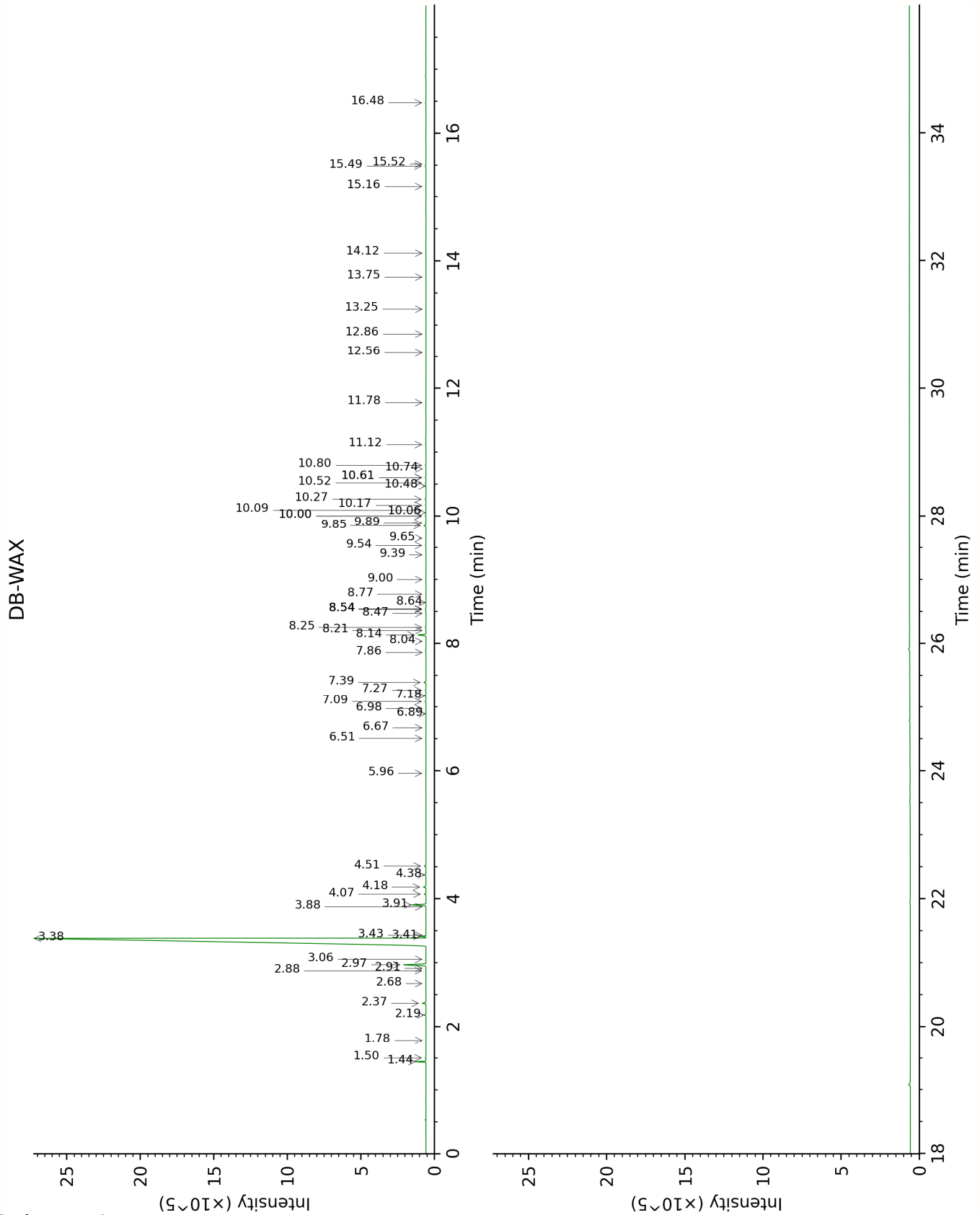
Note: no correction factor was applied

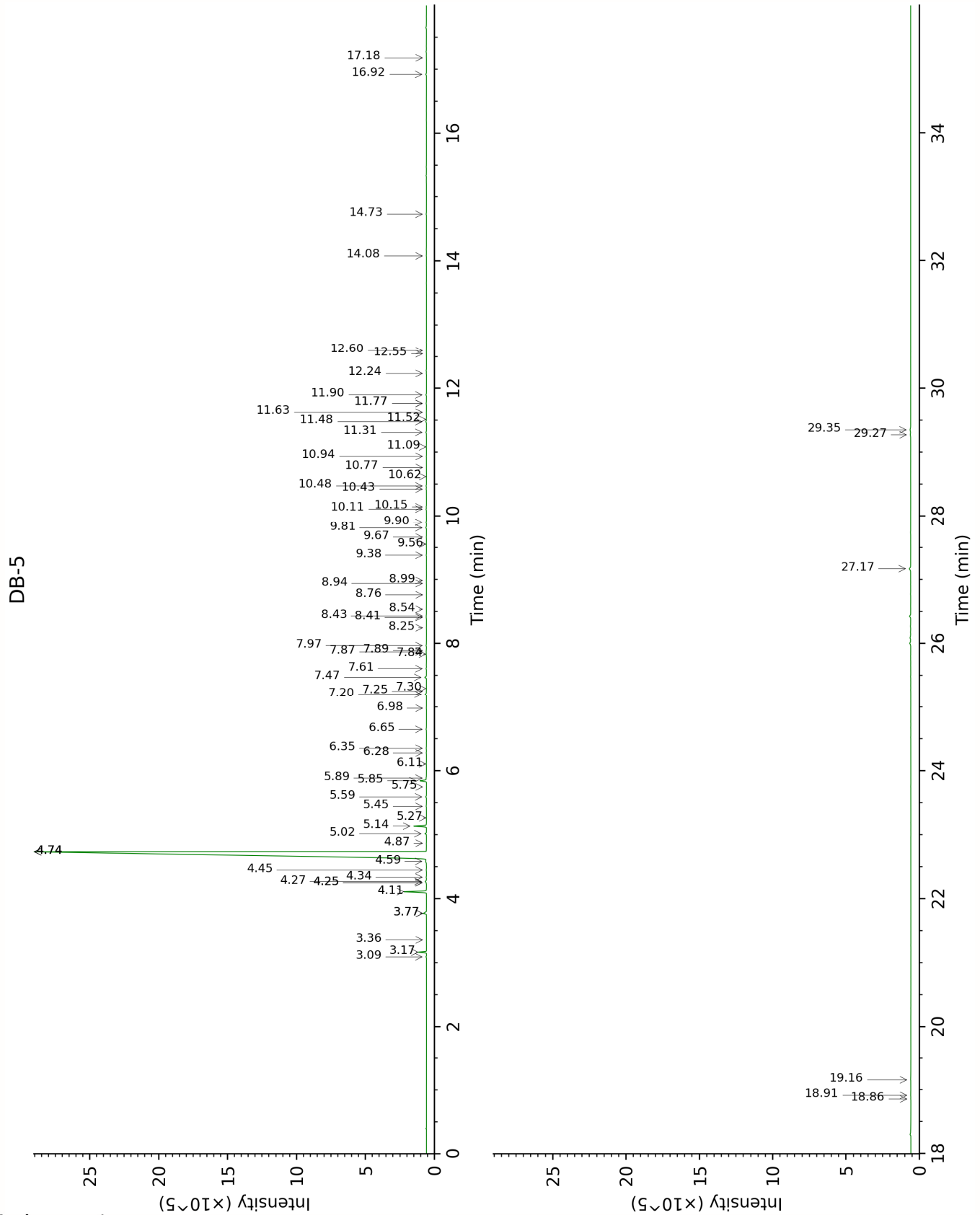
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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





FULL ANALYSIS DATA

α-Thujene	Column DB-WAX			Column DB-5		
	1.50	1001.8	0.04	3.09	926.2	0.04
α -Pinene	1.44	992.6	0.50	3.17	931.0	0.50
Camphene	1.78	1029.8	tr	3.36	943.7	tr
β -Pinene	2.18	1067.5	0.10	3.77*	970.9	[0.33]
Sabinene	2.37	1084.8	0.22	3.77*	970.9	[0.33]
Myrcene	2.97	1134.4	1.64	4.11	993.3	1.63
α -Phellandrene	2.88	1127.3	0.03	4.25*†	1002.5	[0.03]
Pseudolimonene	2.91	1130.1	tr	4.25*†	1002.5	[0.03]
Octanal	4.51	1248.6	0.11	4.27*†	1003.7	[0.11]
Δ 3-Carene	2.68	1112.2	0.03	4.34	1008.0	0.03
α -Terpinene	3.06	1140.8	0.03	4.45	1015.1	0.02
<i>para</i> -Cymene	4.18	1225.2	0.17	4.59	1023.5	0.13
Limonene	3.38	1165.7	91.67	4.74*	1032.9	[91.81]
β -Phellandrene	3.41	1168.1	0.24	4.74*	1032.9	[91.81]
1,8-Cineole	3.43	1169.3	tr	4.74*	1032.9	[91.81]
(<i>Z</i>)- β -Ocimene	3.88	1203.1	0.01	4.87	1041.2	0.01
(<i>E</i>)- β -Ocimene	4.07	1217.4	0.11	5.02	1050.6	0.11
γ -Terpinene	3.91	1205.4	0.92	5.14	1058.0	0.92
<i>cis</i> -Sabinene hydrate	6.98	1426.5	0.01	5.27	1066.0	tr
Octanol	8.25	1523.2	0.05	5.45	1077.2	0.04
Terpinolene	4.38	1238.8	0.07	5.59	1086.5	0.07
<i>trans</i> -Sabinene hydrate	8.04	1506.1	tr	5.75	1096.3	0.01
Linalool	8.14	1513.9	0.55	5.85	1102.3	0.52
Nonanal	5.96	1352.5	0.03	5.89	1104.9	0.05
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.00	1582.0	0.02	6.11	1119.0	0.02
<i>cis</i> -Limonene oxide	6.51	1391.9	0.02	6.28	1129.9	0.02
<i>trans</i> -Limonene oxide	6.68	1404.0	0.02	6.35	1134.6	0.04
Citronellal	7.09	1434.7	0.07	6.65	1153.5	0.05
Terpinen-4-ol	8.64	1553.7	0.01	6.98	1174.7	0.01
α -Terpineol	9.85	1650.6	0.13	7.20	1188.7	0.13
Unknown MISC XXXI [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.86	1493.0	0.01	7.25	1191.9	0.01
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	8.21	1519.5	0.01	7.30	1194.7	0.01
Decanal	7.39	1457.8	0.15	7.47	1206.0	0.15
Octyl acetate	7.18	1441.6	0.04	7.61	1215.1	0.04
Nerol	11.12	1758.4	0.04	7.84	1230.3	0.03

Citronellol	10.80	1730.2	0.05	7.87	1232.7	0.03
Thymol methyl ether	8.54*	1545.6	[0.08]	7.89	1234.1	0.02
Neral	9.54	1624.9	0.06	7.97	1239.2	0.04
Geraniol	11.78	1805.8	0.02	8.25	1257.8	0.01
Perillaldehyde	10.74	1725.5	0.01	8.41	1268.7	0.02
Geranial	10.17	1677.5	0.05	8.43	1270.1	0.03
Unknown CIAU V [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	12.56	1877.2	0.01	8.54	1277.2	0.01
Limonen-10-ol	13.25	1941.1	0.01	8.76	1292.3	0.01
Thymol	15.16	2126.7	0.02	8.94	1304.2	0.02
Undecanal	8.77	1564.0	0.01	8.99	1307.3	0.02
<i>para</i> -Mentha-1,8- diene-4- hydroperoxide				9.38	1335.3	0.03
α -Cubebene	6.89	1420.3	0.01	9.56	1347.5	0.01
Unknown PIMA XXVI [m/z 43, 81 (96), 95 (85), 67 (74), 69 (68), 41 (66)...204 (1)]				9.67	1355.3	0.02
Neryl acetate	10.27	1685.4	0.07	9.81	1365.6	0.06
α -Copaene	7.27	1448.5	0.05	9.90	1371.9	0.05
Geranyl acetate	10.61*	1713.7	[0.06]	10.11	1386.7	0.05
β -Elemene	8.54*	1545.6	[0.08]	10.15	1389.1	0.03
Dodecanal	10.06	1667.9	0.03	10.43	1408.9	0.04
β -Caryophyllene	8.54*	1545.6	[0.08]	10.48	1412.7	0.05
β -Copaene	8.47	1540.3	0.01	10.62	1423.6	0.01
<i>trans</i> - α -Bergamotene	8.54*	1545.6	[0.08]	10.76	1434.2	0.01
α -Humulene	9.39	1612.8	0.02	10.94	1447.1	0.02
(<i>E</i>)- β -Farnesene	9.65	1634.3	0.02	11.09	1458.1	0.02
Germacrene D	9.89	1653.9	0.05	11.31	1475.0	0.06
Valencene	10.00*	1663.5	[0.06]	11.48	1487.4	0.06
α -Selinene	10.00*	1663.5	[0.06]	11.52	1490.1	0.02
α -Muurolene	10.09	1671.0	0.03	11.63	1498.3	0.02
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	10.61*	1713.7	[0.06]	11.77*	1508.8	[0.05]
γ -Cadinene	10.48	1702.6	0.02	11.77*	1508.8	[0.05]
δ -Cadinene	10.52	1706.5	0.06	11.90	1519.2	0.06
α -Elemol	14.12	2024.3	0.02	12.24	1545.6	0.02
Germacrene D-4-ol	13.75	1988.4	0.01	12.55	1569.9	0.01
Caryophyllene oxide	12.86	1904.4	0.01	12.60	1573.8	0.01
β -Sinensal	15.52	2163.7	0.02	14.08	1694.4	0.03
α -Sinensal	16.48	2263.0	0.05	14.73	1750.1	0.04
<i>meta</i> -Camphorene	15.49	2160.4	0.07	16.92	1948.9	0.07
Palmitic acid				17.18	1973.5	0.01

Linoleic acid		18.86	2140.0	0.02
Oleic acid		18.92	2145.9	0.04
Stearic acid		19.16	2171.0	0.05
Tangeretin		27.17	3140.0	0.22
3,3',4',5,6,7,8- Heptamethoxyflavone		29.27	3321.2	0.08
Nobiletin		29.35	3326.3	0.12
Total reported	98.04%		98.45%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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