Date : February 13, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22B01-PTH02
Customer identification : Orange Sweet ORGANIC - Mexico - O301122111R
Type : Essential oil
Source : *Citrus sinensis*
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 : Alexis St-Gelais, Ph. D., Chimiste 2013-174
Analysis date : February 13, 2022

Checked and approved by :

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Laboratoire PhytoChemia
628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid
Refractive index: 1.4734 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

Analysis summary – Consolidated contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Hexanal	tr	Aliphatic aldehyde
α-Thujene	tr	Monoterpene
α-Pinene	0.56	Monoterpene
Camphene	tr	Monoterpene
Sabinene	0.18	Monoterpene
β-Pinene	0.02	Monoterpene
Myrcene	1.95	Monoterpene
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	tr	Monoterpene
Octanal	0.24	Aliphatic aldehyde
Δ3-Carene	0.09	Monoterpene
Limonene	94.51	Monoterpene
β-Phellandrene	0.29	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.34	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
Citronellal	0.05	Monoterpenic aldehyde
α-Terpineol	0.04	Monoterpenic alcohol
Decanal	0.20	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Neral	0.05	Monoterpenic aldehyde
Carvone	0.01	Monoterpenic ketone
Perillaldehyde	0.02	Monoterpenic aldehyde
Geranial	0.08	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
Neryl acetate	0.01	Monoterpenic ester
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β-Caryophyllene	0.02	Sesquiterpene
β-Copaene	0.03	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Valencene	0.03	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene

γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
β-Sinensal	0.03	Sesquiterpenic aldehyde
α-Sinensal	0.02	Sesquiterpenic aldehyde
Myristic acid	0.02	Aliphatic acid
Nootkatone	0.01	Sesquiterpenic ketone
Hexadecanal	0.04	Aliphatic aldehyde
Palmitic acid	0.04	Aliphatic acid
Linoleic acid	0.04	Aliphatic acid
Oleic acid	0.02	Aliphatic acid
cis-Vaccenic acid	0.01	Aliphatic acid
Tetramethoxyflavone isomer	0.03	Flavonoid
Tangeretin	0.05	Flavonoid
Nobiletin	0.10	Flavonoid
para-Cymene	tr	Monoterpene
Consolidated total	**99.55%**	

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

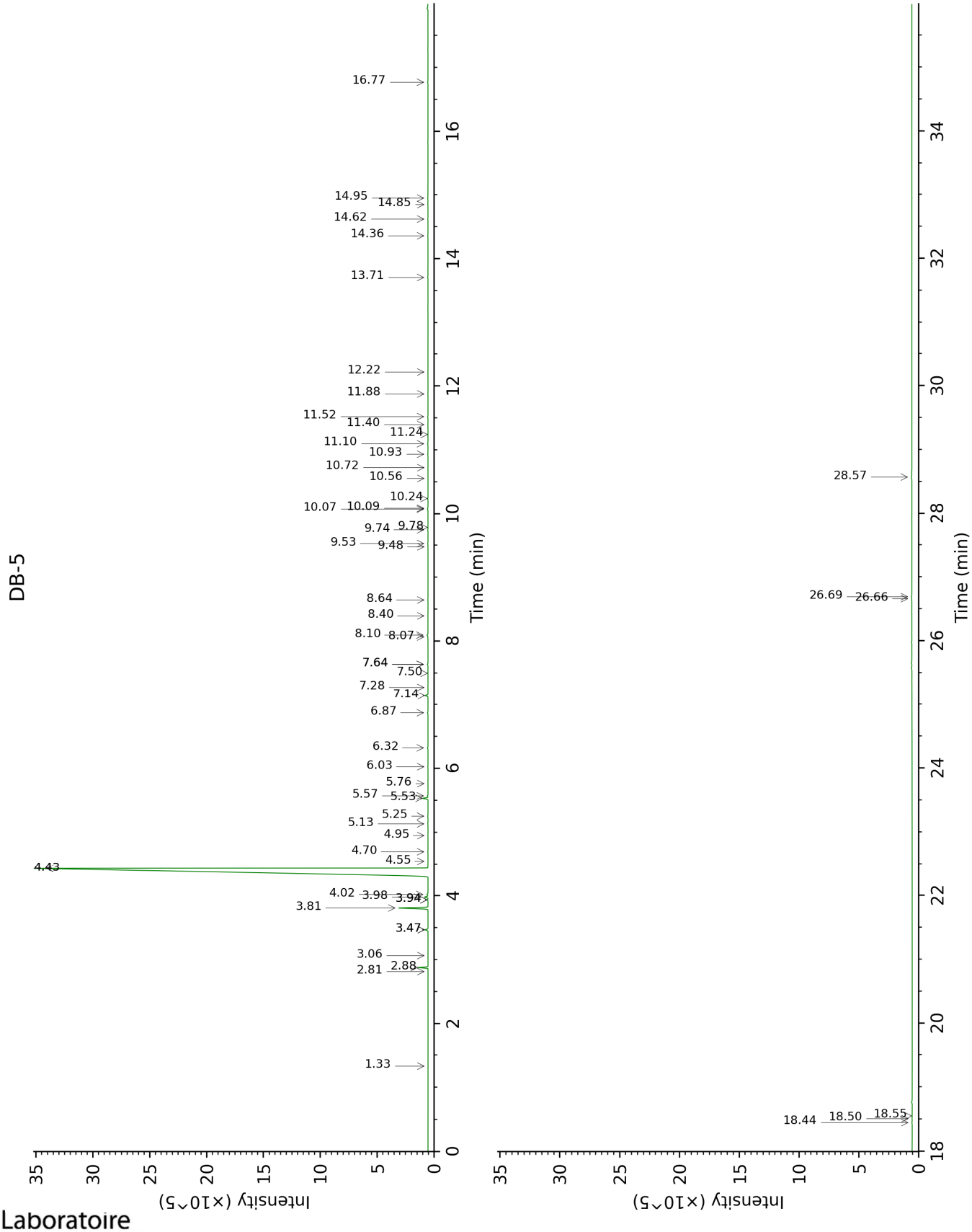
Note: no correction factor was applied

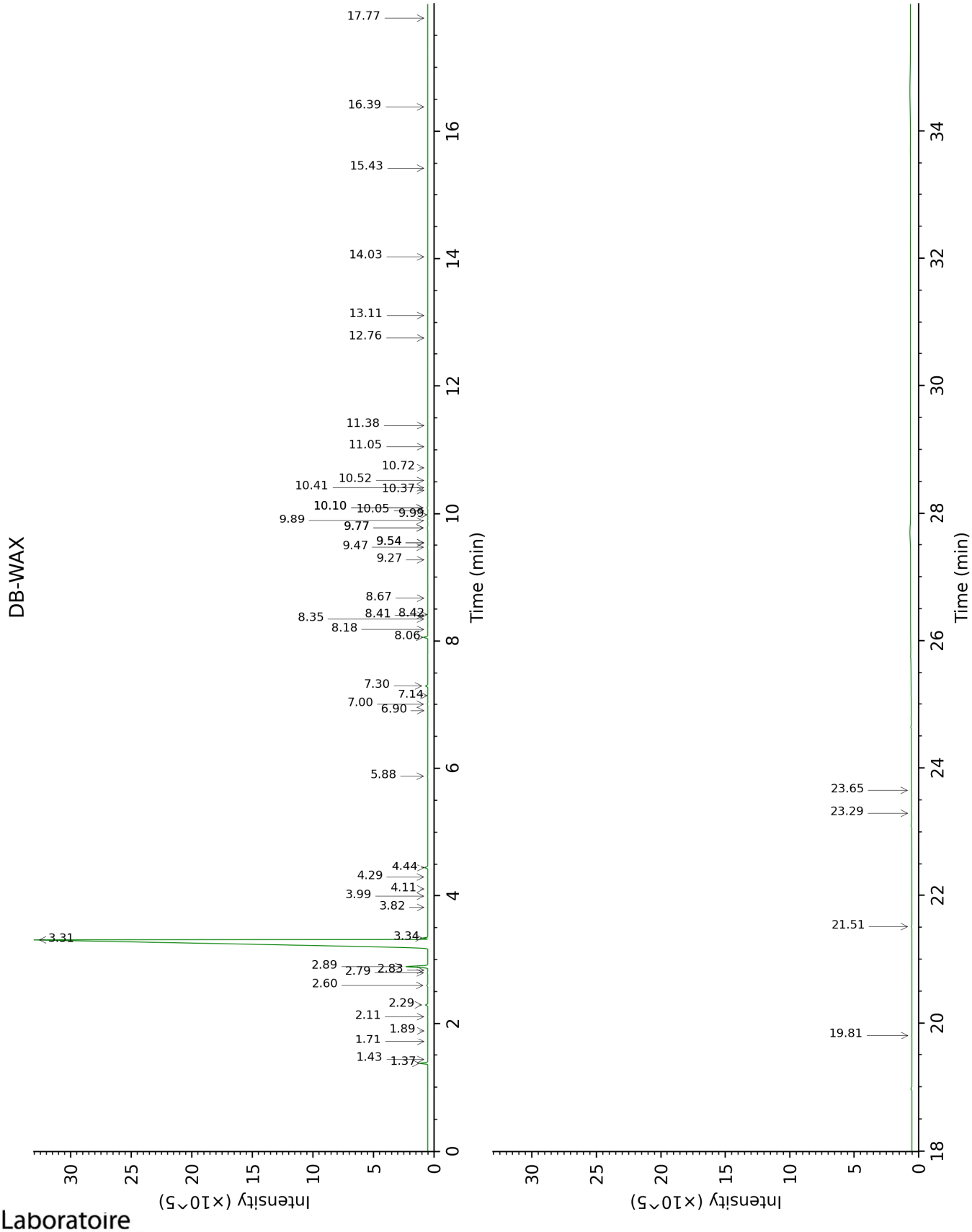
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-5
16.77
14.95
14.85
14.62
14.36
13.71
12.22
11.88
11.52
11.40
11.24
11.10
10.93
10.72
10.56
10.24
10.07
10.09
9.74
9.78
9.53
9.48
8.64
8.40
8.10
8.07
7.64
7.50
7.28
7.14
6.87
6.32
6.03
5.76
5.57
5.53
5.25
5.13
4.95
4.70
4.55
4.43
4.02
3.98
3.94
3.81
3.47
3.06
2.88
2.81
1.33
28.57
26.69
26.66
18.44
18.50
18.55
Time (min)
Intensity (×10^5)


DB-WAX
17.77
16.39
15.43
14.03
13.11
12.76
11.38
11.05
10.72
10.52
10.41
10.37
10.10
10.05
9.99
9.89
9.77
9.47
9.54
9.27
8.67
8.41
8.42
8.35
8.18
8.06
7.30
7.14
7.00
6.90
5.88
4.44
4.29
4.11
3.99
3.82
3.34
3.31
2.89
2.79
2.83
2.60
2.29
2.11
1.89
1.71
1.43
1.37
23.65
23.29
21.51
19.81
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.33	800	tr	1.89	1043	tr
α-Thujene	2.81	926	tr	1.43	998	tr
α-Pinene	2.88	930	0.56	1.37	990	0.56
Camphene	3.06	943	tr	1.71	1026	tr
Sabinene	3.47*	970	0.19	2.29	1083	0.18
β-Pinene	3.47*	970	[0.19]	2.11	1065	0.02
Myrcene	3.81	993	1.95	2.89	1133	1.94
α-Phellandrene	3.94*	1002	0.04	2.79	1126	0.04
Pseudolimonene	3.94*	1002	[0.04]	2.84	1129	tr
Octanal	3.98	1005	0.24	4.44	1252	0.24
Δ3-Carene	4.02	1008	0.09	2.60	1110	0.09
Limonene	4.43*	1034	94.50	3.31	1166	94.51
β-Phellandrene	4.43*	1034	[94.50]	3.34	1168	0.29
(*Z*)-β-Ocimene	4.55	1041	0.01	3.82	1206	tr
(*E*)-β-Ocimene	4.70	1050	0.02	3.99	1219	0.02
cis-Sabinene hydrate	4.95	1067	0.01	6.90	1428	0.01
Octanol	5.13	1078	0.02	8.18	1524	0.02
Terpinolene	5.25	1086	0.02	4.29	1241	0.02
Linalool	5.53	1104	0.34	8.06	1514	0.34
Nonanal	5.57	1106	0.04	5.88	1353	0.04
trans-para-Mentha-2,8-dien-1-ol	5.76	1118	0.01			
cis-para-Mentha-2,8-dien-1-ol	6.03	1135	0.01	9.54*	1630	0.01
Citronellal	6.32	1154	0.05	7.00	1435	0.04
α-Terpineol	6.87	1190	0.04	9.77*	1649	0.06
Decanal	7.14	1207	0.20	7.30	1457	0.19
trans-Carveol	7.28	1216	0.01	11.38	1784	0.01
Nerol	7.50	1231	0.01	11.05	1756	0.01
Neral	7.64*	1240	0.05	9.47	1625	0.05
Carvone	7.64*	1240	[0.05]	10.05	1672	0.01
Perillaldehyde	8.07	1269	0.02	10.72	1728	0.01
Geranial	8.10	1271	0.08	10.10*	1676	0.07
Limonen-10-ol	8.40	1291	0.01	13.11	1939	0.01
Undecanal	8.64	1308	0.01	8.67	1562	0.01
Neryl acetate	9.48	1367	0.01			
α-Copaene	9.53	1371	0.03	7.14	1445	0.03
Geranyl acetate	9.74	1386	0.02	10.52	1711	0.03
β-Elemene	9.78	1388	0.01	8.42	1542	0.01
Dodecanal	10.08	1410	0.05	9.99	1667	0.04
β-Caryophyllene	10.09	1411	0.02	8.41	1541	0.02
β-Copaene	10.24	1422	0.03	8.35	1536	0.02
α-Humulene	10.56	1446	0.01	9.27	1609	0.01
(*E*)-β-Farnesene	10.72	1458	0.01	9.54*	1630	[0.01]
Germacrene D	10.93	1474	0.02	9.77*	1649	[0.06]
Valencene	11.10	1486	0.03	9.89	1659	0.03
α-Muurolene	11.24	1497	0.01	10.10*	1676	[0.07]
γ-Cadinene	11.40	1509	0.02	10.37	1698	0.01

δ-Cadinene	11.52	1518	0.03	10.41	1701	0.03
α-Elemol	11.88	1546	0.01	14.03	2024	0.01
Caryophyllene oxide	12.22	1573	0.01	12.76	1906	0.01
β-Sinensal	13.71	1695	0.03	15.43	2162	0.02
α-Sinensal	14.36	1751	0.02	16.38	2260	0.02
Myristic acid	14.62	1774	0.02	19.81	2643	0.02
Nootkatone	14.85	1794	0.01	17.77	2409	0.01
Hexadecanal	14.95	1802	0.04			
Palmitic acid	16.77	1971	0.04	21.51	2853	0.04
Linoleic acid	18.44	2138	0.04	23.65	3140	0.03
Oleic acid	18.50	2144	0.02	23.29	3089	0.02
cis-Vaccenic acid	18.55	2148	0.01			
Tetramethoxyflavone isomer	26.66	3141	0.03			
Tangeretin	26.69	3145	0.05			
Nobiletin	28.57	3328	0.10			
para-Cymene				4.10	1227	tr
Total identified		**99.24%**			**99.23%**	
Total reported		**99.24%**			**99.23%**	

*: 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