

Date : 2023-08-08

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23G20-NPA06

Customer Identification : NPS00089 - Orange - Citrus sinensis - Italy - Lot # NP0180

Type : Essential Oil

Source : Citrus sinensis

Customer : Nature Packaged

Checked and approved by:

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

Notes: 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.

This report is an update from the first version issued on 2023-08-03 to format it for online publication.

GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

✖ISO

Results : See analysis summary (next page)

Analyst : Amélie Simard, Analyste

Date : 2023-08-02

PHYSICOCHEMICAL DATA

Refractive index : 1.4731 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2023-07-20

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	0.44	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.28	Monoterpene
β -Pinene	0.05	Monoterpene
Myrcene	1.64	Monoterpene
Octanal	0.33	Aliphatic aldehyde
α -Phellandrene	0.04	Monoterpene
Δ^3 -Carene	0.23	Monoterpene
α -Terpinene	tr	Monoterpene
<i>para</i> -Cymene	0.02	Monoterpene
Limonene	93.44	Monoterpene
β -Phellandrene	0.25	Monoterpene
(<i>Z</i>)- β -Ocimene	tr	Monoterpene
(<i>E</i>)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	0.05	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.05	Aliphatic alcohol
Terpinolene	0.04	Monoterpene
Linalool	0.37	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.04	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.04	Monoterpenic ether
<i>cis-para</i> -Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
Citronellal	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.04	Monoterpenic alcohol
Decanal	0.33	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
<i>trans</i> -Carveol	0.03	Monoterpenic alcohol
Nerol	0.03	Monoterpenic alcohol
<i>cis</i> -Carveol	0.02	Monoterpenic alcohol
Neral	0.01	Monoterpenic aldehyde
Carvone	0.04	Monoterpenic ketone
Geraniol	0.02	Monoterpenic alcohol
Perillaldehyde	0.01	Monoterpenic aldehyde
Geranial	0.06	Monoterpenic aldehyde
Decanol	0.01	Aliphatic alcohol
Limonen-10-ol	0.01	Monoterpenic alcohol

Undecanal	0.01	Aliphatic aldehyde
Citronellyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.01	Monoterpenic ester
α -Copaene	0.02	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β -Elemene	0.01	Sesquiterpene
Dodecanal	0.04	Aliphatic aldehyde
β -Caryophyllene	0.02	Sesquiterpene
β -Copaene	0.02	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Valencene	0.11	Sesquiterpene
γ -Cadinene	tr	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
β -Sinensal	0.02	Sesquiterpenic aldehyde
α -Sinensal	0.02	Sesquiterpenic aldehyde
Nootkatone	0.02	Sesquiterpenic ketone
Palmitic acid	0.05	Aliphatic acid
Linoleic acid	0.03	Aliphatic acid
Stearic acid	0.20	Aliphatic acid
Tetramethoxyflavone isomer	0.01	Flavonoid
Tangeretin	0.03	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.05	Flavonoid
Nobiletin	0.03	Flavonoid
Consolidated total	98.87	

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

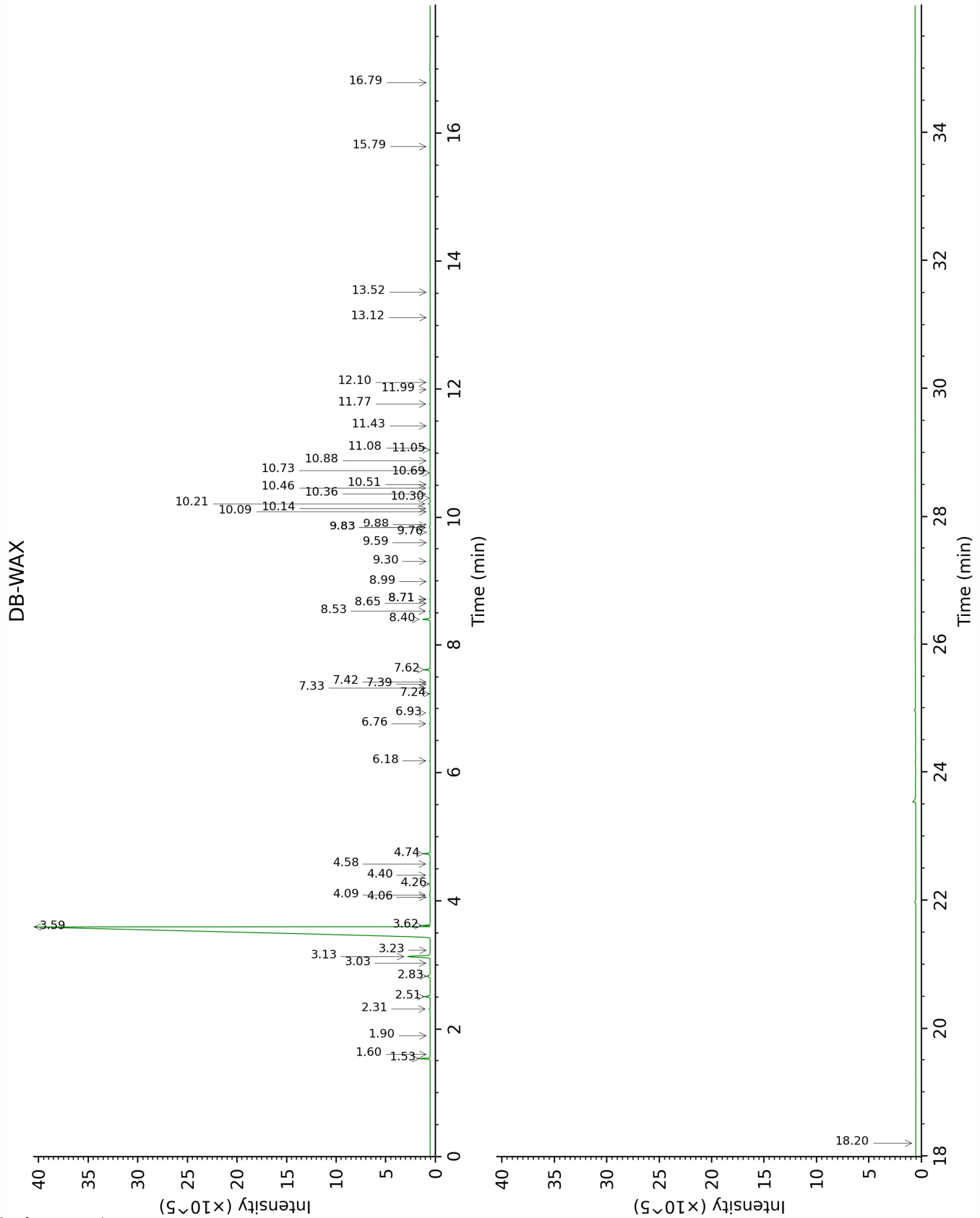
Note: no correction factor was applied

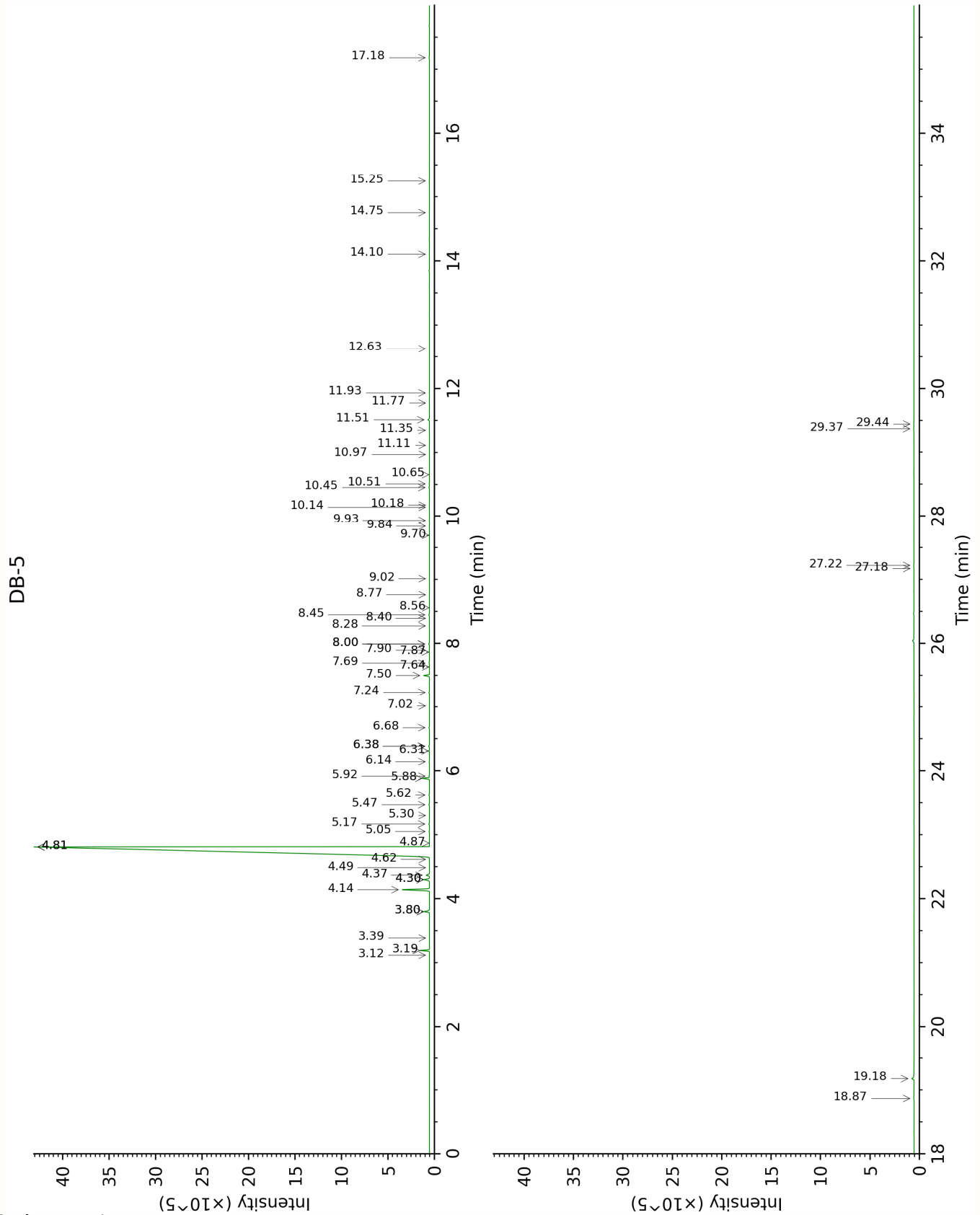
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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





FULL ANALYSIS DATA

α-Thujene	Column DB-WAX			Column DB-5		
	1.60	996.8	tr	3.12	926.3	0.01
α -Pinene	1.53	990.4	0.43	3.19	931.2	0.44
Camphene	1.90	1025.5	tr	3.39	944.0	0.01
Sabinene	2.51	1083.8	0.28	3.80*	971.1	[0.33]
β -Pinene	2.32	1065.3	0.05	3.80*	971.1	[0.33]
Myrcene	3.13	1133.4	1.65	4.14	993.7	1.64
Octanal	4.74	1253.8	0.33	4.30*	1004.0	[0.37]
α -Phellandrene	3.03	1125.5	0.04	4.30*	1004.0	[0.37]
Δ^3 -Carene	2.83	1109.8	0.22	4.37	1008.3	0.23
α -Terpinene	3.23	1140.9	0.01	4.49	1015.7	tr
<i>para</i> -Cymene	4.40	1229.2	0.04	4.62	1023.7	0.02
Limonene	3.59	1169.1	93.44	4.81*	1035.9	[93.83]
β -Phellandrene	3.62	1170.9	0.25	4.81*	1035.9	[93.83]
(<i>Z</i>)- β -Ocimene	4.06	1204.3	0.01	4.87	1039.6	tr
(<i>E</i>)- β -Ocimene	4.26	1219.3	0.02	5.05	1051.0	0.03
γ -Terpinene	4.09	1206.7	0.04	5.17	1058.3	0.05
<i>cis</i> -Sabinene hydrate	7.24	1430.0	0.01	5.30	1066.6	0.01
Octanol	8.53	1526.8	0.05	5.47	1077.1	0.05
Terpinolene	4.58	1242.1	0.04	5.62	1086.6	0.04
Linalool	8.40	1517.1	0.38	5.88	1102.9	0.37
Nonanal	6.18	1353.0	0.02	5.92	1105.0	0.03
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.30	1586.4	0.02	6.14	1119.4	0.03
<i>cis</i> -Limonene oxide	6.76	1394.7	0.04	6.31	1130.1	0.04
<i>trans</i> -Limonene oxide	6.93	1407.1	0.04	6.38*	1134.7	[0.06]
<i>cis-para</i> -Mentha-2,8-dien-1-ol	9.83*	1628.8	[0.06]	6.38*	1134.7	[0.06]
Citronellal	7.33	1436.6	0.04	6.68	1153.3	0.04
Terpinen-4-ol				7.02	1175.0	0.01
α -Terpineol	10.14	1653.4	0.04	7.24	1189.0	0.04
Decanal	7.62	1457.8	0.31	7.50	1206.0	0.33
Octyl acetate	7.39	1440.9	0.01	7.64	1214.9	0.01
<i>trans</i> -Carveol	11.77	1788.4	0.03	7.69	1218.8	0.03
Nerol	11.43	1759.9	0.01	7.87	1230.5	0.03
<i>cis</i> -Carveol	12.10	1817.9	0.02	7.90	1232.3	0.02
Neral	9.83*	1628.8	[0.06]	8.00*	1238.9	[0.06]
Carvone	10.36	1671.6	0.04	8.00*	1238.9	[0.06]
Geraniol	11.99	1808.2	0.02	8.28	1257.8	0.02
Perillaldehyde	11.05	1728.8	0.01	8.40	1265.7	0.01
Geranial	10.46	1679.1	0.05	8.45	1269.4	0.06
Decanol	11.08	1730.9	0.01	8.56	1276.8	0.01
Limonen-10-ol	13.52	1943.5	0.01	8.77	1290.4	0.01
Undecanal	8.99	1562.2	0.01	9.02	1307.2	0.01

Citronellyl acetate	9.76	1622.9	0.01	9.70	1355.1	0.01
Neryl acetate	10.51	1683.6	0.02	9.84	1365.4	0.01
α -Copaene	7.42	1443.7	0.02	9.93	1371.9	0.02
Geranyl acetate	10.88	1714.3	0.01	10.14	1386.5	0.01
β -Elemene	8.71*	1541.1	[0.03]	10.18	1388.9	0.01
Dodecanal	10.30	1666.5	0.02	10.45	1408.6	0.04
β -Caryophyllene	8.71*	1541.1	[0.03]	10.51	1412.9	0.02
β -Copaene	8.65	1536.2	0.02	10.65	1423.6	0.02
α -Humulene	9.59	1609.7	0.01	10.97	1447.0	0.01
(<i>E</i>)- β -Farnesene	9.88	1632.6	0.01	11.11	1457.6	0.01
Germacrene D	10.09	1649.4	0.01	11.35	1475.1	0.01
Valencene	10.21	1659.3	0.10	11.51	1487.3	0.11
γ -Cadinene	10.69	1698.6	0.02	11.77	1507.0	tr
δ -Cadinene	10.73	1701.6	0.02	11.93	1519.3	0.02
Caryophyllene oxide	13.12	1907.7	0.01	12.63	1573.9	0.01
β -Sinensal	15.79	2159.1	0.02	14.10	1694.0	0.02
α -Sinensal	16.79	2259.4	0.01	14.75	1749.7	0.02
Nootkatone	18.20	2408.4	0.02	15.25	1792.5	0.02
Palmitic acid				17.18	1970.7	0.05
Linoleic acid				18.87	2137.6	0.03
Stearic acid				19.18	2169.8	0.20
Tetramethoxyflavone isomer				27.18	3135.8	0.01
Tangeretin				27.22	3140.7	0.03
3,3',4',5,6,7,8-Heptamethoxyflavone				29.37	3322.5	0.05
Nobiletin				29.44	3327.3	0.03
Total reported		98.39%			99.02%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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