

Date : January 28, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22A14-PTH04

Customer identification : Tangerine - T10109218R

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 liquid by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : January 27, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Bright orange liquid

Refractive index: 1.4739 ± 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	0.01	Monoterpene
α -Pinene	0.91	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.44	Monoterpene
β -Pinene	0.29	Monoterpene
Myrcene	1.38	Monoterpene
α -Phellandrene	0.03	Monoterpene
Octanal	0.11	Aliphatic aldehyde
Δ^3 -Carene	0.09	Monoterpene
α -Terpinene	0.02	Monoterpene
para-Cymene	0.15	Monoterpene
Limonene	91.31	Monoterpene
1,8-Cineole	0.26	Monoterpenic ether
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.04	Monoterpene
γ -Terpinene	2.63	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.04	Aliphatic alcohol
Terpinolene	0.15	Monoterpene
Linalool	0.20	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
Citronellal	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.04	Monoterpenic alcohol
Decanal	0.09	Aliphatic aldehyde
Octyl acetate	tr	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Neral	0.02	Monoterpenic aldehyde
Geraniol	tr	Monoterpenic alcohol
Geranial	0.01	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	tr	Aliphatic aldehyde
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
Neryl acetate	0.02	Monoterpenic ester
α -Copaene	0.03	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β -Cubebene	0.04	Sesquiterpene
β -Elemene	0.02	Sesquiterpene
β -Caryophyllene	0.01	Sesquiterpene

Dodecanal	0.02	Aliphatic aldehyde
<i>trans</i> - α -Bergamotene	0.01	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.03	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
Valencene	0.03	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
γ -Cadinene	tr	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.07	Sesquiterpene
δ -Cadinene	0.03	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Tetradecanal	tr	Aliphatic aldehyde
β -Sinensal	0.01	Sesquiterpenic aldehyde
Myristic acid	0.02	Aliphatic acid
Palmitic acid	0.13	Aliphatic acid
Linoleic acid	0.14	Aliphatic acid
Oleic acid	0.10	Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.06	Aliphatic acid
Stearic acid	0.08	Aliphatic acid
Tangeretin	0.11	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.05	Flavonoid
Nobiletin	0.06	Flavonoid
Consolidated total	99.60%	

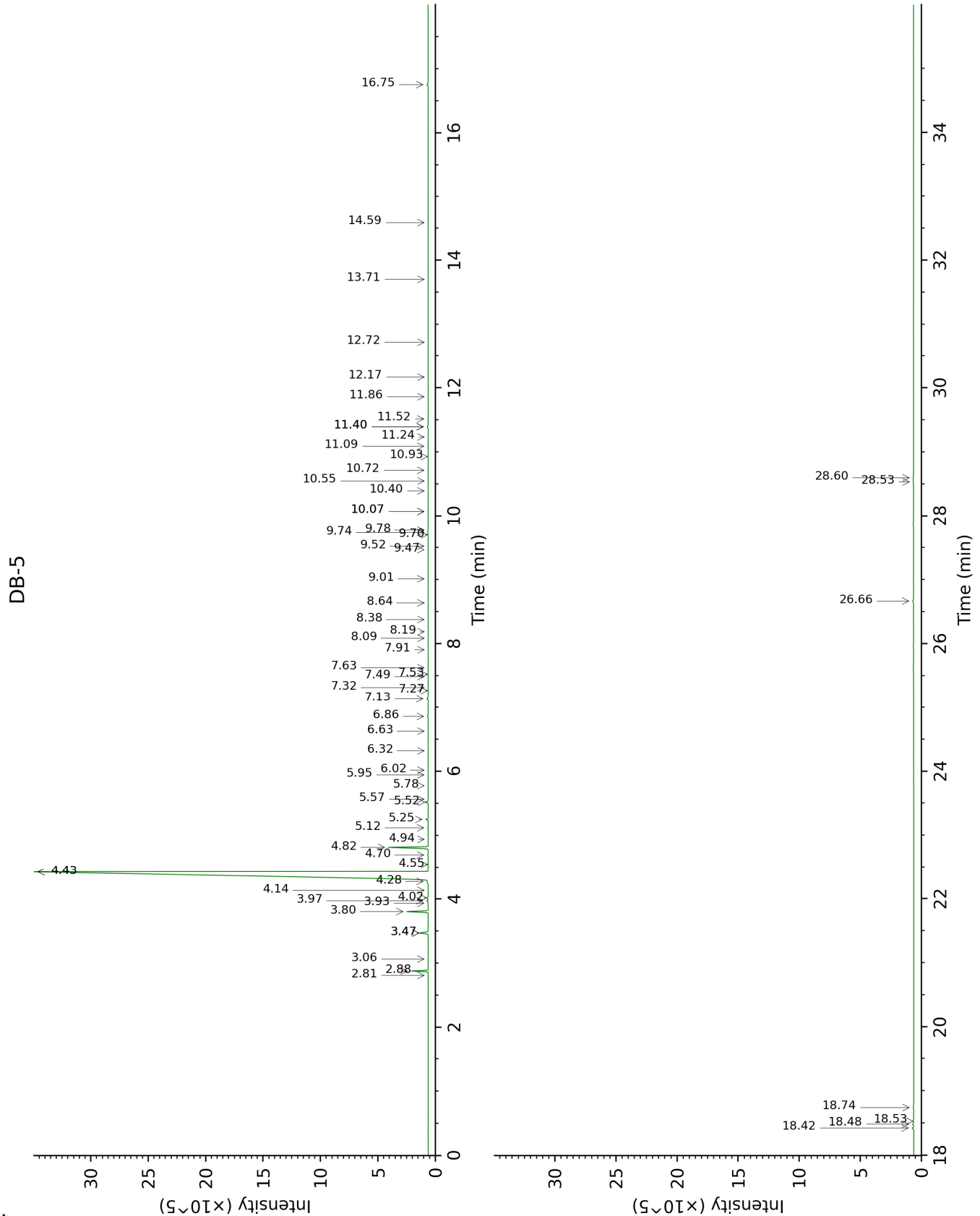
tr: The compound has been detected below 0.005% of total signal.

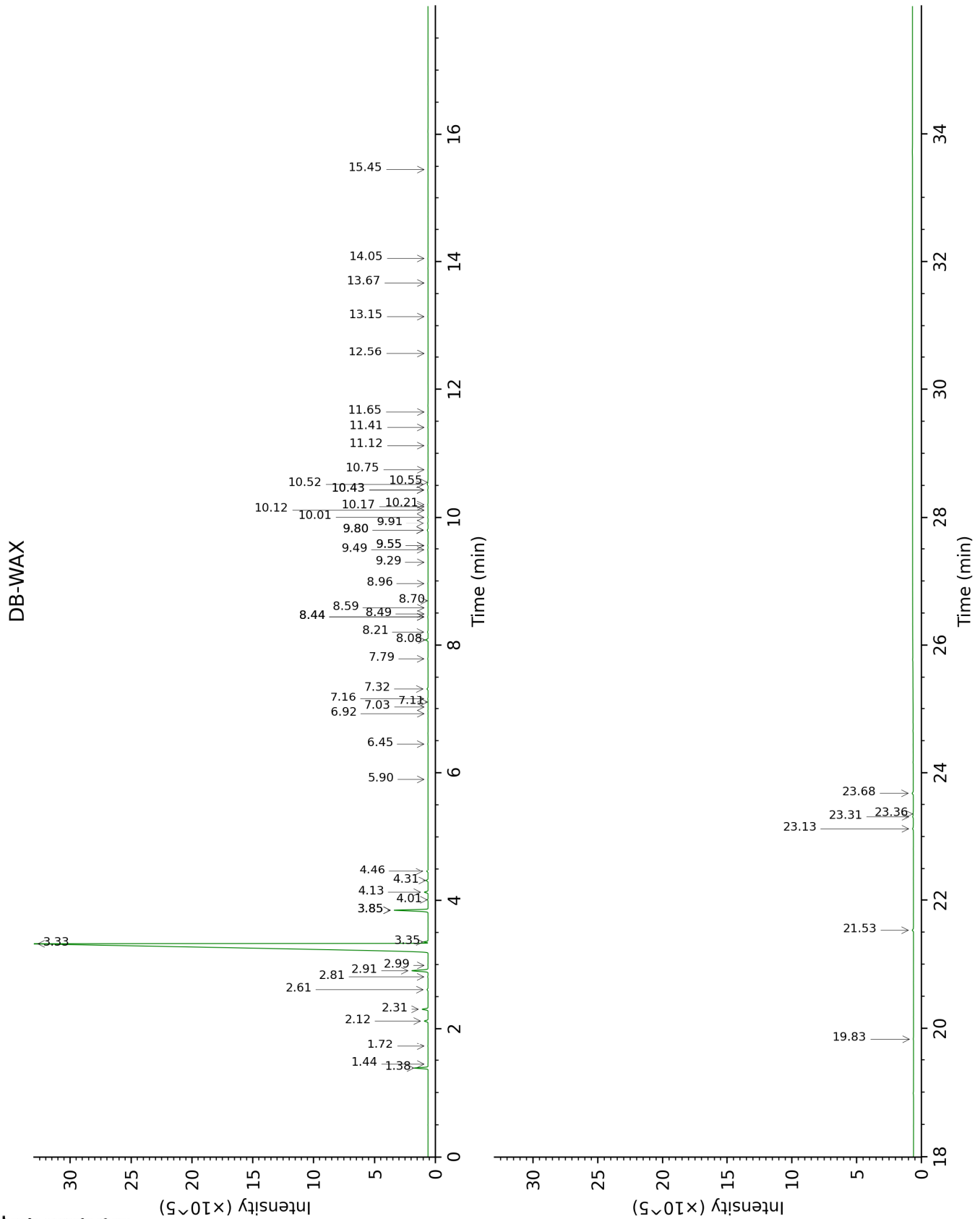
Note: no correction factor was applied

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.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Thujene	2.81	926	0.01	1.44	999	0.01
α-Pinene	2.88	930	0.91	1.38	992	0.91
Camphene	3.06	943	0.02	1.72	1027	0.01
Sabinene	3.47*	970	0.71	2.30	1084	0.44
β-Pinene	3.47*	970	[0.71]	2.12	1066	0.29
Myrcene	3.80	993	1.38	2.91	1134	1.37
α-Phellandrene	3.93	1002	0.03	2.81	1127	0.03
Octanal	3.97	1005	0.11	4.46	1254	0.10
Δ ³ -Carene	4.02	1008	0.09	2.61	1111	0.09
α-Terpinene	4.14	1015	0.02	2.99	1141	0.02
para-Cymene	4.28	1024	0.15	4.13	1229	0.28
Limonene	4.43*	1033	91.32	3.32	1168	91.31
1,8-Cineole	4.43*	1033	[91.32]	3.35	1170	0.26
(Z)-β-Ocimene	4.55	1041	0.02	3.85*	1208	2.64
(E)-β-Ocimene	4.70	1050	0.04	4.01	1220	0.03
γ-Terpinene	4.82	1058	2.63	3.85*	1208	[2.64]
cis-Sabinene hydrate	4.94	1066	0.01	6.92	1429	0.01
Octanol	5.12	1077	0.04	8.21	1526	0.04
Terpinolene	5.25	1086	0.15	4.31	1243	0.15
Linalool	5.52	1103	0.20	8.08	1516	0.20
Nonanal	5.57	1106	0.02	5.90	1354	0.02
trans-para-Mentha-2,8-dien-1-ol	5.78	1119	0.02	8.96	1584	0.02
cis-Limonene oxide	5.94	1130	0.02	6.45	1394	0.02
cis-para-Mentha-2,8-dien-1-ol	6.02	1135	0.02	9.56*	1632	0.03
Citronellal	6.32	1154	0.01	7.03	1437	0.01
Terpinen-4-ol	6.63	1174	0.01	8.58	1555	0.01
α-Terpineol	6.86	1189	0.04	9.80*	1651	0.08
Decanal	7.14	1207	0.09	7.32	1458	0.09
Octyl acetate	7.27	1216	tr	7.10	1442	tr
trans-Carveol	7.32	1219	0.01	11.41	1786	0.01
Nerol	7.49	1230	0.01	11.12	1762	0.02
Citronellol	7.53	1233	0.01	10.75	1730	0.01
Neral	7.63	1240	0.02	9.49	1626	0.04
Geraniol	7.91	1258	tr	11.65	1807	tr
Geranial	8.09	1270	0.01	10.17	1682	0.01
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.19	1277	0.01			
Limonen-10-ol	8.38	1290	0.01	13.15	1942	0.01
Undecanal	8.64	1308	tr	8.70	1564	tr
para-Mentha-1,8-diene-4-hydroperoxide	9.01	1334	0.01			
Neryl acetate	9.47	1366	0.02	10.20	1684	0.02
α-Copaene	9.52	1370	0.03	7.16	1446	0.03
Geranyl acetate	9.70	1383	0.01	10.55	1713	0.01

β-Cubebene	9.74	1386	0.04	7.79	1493	0.03
β-Elemene	9.78	1388	0.02	8.44*	1544	0.03
β-Caryophyllene	10.07*	1410	0.03	8.44*	1544	[0.03]
Dodecanal	10.07*	1410	[0.03]	10.01	1668	0.02
<i>trans</i> -α-Bergamotene	10.40	1434	0.01	8.49	1548	0.01
α-Humulene	10.55	1445	0.01	9.29	1611	0.01
(<i>E</i>)-β-Farnesene	10.72	1458	0.03	9.56*	1632	[0.03]
Germacrene D	10.93	1474	0.04	9.80*	1651	[0.08]
Valencene	11.09	1486	0.03	9.91	1660	0.03
α-Muurolene	11.24	1496	0.01	10.12	1677	0.01
γ-Cadinene	11.40*	1509	0.08	10.43*	1703	0.04
(3 <i>E</i> ,6 <i>E</i>)-α-Farnesene	11.40*	1509	[0.08]	10.52	1711	0.07
δ-Cadinene	11.52	1518	0.03	10.43*	1703	[0.04]
α-Elemol	11.86	1545	0.01	14.05	2027	0.02
Germacrene D-4-ol	12.17	1570	0.01	13.67	1990	tr
Tetradecanal	12.72	1614	tr	12.56	1888	0.01
β-Sinensal	13.70	1695	0.01	15.45	2164	0.01
Myristic acid	14.59	1771	0.02	19.83	2646	0.03
Palmitic acid	16.75	1970	0.13	21.53	2856	0.12
Linoleic acid	18.42	2136	0.14	23.68	3144	0.12
Oleic acid	18.48	2142	0.10	23.31	3092	0.07
<i>cis</i> -Vaccenic acid?	18.53	2147	0.06	23.36	3098	0.04
Stearic acid	18.74	2169	0.08	23.13	3067	0.08
Tangeretin	26.66	3142	0.11			
3,3',4',5,6,7,8- Heptamethoxyflavone	28.53	3326	0.05			
Nobiletin	28.60	3330	0.06			
Total identified		99.33%			99.39%	
Total reported		99.34%			99.39%	

*: 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