Date : August 15, 2019

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 19H08-PTH04-1-JSB
Customer identification : Tangerine Org - Mexico - TP010192R
Type : Essential oil
Source : *Citrus reticulata* cv. Tangerine
Customer : Plant Therapy

Analysis

Method: PC-PA-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 : Lindsay Girard, B. Sc.
Analysis date : August 13, 2019

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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PHYSICOCHEMICAL DATA

Physical aspect: Bright orange liquid
Refractive index: 1.4742 ± 0.0003 (20 °C)

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	%	Classe
α-Thujene	0.14	Monoterpene
α-Pinene	0.85	Monoterpene
Camphene	0.01	Monoterpene
β-Pinene	0.29	Monoterpene
Sabinene	0.16	Monoterpene
Myrcene	1.90	Monoterpene
Octanal	0.17	Aliphatic aldehyde
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.07	Monoterpene
para-Cymene	0.14	Monoterpene
1,8-Cineole	0.28	Monoterpenic ether
Limonene	88.95	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	3.04	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Octanol	0.05	Aliphatic alcohol
Terpinolene	0.17	Monoterpene
Linalool	0.49	Monoterpenic alcohol
Nonanal	0.05	Aliphatic aldehyde
Citronellal	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.08	Monoterpenic alcohol
Decanal	0.14	Aliphatic aldehyde
Nerol	0.01	Monoterpenic alcohol
Neral	0.01	Monoterpenic aldehyde
Geranial	0.03	Monoterpenic aldehyde
Limonen-10-ol	0.02	Monoterpenic alcohol
Undecanal	0.05	Aliphatic aldehyde
cis-para-Mentha-2,8-diene-1-hydroperoxide	0.01	Monoterpenic peroxide
para-Mentha-1,8-diene-4-hydroperoxide	0.06	Monoterpenic peroxide
Neryl acetate	0.04	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
Geranyl acetate	0.06	Monoterpenic ester
β-Elemene	0.03	Sesquiterpene
Dodecanal	0.08	Aliphatic aldehyde
trans-α-Bergamotene	0.01	Sesquiterpene
α-Humulene	0.08	Sesquiterpene
(*E*)-β-Farnesene	0.03	Sesquiterpene
Germacrene D	0.06	Sesquiterpene
Valencene	0.01	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.07	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol

Caryophyllene oxide	0.02	Sesquiterpenic ether
Tetradecanal	0.01	Aliphatic aldehyde
α-Sinensal	0.14	Sesquiterpenic aldehyde
Myristic acid	0.04	Aliphatic acid
Palmitic acid	0.15	Aliphatic acid
Linoleic acid	0.03	Aliphatic acid
Oleic acid	0.03	Aliphatic acid
cis-Vaccenic acid?	0.03	Aliphatic acid
Stearic acid	0.19	Aliphatic acid
Tangeretin	0.32	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.18	Flavonoid
β-Caryophyllene	tr	Sesquiterpene
β-Sinensal	0.01	Sesquiterpenic aldehyde
Myristic acid	0.06	Aliphatic acid
Palmitic acid	0.20	Aliphatic acid
Consolidated total	**99.28%**	

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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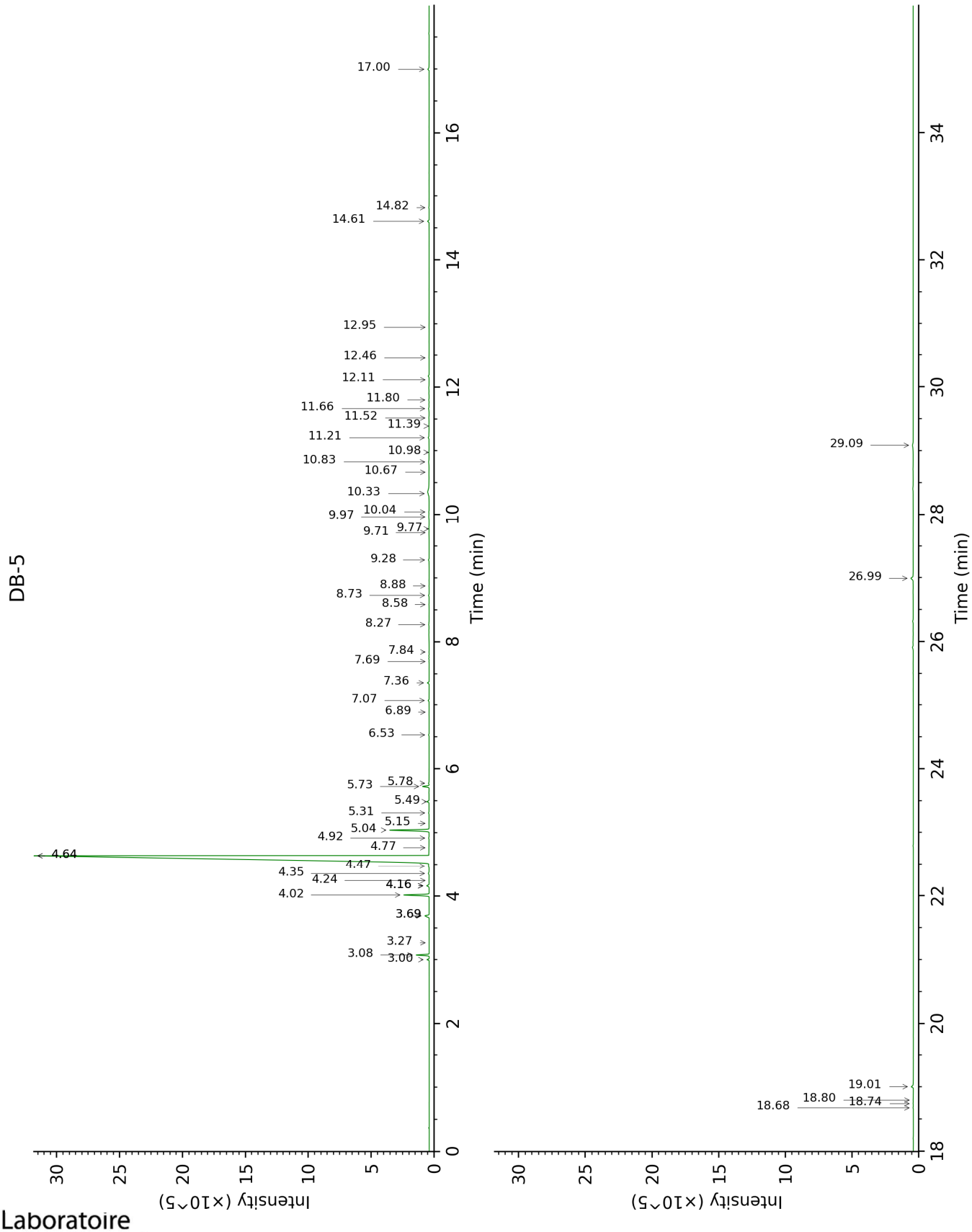
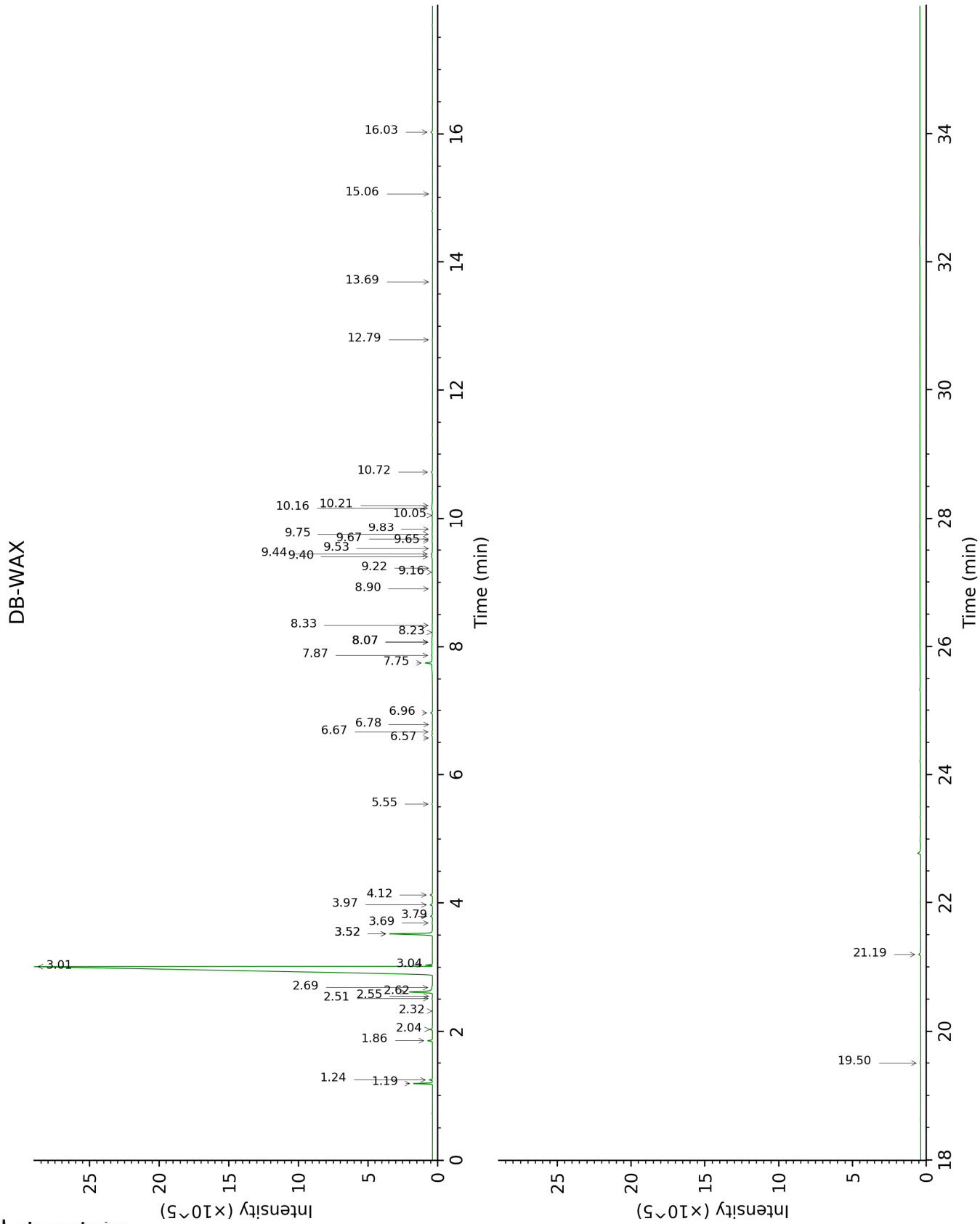

DB-5
17.00
14.82
14.61
12.95
12.46
12.11
11.80
11.66
11.52
11.39
11.21
10.98
10.83
10.67
10.33
10.04
9.97
9.77
9.71
9.28
8.88
8.73
8.58
8.27
7.84
7.69
7.36
7.07
6.89
6.53
5.78
5.73
5.49
5.31
5.15
5.04
4.92
4.77
4.64
4.47
4.35
4.24
4.16
4.02
3.69
3.27
3.08
3.00
29.09
26.99
19.01
18.80
18.74
18.68
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
16.03
15.06
13.69
12.79
10.72
10.16
10.21
10.05
9.83
9.75
9.67
9.65
9.53
9.44
9.40
9.22
9.16
8.90
8.33
8.23
8.07
7.87
7.75
6.96
6.78
6.67
6.57
5.55
4.12
3.97
3.79
3.69
3.52
3.04
3.01
2.69
2.62
2.55
2.51
2.32
2.04
1.86
1.24
1.19
21.19
19.50

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Thujene	3.00	925	0.14	1.24	1000	0.14
α-Pinene	3.08	930	0.85	1.19	990	0.85
Camphene	3.27	942	0.01			
β-Pinene	3.69*	970	0.43	1.86	1064	0.29
Sabinene	3.69*	970	[0.43]	2.04	1083	0.16
Myrcene	4.02	992	1.90	2.62	1134	1.89
Octanal	4.16*	1001	0.21	4.12	1252	0.17
α-Phellandrene	4.16*	1001	[0.21]	2.51	1125	0.04
Pseudolimonene	4.16*	1001	[0.21]	2.55	1128	0.01
Δ3-Carene	4.24	1006	0.01	2.32	1110	0.01
α-Terpinene	4.35	1013	0.07	2.68	1139	0.10
para-Cymene	4.47†	1021	89.21	3.79	1227	0.14
1,8-Cineole	4.64*†	1031	[89.21]	3.04	1168	0.28
Limonene	4.64*†	1031	[89.21]	3.01	1166	88.95
(*Z*)-β-Ocimene	4.77	1039	0.01	3.52*	1207	3.05
(*E*)-β-Ocimene	4.92	1049	0.03	3.69	1219	0.03
γ-Terpinene	5.04	1057	3.04	3.52*	1207	[3.05]
cis-Sabinene hydrate	5.15	1064	0.02	6.57	1430	0.01
Octanol	5.31	1074	0.05	7.87	1528	0.03
Terpinolene	5.49	1085	0.17	3.97	1240	0.16
Linalool	5.73	1100	0.49	7.75	1519	0.46
Nonanal	5.78	1103	0.05	5.55	1355	0.04
Citronellal	6.53	1152	0.04	6.67	1437	0.04
Terpinen-4-ol	6.89	1176	0.01	8.23	1556	0.01
α-Terpineol	7.07	1188	0.08	9.44	1653	0.11
Decanal	7.36	1207	0.14	6.96	1459	0.14
Nerol	7.69	1230	0.01	10.72	1760	0.10
Neral	7.84	1240	0.01	9.16	1630	0.02
Geranial	8.27	1270	0.03	9.75	1678	0.03
Limonen-10-ol	8.58	1292	0.02	12.79	1943	0.02
Undecanal	8.73	1302	0.05	8.33	1564	0.01
cis-para-Mentha-2,8-diene-1-hydroperoxide	8.88	1306	0.01			
para-Mentha-1,8-diene-4-hydroperoxide	9.28	1335	0.06			
Neryl acetate	9.71	1366	0.04	9.83	1684	0.02
α-Copaene	9.77	1370	0.01	6.78	1446	0.01
Geranyl acetate	9.97	1384	0.06	10.20	1715	0.08
β-Elemene	10.04	1389	0.03	8.07*	1544	0.04
Dodecanal	10.33	1410	0.08	9.65	1669	0.02
trans-α-Bergamotene	10.67	1435	0.01	8.07*	1544	[0.04]
α-Humulene	10.83	1447	0.08	8.90	1609	0.02
(*E*)-β-Farnesene	10.98	1458	0.03	9.22	1635	0.01
Germacrene D	11.21	1475	0.06	9.40	1649	0.10
Valencene	11.39	1489	0.01	9.53	1660	0.01
α-Muurolene	11.52	1498	0.02	9.67	1672	tr

(3*E*,6*E*)-α-Farnesene	11.66	1510	0.07	10.16	1712	0.10
δ-Cadinene	11.80	1520	0.04	10.05	1702	0.03
α-Elemol	12.11	1545	0.01	13.69	2028	0.01
Caryophyllene oxide	12.46	1572	0.02			
Tetradecanal	12.95	1611	0.01			
α-Sinensal	14.61	1750	0.14	16.03	2262	0.14
Myristic acid	14.82	1769	0.04			
Palmitic acid	17.00	1968	0.15			
Linoleic acid	18.68	2134	0.03			
Oleic acid	18.74	2141	0.03			
cis-Vaccenic acid?	18.80	2146	0.03			
Stearic acid	19.01	2168	0.19			
Tangeretin	26.99	3133	0.32			
3,3',4',5,6,7,8-Heptamethoxyflavone	29.09	3318	0.18			
β-Caryophyllene				8.07*	1544	[0.04]
β-Sinensal				15.06	2162	0.01
Myristic acid				19.50	2652	0.06
Palmitic acid				21.19	2862	0.20
Total identified		**98.83%**			**98.16%**	
Total reported		**98.83%**			**98.16%**	

*: 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
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