

Date : July 15, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20G08-PTH11


Customer identification : Tangerine - Spain - T10106202R

Type : Essential oil

Source : *Citrus reticulata* cv. Tangerine

Customer : Plant Therapy

ANALYSIS

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

Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : July 13, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

PHYSICOCHEMICAL DATA

Physical aspect: Orange liquid

Refractive index: 1.4752 ± 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
α -Thujene	0.02	Monoterpene
α -Pinene	0.56	Monoterpene
Camphene	tr	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
Sabinene	1.00	Monoterpene
β -Pinene	0.09	Monoterpene
Myrcene	1.82	Monoterpene
α -Phellandrene	0.02	Monoterpene
Octanal	0.20	Aliphatic aldehyde
Δ^3 -Carene	0.06	Monoterpene
α -Terpinene	0.01	Monoterpene
para-Cymene	0.03	Monoterpene
Limonene	91.11	Monoterpene
1,8-Cineole	0.26	Monoterpenic ether
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.09	Monoterpene
γ -Terpinene	0.16	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.29	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.05	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.03	Monoterpenic alcohol
Unknown	0.01	Unknown
Decanal	0.22	Aliphatic aldehyde
trans-Carveol	0.02	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Carvone	0.05	Monoterpenic ketone
(2E)-Decenal	tr	Aliphatic aldehyde
Perillaldehyde	tr	Monoterpenic aldehyde
Geranial	0.02	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
cis-Ascaridole glycol	0.01	Monoterpenic alcohol
Undecanal	tr	Aliphatic aldehyde
Limonene cis-glycol	0.02	Monoterpenic alcohol
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
Limonene trans-glycol	0.01	Monoterpenic alcohol
Unknown	tr	Sesquiterpene

α-Copaene	0.04	Sesquiterpene
β-Cubebene	tr	Sesquiterpene
Geranyl acetate	0.04	Monoterpenic ester
Dimethyl anthranilate	0.01	Phenolic ester
β-Caryophyllene	0.04	Sesquiterpene
α-Humulene	0.03	Sesquiterpene
(2E)-Dodecenal	0.01	Aliphatic aldehyde
α-Selinene	0.02	Sesquiterpene
(3E,6E)-α-Farnesene	0.07	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
(2E)-Tridecenal	0.01	Aliphatic aldehyde
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.04	Sesquiterpenic ether
Tetradecanal	0.01	Aliphatic aldehyde
α-Sinensal	0.23	Sesquiterpenic aldehyde
Myristic acid	0.09	Aliphatic acid
Palmitic acid	0.14	Aliphatic acid
Linoleic acid	0.06	Aliphatic acid
Oleic acid	0.09	Aliphatic acid
Stearic acid	0.29	Aliphatic acid
Tangeretin	0.07	Flavonoid
Nobiletin	0.21	Flavonoid
Consolidated total	97.89%	

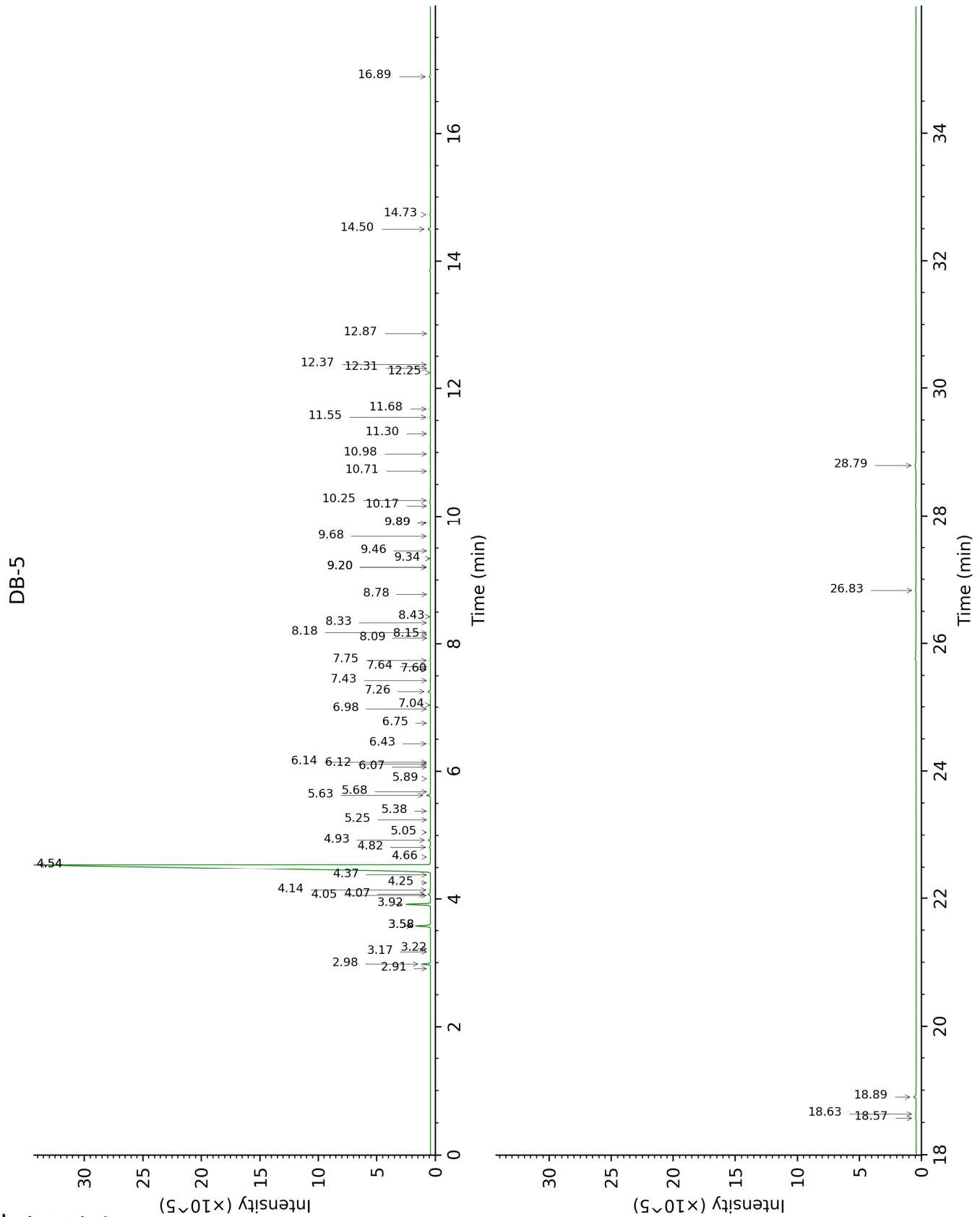
tr: The compound has been detected below 0.005% of total signal.

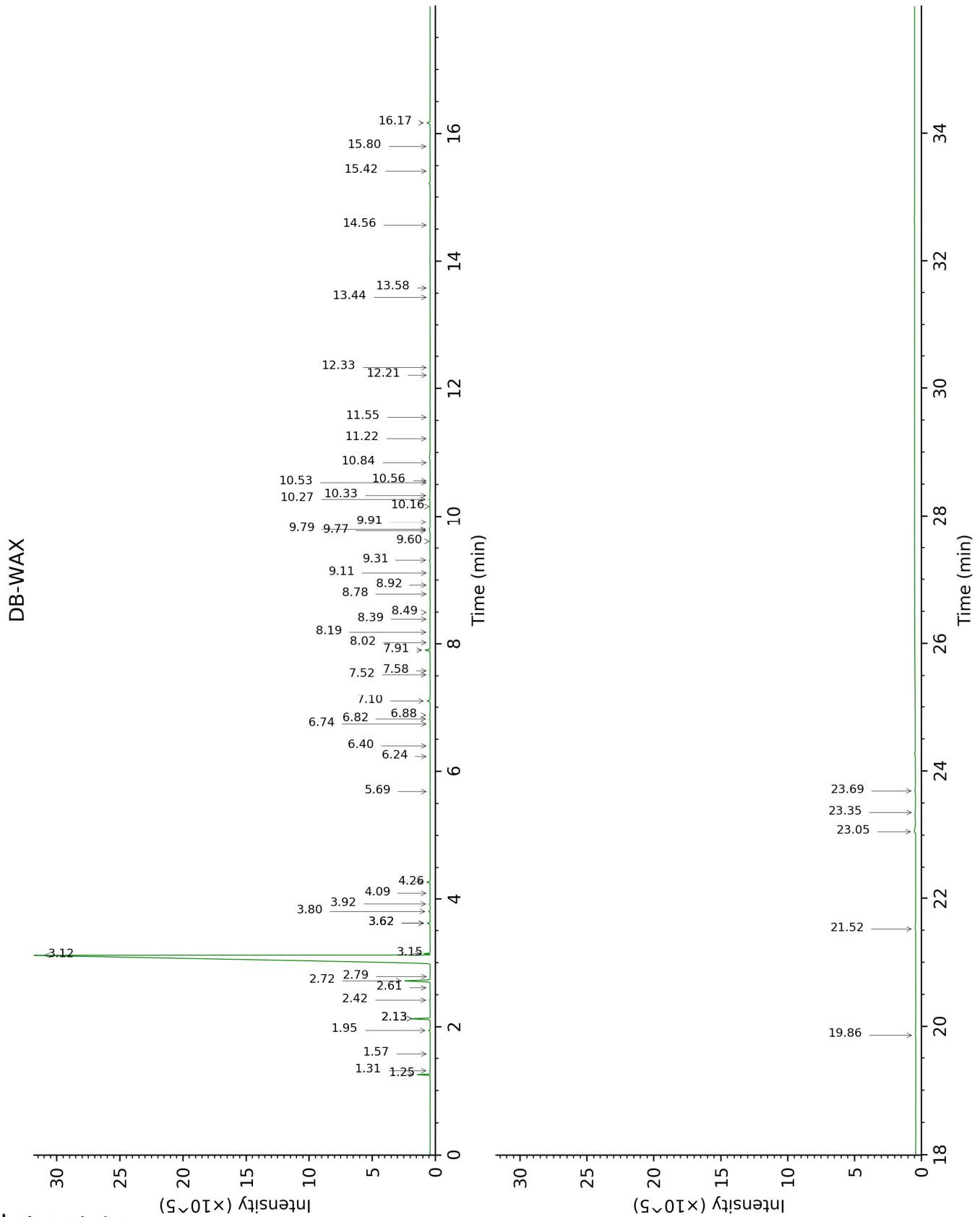
Note: no correction factor was applied

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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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Thujene	2.91	926	0.02	1.31	997	0.02
α-Pinene	2.98	930	0.56	1.25	988	0.56
Camphene	3.17	943	tr	1.57	1024	0.01
Thuja-2,4(10)-diene	3.22	946	tr	2.13*	1083	1.02
Sabinene	3.58*	970	1.09	2.13*	1083	[1.02]
β-Pinene	3.58*	970	[1.09]	1.95	1064	0.09
Myrcene	3.92	992	1.82	2.72	1134	1.83
α-Phellandrene	4.05	1001	0.02	2.61	1125	0.03
Octanal	4.07	1002	0.20	4.26	1254	0.20
Δ ³ -Carene	4.14	1006	0.06	2.42	1109	0.05
α-Terpinene	4.25	1014	0.01	2.79	1139	0.01
para-Cymene	4.37	1021	0.03	3.92	1228	0.05
Limonene	4.54*	1032	91.82	3.12	1166	91.11
1,8-Cineole	4.54*	1032	[91.82]	3.15	1168	0.26
(Z)-β-Ocimene	4.66	1039	0.01	3.62*	1206	0.17
(E)-β-Ocimene	4.82	1049	0.09	3.80	1220	0.09
γ-Terpinene	4.93	1056	0.16	3.62*	1206	[0.17]
cis-Sabinene hydrate	5.05	1064	0.01	6.74	1430	0.01
Octanol	5.24	1076	0.01	8.02	1527	0.01
Terpinolene	5.38	1084	0.02	4.09	1241	0.03
Linalool	5.63	1100	0.29	7.91	1518	0.32
Nonanal	5.68	1104	0.02	5.69	1352	0.02
trans-para-Mentha-2,8-dien-1-ol	5.89	1117	0.01	8.78	1586	0.01
cis-Limonene oxide	6.07	1128	0.01	6.24	1392	0.02
cis-para-Mentha-2,8-dien-1-ol	6.12	1132	0.01	9.31	1628	0.07
trans-Limonene oxide	6.14	1133	0.02	6.40	1404	0.02
Citronellal	6.43	1152	0.05	6.82	1436	0.05
Terpinen-4-ol	6.76	1173	0.01	8.39	1555	0.01
α-Terpineol	6.98	1187	0.03	9.60	1652	0.03
Unknown [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.04	1191	0.01	7.52	1488	0.03
Decanal	7.26	1206	0.22	7.10	1457	0.20
trans-Carveol	7.43	1218	0.02	11.22	1787	0.02
Nerol	7.60	1229	0.01	10.84	1755	0.01
Citronellol	7.64	1232	0.01	10.56	1731	0.01
Carvone	7.74	1239	0.05	9.79	1667	0.06
(2E)-Decenal	8.09	1263	tr	8.92	1596	0.01
Perillaldehyde	8.15	1267	tr	10.53	1729	tr

Geranial	8.18	1269	0.02	9.91	1677	0.03
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.33	1280	0.01	12.21	1874	0.01
<i>cis</i> -Ascaridole glycol	8.43	1286	0.01	14.56	2095	0.01
Undecanal	8.78	1306	tr	8.50	1563	tr
Limonene <i>cis</i> -glycol	9.20*	1336	0.03	15.42	2179	0.02
para-Mentha-1,8-diene-4-hydroperoxide	9.20*	1336	[0.03]			
Limonene <i>trans</i> -glycol	9.34	1345	0.01	15.80	2219	0.04
Unknown [m/z 43, 81 (96), 95 (85), 67 (74), 69 (68), 41 (66)...204 (1)]	9.46	1354	tr			
α -Copaene	9.68	1370	0.04	6.88	1440	0.04
β -Cubebene	9.89*	1385	0.06	7.58	1492	tr
Geranyl acetate	9.89*	1385	[0.06]	10.33	1712	0.04
Dimethyl anthranilate	10.17	1404	0.01	13.58	2000	0.01
β -Caryophyllene	10.25	1411	0.04	8.18	1539	0.03
α -Humulene	10.71	1445	0.03	9.11	1612	0.01
(2 <i>E</i>)-Dodecenal	10.98	1465	0.01	11.55	1816	0.02
α -Selinene	11.30	1489	0.02	9.77	1665	0.04
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	11.55	1508	0.07	10.27	1707	0.08
δ -Cadinene	11.68	1518	0.04	10.16	1697	0.05
(2 <i>E</i>)-Tridecenal	12.25	1563	0.01			
Germacrene D-4-ol	12.32	1568	0.01	13.44	1986	0.01
Caryophyllene oxide	12.37	1573	0.04			
Tetradecanal	12.87	1612	0.01	12.33	1885	0.01
α -Sinensal	14.50	1749	0.23	16.17	2257	0.23
Myristic acid	14.73	1769	0.09	19.86	2669	0.11
Palmitic acid	16.89	1967	0.14	21.52	2875	0.17
Linoleic acid	18.57	2133	0.06	23.69	3164	0.11
Oleic acid	18.63	2139	0.09	23.35	3117	0.07
Stearic acid	18.89	2167	0.29	23.05	3076	0.34
Tangeretin	26.83	3132	0.07			
Nobiletin	28.79	3314	0.21			
Total identified		98.34%			97.87%	
Total reported		98.36%			97.91%	

*: 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