CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22A28-PTH02
Customer identification : Tangerine Organic - TP01032011R
Type : Essential oil
Source : *Citrus reticulata* cv. Tangerine
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 : Seydou Ka, Ph. D.
Analysis date : February 08, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Orange liquid
Refractive index: 1.4753 ± 0.0003 (20 °C; method PC-MAT-016)

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	%	Class
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.34	Monoterpene
α-Pinene	1.19	Monoterpene
Camphene	0.01	Monoterpene
β-Pinene	0.71	Monoterpene
Heptanol	0.01	Aliphatic alcohol
Sabinene	0.34	Monoterpene
Myrcene	1.73	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.07	Aliphatic aldehyde
α-Terpinene	0.14	Monoterpene
para-Cymene	0.47	Monoterpene
Limonene	83.14	Monoterpene
β-Phellandrene	0.25	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.09	Monoterpene
γ-Terpinene	7.94	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.36	Monoterpene
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	0.18	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.05	Monoterpenic ether
trans-Limonene oxide	0.08	Monoterpenic ether
Epoxyterpinolene	0.03	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.03	Monoterpenic alcohol
para-Cymen-8-ol	tr	Monoterpenic alcohol
α-Terpineol	0.09	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Decanal	0.10	Aliphatic aldehyde
trans-Carveol	0.02	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Neral	0.02	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Geranial	0.04	Monoterpenic aldehyde
Undecanal	0.01	Aliphatic aldehyde
Limonene *trans*-glycol	0.07	Monoterpenic alcohol
α-Copaene	0.03	Sesquiterpene
β-Cubebene	0.05	Sesquiterpene

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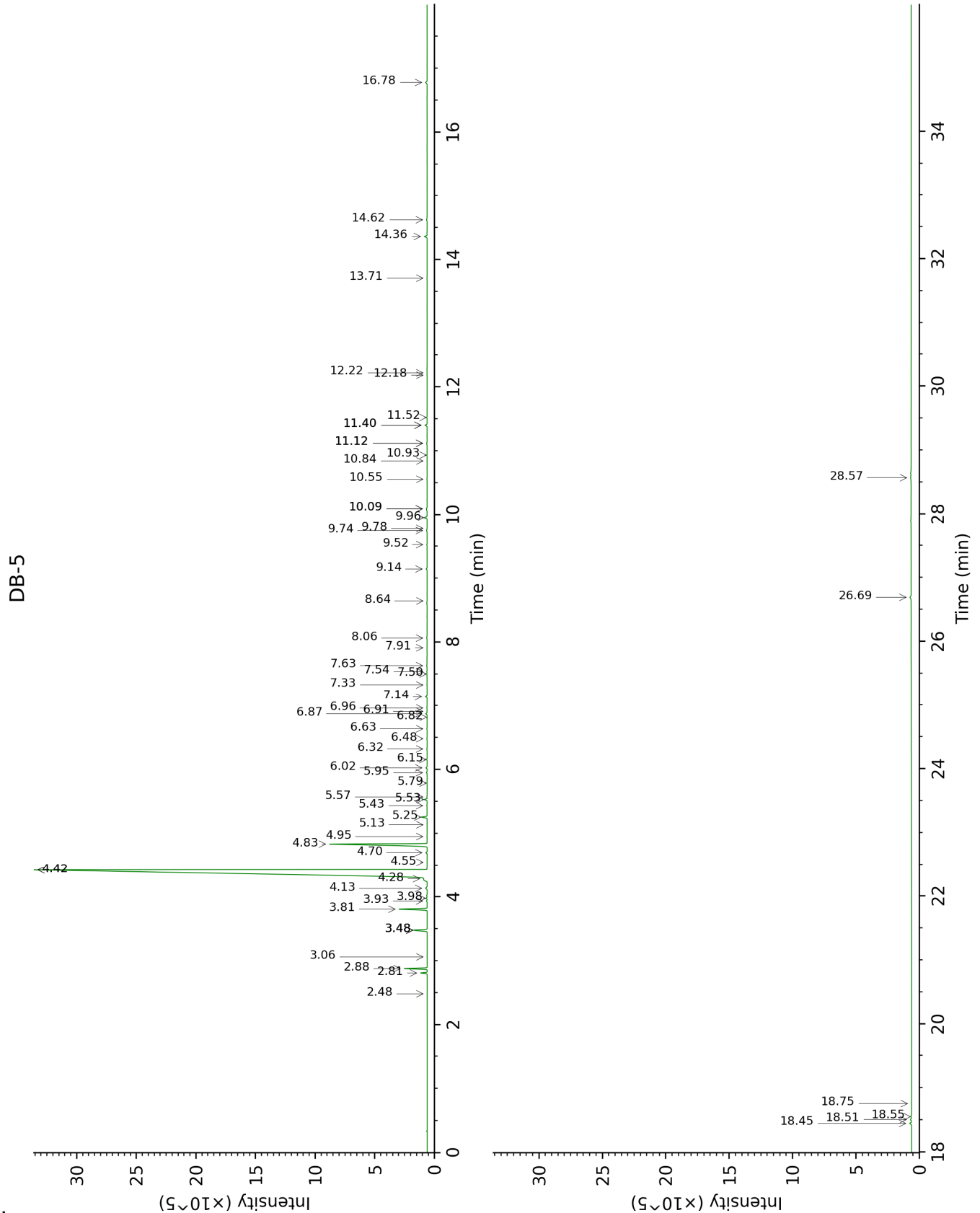| Compound	Value	Class
β-Elemene	0.02	Sesquiterpene
Dimethyl anthranilate	0.20	Phenolic ester
β-Caryophyllene	0.05	Sesquiterpene
Dodecanal	0.01	Aliphatic aldehyde
α-Humulene	0.02	Sesquiterpene
(2*E*)-Dodecenal	0.01	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
α-Selinene	0.04	Sesquiterpene
Bicyclogermacrene	tr	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.18	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
β-Sinensal	0.01	Sesquiterpenic aldehyde
α-Sinensal	0.19	Sesquiterpenic aldehyde
Myristic acid	0.05	Aliphatic acid
Palmitic acid	0.13	Aliphatic acid
Linoleic acid	0.16	Aliphatic acid
Oleic acid	0.11	Aliphatic acid
cis-Vaccenic acid?	0.06	Aliphatic acid
Stearic acid	0.02	Aliphatic acid
Tangeretin	0.12	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.06	Flavonoid
Consolidated total	**99.38%**	

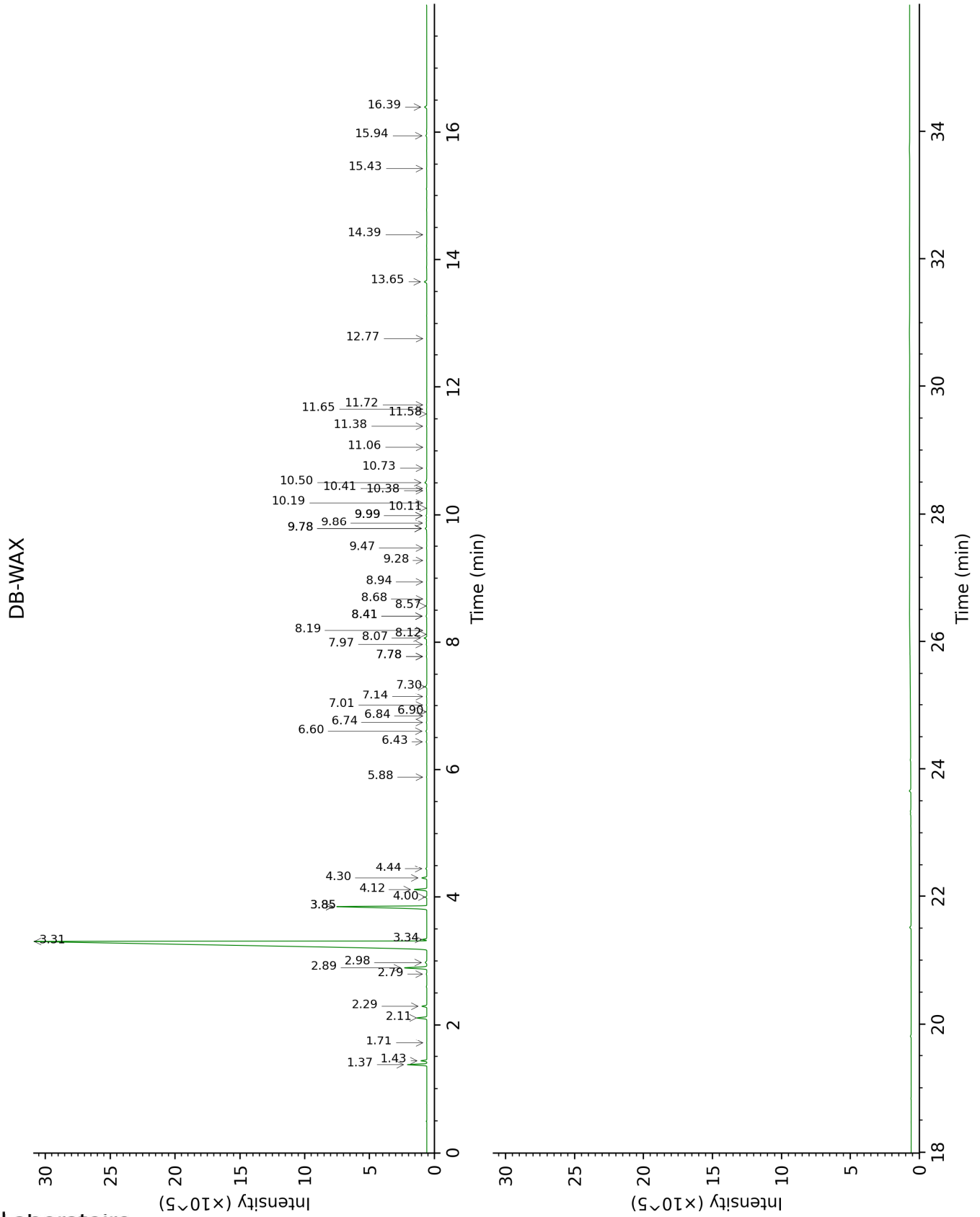tr: The compound has been detected below 0.005% of total signal.

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

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DB-WAX

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Heptanal	2.48	903	0.01			
α-Thujene	2.81	926	0.34	1.43	998	0.34
α-Pinene	2.88	930	1.19	1.37	990	1.19
Camphene	3.06	943	0.01	1.71	1026	0.01
β-Pinene	3.48*	971	1.04	2.11	1065	0.71
Heptanol	3.48*	971	[1.04]	6.84	1422	0.01
Sabinene	3.48*	971	[1.04]	2.29	1083	0.34
Myrcene	3.80	993	1.73	2.89	1133	1.72
α-Phellandrene	3.93	1002	0.04	2.80	1126	0.04
Octanal	3.98	1005	0.07	4.44	1252	0.07
α-Terpinene	4.13	1015	0.14	2.98	1140	0.14
para-Cymene	4.28	1024	0.47	4.12	1228	0.87
Limonene	4.42*	1033	83.62	3.30	1166	83.14
β-Phellandrene	4.42*	1033	[83.62]	3.34	1168	0.25
(*Z*)-β-Ocimene	4.55	1041	0.01	3.85*	1208	7.97
(*E*)-β-Ocimene	4.70	1051	0.09	4.00	1219	0.09
γ-Terpinene	4.83	1059	7.94	3.85*	1208	[7.97]
cis-Sabinene hydrate	4.95	1066	0.02	6.90	1427	0.02
Octanol	5.13	1078	0.01	8.18	1524	0.01
Terpinolene	5.25	1086	0.36	4.30	1242	0.35
trans-Sabinene hydrate	5.43	1097	0.03	7.97	1507	0.04
Linalool	5.53	1103	0.18	8.07	1515	0.19
Nonanal	5.57	1106	0.02	5.88	1353	0.02
trans-para-Mentha-2,8-dien-1-ol	5.79	1120	0.01	8.94	1583	0.01
cis-Limonene oxide	5.95	1130	0.05	6.43	1393	0.04
trans-Limonene oxide	6.02	1135	0.08	6.60	1405	0.07
Epoxyterpinolene	6.15	1143	0.03	6.74	1415	0.03
Citronellal	6.32	1154	0.03	7.01	1435	0.03
Borneol	6.48	1164	0.02	9.78*	1650	0.13
Terpinen-4-ol	6.63	1174	0.03	8.57	1554	0.02
para-Cymen-8-ol	6.82	1186	tr	11.58	1801	0.01
α-Terpineol	6.87	1189	0.09	9.78*	1650	[0.13]
Unknown [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	6.91	1192	0.01	7.78*	1492	0.04
Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	6.96	1195	0.02	8.12	1519	0.01
Decanal	7.14	1207	0.10	7.30	1457	0.13
trans-Carveol	7.33	1220	0.02	11.38	1784	0.02
Nerol	7.50	1231	0.01	11.06	1756	tr
Citronellol	7.54	1234	0.02	10.73	1729	0.01
Neral	7.63	1240	0.02	9.47	1625	0.03
Geraniol	7.91	1259	0.01	11.65	1807	0.01
Geranial	8.06	1269	0.04	10.19	1683	0.01

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	R.T.	R.I.	%	R.T.	R.I.	%
Undecanal	8.64	1308	0.01	8.68	1562	0.01
Limonene *trans*-glycol	9.14	1343	0.07	15.94	2214	0.08
α-Copaene	9.52	1370	0.03	7.14	1445	0.03
β-Cubebene	9.74	1386	0.05	7.78*	1492	[0.04]
β-Elemene	9.78	1388	0.02	8.41*	1541	0.06
Dimethyl anthranilate	9.96	1401	0.20	13.65	1988	0.20
β-Caryophyllene	10.09*	1411	0.05	8.41*	1541	[0.06]
Dodecanal	10.09*	1411	[0.05]	9.99*	1667	0.05
α-Humulene	10.56	1446	0.02	9.28	1609	0.01
(2*E*)-Dodecenal	10.84	1467	0.01	11.72	1813	0.01
Germacrene D	10.93	1474	0.01	9.86	1657	0.07
α-Selinene	11.12*	1488	0.04	9.99*	1667	[0.05]
Bicyclogermacrene	11.12*	1488	[0.04]	10.11	1676	tr
(3*E*,6*E*)-α-Farnesene	11.40*	1509	0.15	10.50	1709	0.18
γ-Cadinene	11.40*	1509	[0.15]	10.41	1702	0.03
δ-Cadinene	11.52	1518	0.03	10.38	1699	0.02
Spathulenol	12.18	1570	0.01	14.39	2059	0.01
Caryophyllene oxide	12.22	1573	0.01	12.76	1906	0.01
β-Sinensal	13.71	1695	0.01	15.43	2162	0.01
α-Sinensal	14.36	1751	0.19	16.39	2261	0.19
Myristic acid	14.62	1774	0.05			
Palmitic acid	16.78	1972	0.13			
Linoleic acid	18.45	2138	0.16			
Oleic acid	18.51	2144	0.11			
cis-Vaccenic acid?	18.55	2149	0.06			
Stearic acid	18.75	2170	0.02			
Tangeretin	26.69	3145	0.12			
3,3',4',5,6,7,8-Heptamethoxyflavone	28.57	3328	0.06			
Total identified		**99.49%**			**99.05%**	
Total reported		**99.53%**			**99.06%**	

*: 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

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