

Date : 2025-12-03

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25K07-PTH18

Customer Identification : Org Grapefruit - USA - GK0110R

Type : Essential Oil

Source : *Citrus x paradisi* [syn. *Citrus x paradisi* cv. Red]

Customer : Plant Therapy

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The compliance status of the sample is provided to facilitate the reading of the report. The client remains ultimately responsible for reviewing the results presented within this report and to establish compliance of the tested batch against relevant quality criteria.

This report is an update of the version first issued on November 11, 2025 to make a correction in the sample identification section.

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 : Jean-Christophe Fortin, M. Sc.

Date : 2025-11-10

PHYSICOCHEMICAL DATA

Refractive index : 1.4762 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2025-11-07

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	0.58	Monoterpene
Camphene	0.01	Monoterpene
β -Pinene	0.03	Monoterpene
Sabinene	0.48	Monoterpene
Myrcene	1.98	Monoterpene
Octanal	0.14	Aliphatic aldehyde
α -Phellandrene	0.03	Monoterpene
1,8-Cineole	0.27	Monoterpenic ether
Limonene	92.19	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.10	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.01	Monoterpene
Linalool	0.08	Monoterpenic alcohol
Nonanal	0.05	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	0.06	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.03	Monoterpenic alcohol
Decanal	0.21	Aliphatic aldehyde
Octyl acetate	0.04	Aliphatic ester
cis-Carveol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Neral	0.03	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Geranial	0.04	Monoterpenic aldehyde
Unknown	0.02	Oxygenated monoterpene
Undecanal	0.02	Aliphatic aldehyde
α -Terpinyl acetate	0.01	Monoterpenic ester
Limonene hydroperoxide IV	0.01	Monoterpenic peroxide
Neryl acetate	0.01	Monoterpenic ester
α -Copaene	0.11	Sesquiterpene
Geranyl acetate	0.04	Monoterpenic ester
β -Cubebene	0.10	Sesquiterpene
β -Elemene	0.03	Sesquiterpene

Dodecanal	0.04	Aliphatic aldehyde
β -Caryophyllene	0.29	Sesquiterpene
α -Humulene	0.05	Sesquiterpene
(E)- β -Farnesene	0.05	Sesquiterpene
Germacrene D	0.10	Sesquiterpene
Bicyclogermacrene	0.04	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
Cubebol	0.02	Sesquiterpenic alcohol
δ -Cadinene	0.12	Sesquiterpene
α -Elemol	0.03	Sesquiterpenic alcohol
(E)-Nerolidol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
β -Sinensal	0.06	Sesquiterpenic aldehyde
(2E,6E)-Farnesol	0.02	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.01	Sesquiterpenic aldehyde
Myristic acid	0.03	Aliphatic acid
Nootkatone	0.04	Sesquiterpenic ketone
Palmitic acid	0.07	Aliphatic acid
Bergapten	0.02	Furanocoumarin
Osthole	0.08	Coumarin
Linoleic acid	0.06	Aliphatic acid
Oleic acid	0.04	Aliphatic acid
cis-Vaccenic acid?	0.02	Aliphatic acid
Stearic acid	0.04	Aliphatic acid
7-Methoxy-8-(2-formyl-2-methylpropyl)coumarin	0.02	Coumarin
Isoauraptene	0.08	Coumarin
Meranzin	0.12	Coumarin
Auraptene	0.94	Coumarin
Epoxyaurapten	0.14	Coumarin
Tangeretin	0.06	Flavonoid
3,5,6,7,8,3',4'-Heptamethoxyflavone?	0.03	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.02	Flavonoid
Consolidated total	99.58	

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

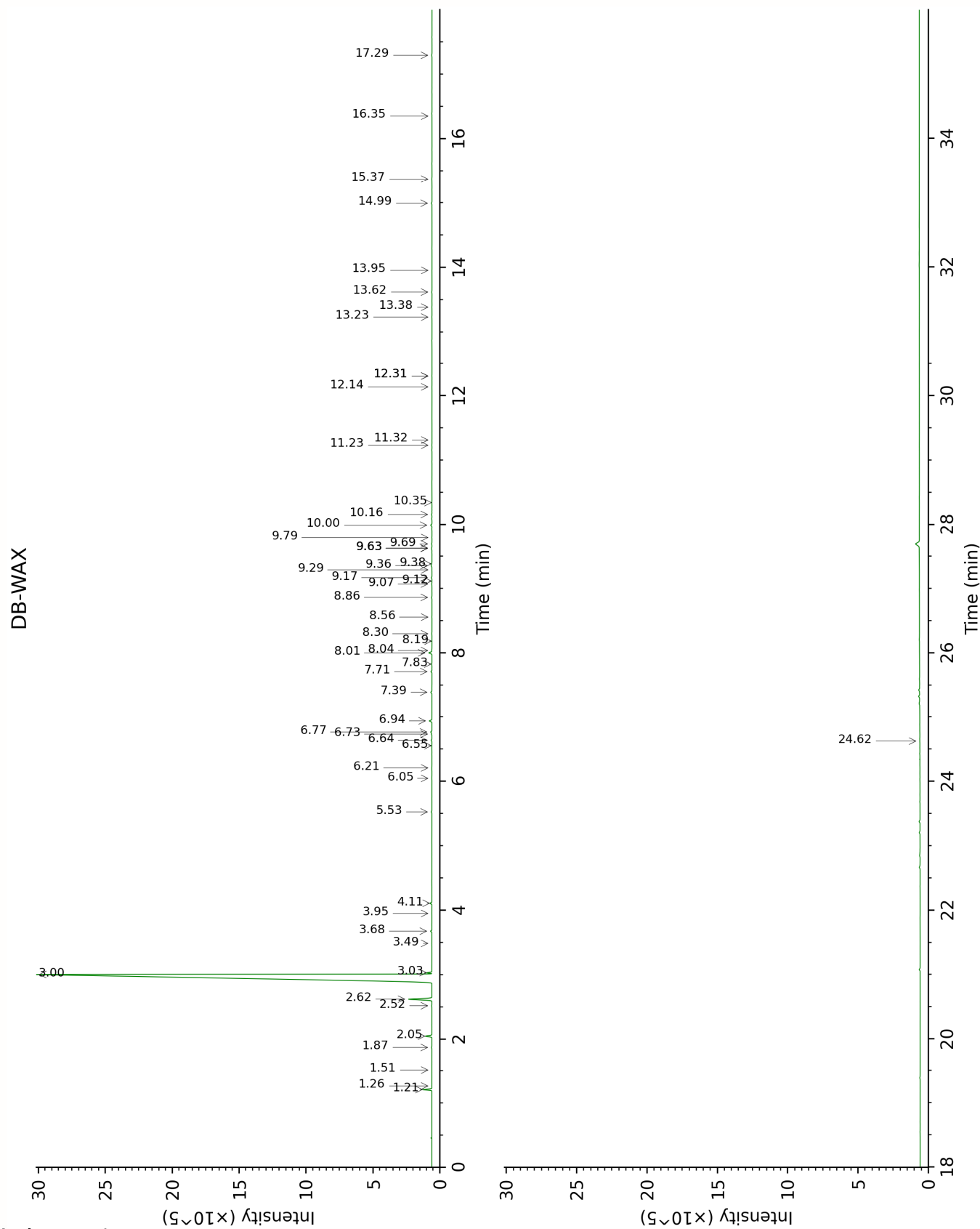
Note: no correction factor was applied

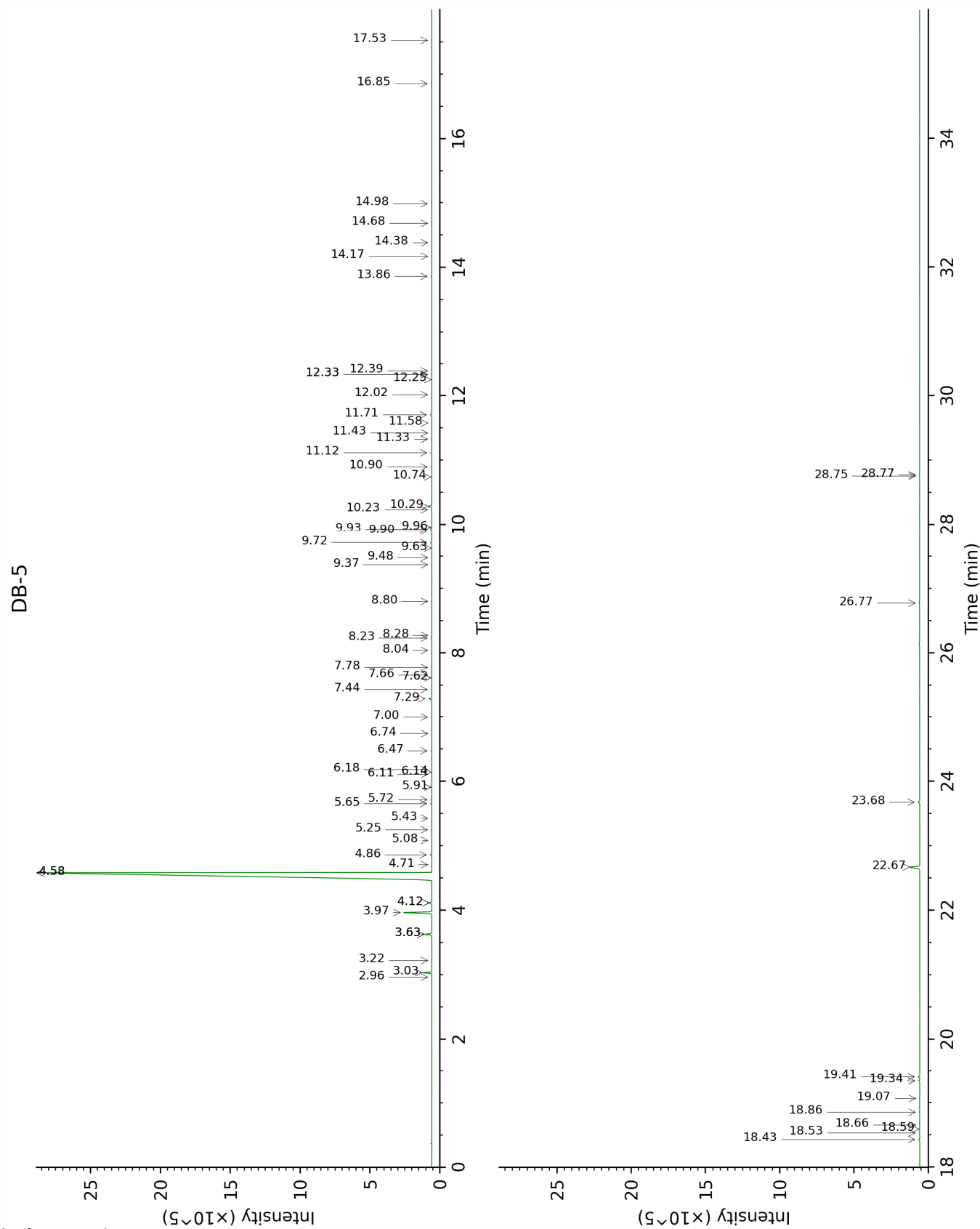
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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		
	1.26	1000.8	tr	2.96	926.2	0.01
α -Pinene	1.21	991.2	0.59	3.03	930.9	0.58
Camphene	1.51	1028.5	tr	3.22	943.6	0.01
β -Pinene	1.87	1065.8	0.03	3.63*	970.8	[0.51]
Sabinene	2.05	1084.0	0.48	3.63*	970.8	[0.51]
Myrcene	2.62	1134.7	1.99	3.97	993.4	1.98
Octanal	4.11	1250.2	0.14	4.12*	1003.5	[0.18]
α -Phellandrene	2.52	1126.5	0.03	4.12*	1003.5	[0.18]
1,8-Cineole	3.03	1167.6	0.27	4.58*	1033.1	[91.92]
Limonene	3.00	1165.3	92.19	4.58*	1033.1	[91.92]
(Z)- β -Ocimene	3.49	1204.1	0.01	4.71	1041.1	0.01
(E)- β -Ocimene	3.68	1218.2	0.10	4.86	1050.7	0.10
cis-Sabinene hydrate	6.55	1429.2	0.01	5.08	1065.0	0.01
Octanol	7.83	1526.8	0.03	5.25	1075.4	0.03
Terpinolene	3.95	1238.5	0.01	5.43	1086.8	0.01
Linalool	7.71	1517.6	0.08	5.65	1101.2	0.08
Nonanal	5.53	1352.9	0.05	5.72	1105.2	0.05
trans-para-Mentha-2,8-dien-1-ol	8.56	1584.4	0.01	5.91	1117.7	0.01
cis-Limonene oxide	6.05	1391.2	0.01	6.11	1130.6	0.01
cis-para-Mentha-2,8-dien-1-ol	9.12	1629.5	0.01	6.14	1132.7	0.01
trans-Limonene oxide	6.21	1403.1	0.01	6.18	1135.4	0.02
Citronellal	6.64	1435.6	0.06	6.47	1154.3	0.06
Terpinen-4-ol	8.19	1555.0	0.01	6.74	1171.6	0.01
α -Terpineol	9.38	1651.6	0.03	7.00	1188.3	0.03
Decanal	6.94	1458.4	0.21	7.29	1207.6	0.21
Octyl acetate	6.73	1442.9	0.04	7.44	1217.3	0.04
cis-Carveol	11.32	1815.9	0.01	7.62	1229.7	0.01
Citronellol	10.35	1732.0	0.02	7.66	1232.6	0.01
Neral	9.07	1625.7	0.03	7.78	1240.7	0.03
Geraniol	11.24	1808.7	0.01	8.04	1258.6	0.01
Geranial	9.69	1677.2	0.04	8.23	1271.8	0.04
Unknown TIDI I [m/z 41, 43 (84), 72 (81), 97 (90), 95 (60)... 150 (4)]	12.31*	1905.5	[0.01]	8.28	1274.7	0.02
Undecanal	8.30	1564.0	0.02	8.80	1307.7	0.02
α -Terpinyl acetate	9.29	1643.9	0.01	9.37	1348.1	0.01
Limonene hydroperoxide IV				9.48	1356.0	0.01
Neryl acetate	9.79	1685.3	0.01	9.63	1366.5	0.01
α -Copaene	6.77	1445.3	0.11	9.72	1372.8	0.11
Geranyl acetate	10.16	1716.0	0.04	9.90	1385.9	0.04

β-Cubebene	7.39	1492.9	0.10	9.93	1387.7	0.10
β-Elemene	8.04	1543.4	0.03	9.96	1390.1	0.03
Dodecanal	9.63*	1671.6	[0.06]	10.23	1409.6	0.04
β-Caryophyllene	8.00	1540.7	0.28	10.29	1413.8	0.29
α-Humulene	8.86	1608.6	0.04	10.74	1447.8	0.05
(E)-β-Farnesene	9.17	1633.9	0.05	10.90	1459.4	0.05
Germacrene D	9.36	1649.3	0.09	11.12	1475.9	0.10
Bicyclogermacrene	9.63*	1671.6	[0.06]	11.33	1491.6	0.04
α-Murolene	9.63*	1671.6	[0.06]	11.43	1499.0	0.02
Cubebol	12.14	1890.2	0.01	11.58	1510.6	0.02
δ-Cadinene	10.00	1702.1	0.11	11.71	1520.7	0.12
α-Elemol	13.62	2028.8	0.03	12.02	1545.4	0.03
(E)-Nerolidol	13.38	2006.3	0.01	12.25	1563.8	0.01
Germacrene D-4-ol	13.23	1991.8	0.01	12.33*	1570.0	[0.03]
Spathulenol	13.95	2061.5	0.01	12.33*	1570.0	[0.03]
Caryophyllene oxide	12.31*	1905.5	[0.01]	12.39	1574.6	0.02
β-Sinensal	14.99	2164.9	0.06	13.86	1695.1	0.06
(2E,6E)-Farnesol	16.35	2306.1	0.01	14.17	1721.5	0.02
(2E,6E)-Farnesal	15.37	2203.7	0.02	14.38	1739.7	0.01
Myristic acid				14.68	1765.8	0.03
Nootkatone	17.29	2408.6	0.04	14.98	1792.2	0.04
Palmitic acid				16.85	1964.7	0.07
Bergapten	24.62	3351.7	0.01	17.53	2029.8	0.02
Osthole				18.43	2120.3	0.08
Linoleic acid				18.53	2131.0	0.06
Oleic acid				18.59	2137.1	0.04
cis-Vaccenic acid?				18.66	2143.6	0.02
Stearic acid				18.86	2164.2	0.04
7-Methoxy-8-(2-formyl-2-methylpropyl)coumarin				19.07	2186.3	0.02
Isoauraptene				19.34	2215.0	0.08
Meranzin				19.40	2221.8	0.12
Auraptene				22.67	2593.4	0.94
Epoxyaurapten				23.68	2719.0	0.14
Tangeretin				26.77†	3126.8	0.04
3,5,6,7,8,3',4'-Heptamethoxyflavone?				28.75	3312.5	0.03
3,3',4',5,6,7,8-Heptamethoxyflavone				28.77	3313.9	0.02
Total reported		97.70%			99.05%	

*: 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