

Date : July 15, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22G08-PTH05


Customer identification : Clementine - Italy - CS4100R

Type : Essential oil

Source : *Citrus x clementina*

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

Analysis date : July 14, 2022

Checked and approved by :



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

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PHYSICOCHEMICAL DATA

Physical aspect: Orange liquid

Refractive index: 1.4746 ± 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	0.04	Monoterpene
α -Pinene	0.61	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.54	Monoterpene
β -Pinene	0.57	Monoterpene
6-Methyl-5-hepten-2-one	tr	Aliphatic ketone
Myrcene	1.81	Monoterpene
α -Phellandrene	0.03	Monoterpene
Octanal	0.12	Aliphatic aldehyde
Δ^3 -Carene	0.07	Monoterpene
α -Terpinene	0.02	Monoterpene
para-Cymene	0.14	Monoterpene
β -Phellandrene	0.26	Monoterpene
Limonene	92.08	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.09	Monoterpene
γ -Terpinene	0.66	Monoterpene
cis-Sabinene hydrate	tr	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.05	Monoterpene
Linalool	0.19	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	0.04	Monoterpenic alcohol
Unknown	0.01	Unknown
trans-Isopiperitenol	0.01	Monoterpenic alcohol
Decanal	0.19	Aliphatic aldehyde
Octyl acetate	tr	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Neral	0.05	Monoterpenic aldehyde
Carvone	0.01	Monoterpenic ketone
(2E)-Decenal	tr	Aliphatic aldehyde
Perillaldehyde	0.01	Monoterpenic aldehyde
Geranial	0.08	Monoterpenic aldehyde
Undecanal	0.01	Aliphatic aldehyde
(2E,4E)-Decadienal	0.01	Aliphatic aldehyde
α -Terpinyl acetate	0.01	Monoterpenic ester
Citronellyl acetate	0.01	Monoterpenic ester

Neryl acetate	0.04	Monoterpenic ester
α -Copaene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β -Cubebene	0.03	Sesquiterpene
β -Elemene	0.02	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β -Caryophyllene	0.04	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
(E)- β -Farnesene	0.02	Sesquiterpene
(2E)-Dodecenal	0.01	Aliphatic aldehyde
Germacrene D	0.04	Sesquiterpene
Valencene	0.06	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
(3E,6E)- α -Farnesene	0.05	Sesquiterpene
γ -Cadinene	0.03	Sesquiterpene
δ -Cadinene	0.04	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
Germacrene B	tr	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
β -Sinensal	0.04	Sesquiterpenic aldehyde
α -Sinensal	0.13	Sesquiterpenic aldehyde
Nootkatone	0.01	Sesquiterpenic ketone
Palmitic acid	0.08	Aliphatic acid
Linoleic acid	0.10	Aliphatic acid
Oleic acid	0.12	Aliphatic acid
Stearic acid	0.04	Aliphatic acid
Tangeretin	0.11	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.12	Flavonoid
Nobiletin	0.05	Flavonoid
Consolidated total	99.26%	

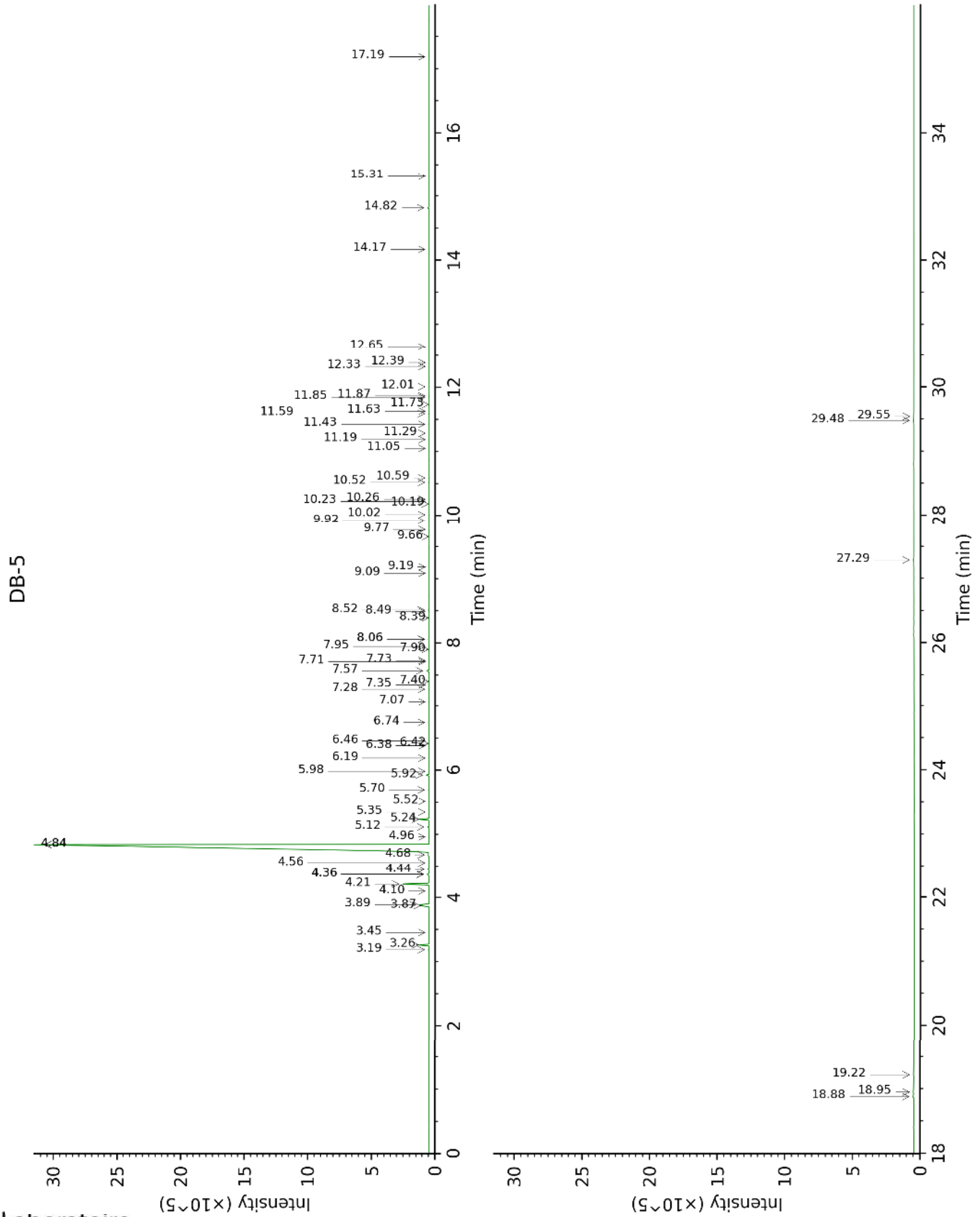
tr: The compound has been detected below 0.005% of total signal.

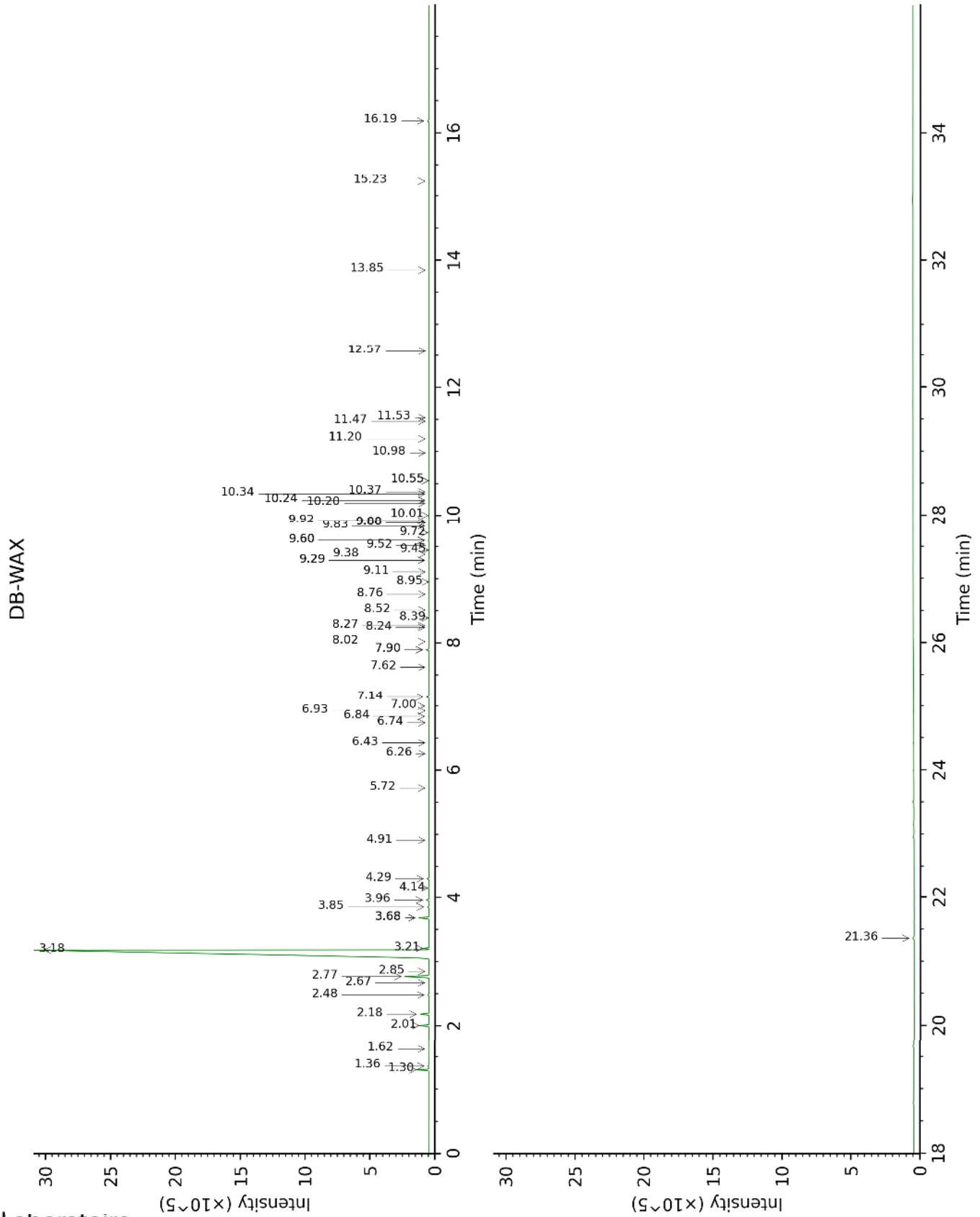
Note: no correction factor was applied

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	3.19	926	0.04	1.36	999	0.04
α -Pinene	3.26	931	0.61	1.30	989	0.61
Camphene	3.45	943	0.01	1.62	1026	0.01
Sabinene	3.87	971	0.54	2.18	1082	0.53
β -Pinene	3.89	972	0.57	2.01	1064	0.59
6-Methyl-5-hepten-2-one	4.10	986	tr	4.91	1295	tr
Myrcene	4.21	993	1.81	2.77	1132	1.81
α -Phellandrene	4.36*	1003	0.16	2.67	1125	0.03
Octanal	4.36*	1003	[0.16]	4.29	1249	0.12
Δ^3 -Carene	4.44	1008	0.07	2.48	1110	0.07
α -Terpinene	4.56	1015	0.02	2.85	1138	0.02
para-Cymene	4.68	1023	0.14	3.96	1225	0.17
β -Phellandrene	4.84*	1033	92.32	3.21	1167	0.26
Limonene	4.84*	1033	[92.32]	3.18	1165	92.08
(Z)- β -Ocimene	4.96	1041	0.01	3.68*	1205	0.67
(E)- β -Ocimene	5.12	1050	0.09	3.85	1217	0.09
γ -Terpinene	5.24	1058	0.66	3.68*	1205	[0.67]
cis-Sabinene hydrate	5.35	1065	tr	6.74	1426	0.01
Octanol	5.52	1076	0.01	8.02	1523	0.01
Terpinolene	5.70	1087	0.05	4.14	1239	0.05
Linalool	5.92	1101	0.19	7.90*	1513	0.19
Nonanal	5.98	1105	0.02	5.72	1352	0.02
trans-para-Mentha-2,8-dien-1-ol	6.19	1118	0.01	8.76	1580	0.01
cis-Limonene oxide	6.38	1131	0.01	6.26	1390	0.01
cis-para-Mentha-2,8-dien-1-ol	6.42	1133	0.01	9.38	1630	0.02
trans-Limonene oxide	6.46	1136	0.02	6.43	1402	0.02
Citronellal	6.74	1154	0.05	6.84	1433	0.06
Terpinen-4-ol	7.06	1175	0.01	8.39	1552	0.01
α -Terpineol	7.28	1189	0.04	9.60*	1648	0.07
Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.35	1194	0.01	7.90*	1513	[0.19]
trans-Isopiperitenol	7.40	1197	0.01	10.24*	1700	0.04
Decanal	7.57	1208	0.19	7.14	1456	0.18
Octyl acetate	7.71	1218	tr	6.93	1440	0.01
trans-Carveol	7.73	1219	0.01	11.20	1782	0.01
cis-Carveol	7.90	1231	0.01	11.53	1811	0.01
Citronellol	7.95	1234	0.02	10.55*	1726	0.02
Neral	8.06*	1241	0.06	9.29*	1622	0.06
Carvone	8.06*	1241	[0.06]	9.88*	1671	0.01
(2E)-Decenal	8.39	1264	tr	8.95	1595	0.01
Perillaldehyde	8.49	1271	0.01	10.55*	1726	[0.02]
Geranial	8.52	1272	0.08	9.92	1674	0.07
Undecanal	9.09	1307	0.01	8.52	1561	0.01
(2E,4E)-Decadienal	9.19	1314	0.01			

α-Terpinyl acetate	9.66	1347	0.01	9.52	1641	0.01
Citronellyl acetate	9.77	1355	0.01	9.29*	1622	[0.06]
Neryl acetate	9.92	1366	0.04	10.01	1681	0.04
α-Copaene	10.02	1373	0.03	7.00	1446	0.03
Geranyl acetate	10.19	1385	0.02	10.37	1712	0.02
β-Cubebene	10.23	1387	0.03	7.62	1492	0.04
β-Elemene	10.26	1390	0.02	8.24	1540	0.03
Dodecanal	10.52	1409	0.05	9.83	1666	0.04
β-Caryophyllene	10.59	1414	0.04	8.27	1542	0.04
α-Humulene	11.05	1448	0.02	9.11	1608	0.01
(E)-β-Farnesene	11.19	1458	0.02	9.45	1636	0.01
(2E)-Dodecenal	11.29	1466	0.01	11.48	1806	0.01
Germacrene D	11.43	1476	0.04	9.60*	1648	[0.07]
Valencene	11.59	1488	0.06	9.72	1658	0.06
Bicyclogermacrene	11.63	1491	0.01	9.88*	1671	[0.01]
α-Murolene	11.74	1499	0.01	9.88*	1671	[0.01]
(3E,6E)-α-Farnesene	11.85	1508	0.05	10.34	1709	0.05
γ-Cadinene	11.87	1509	0.03	10.20	1696	0.02
δ-Cadinene	12.01	1520	0.04	10.24*	1700	[0.04]
α-Elemol	12.33	1546	0.01	13.85	2023	0.01
Germacrene B	12.39	1550	tr	10.98	1763	0.01
Caryophyllene oxide	12.65	1570	0.01	12.57	1903	0.01
β-Sinensal	14.17	1695	0.04	15.23	2159	0.04
α-Sinensal	14.82	1751	0.13	16.19	2258	0.13
Nootkatone	15.31	1794	0.01			
Palmitic acid	17.19	1967	0.08	21.36	2858	0.13
Linoleic acid	18.88	2134	0.10			
Oleic acid	18.95	2142	0.12			
Stearic acid	19.22	2169	0.04			
Tangeretin	27.29	3143	0.11			
3,3',4',5,6,7,8- Heptamethoxyflavone	29.48	3326	0.12			
Nobiletin	29.54	3330	0.05			
Total identified		99.24%			98.78%	
Total reported		99.25%			98.78%	

*: 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