

Date : 2025-07-14

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25F27-PTH01

Customer Identification : Lemon - USA - L60122R

Type : Essential Oil

Source : *Citrus x limon*

Customer : Plant Therapy

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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 : 2025-07-10

PHYSICOCHEMICAL DATA

Refractive index : 1.4746 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2025-06-27

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
Octane	tr	Alkane
Tricyclene	0.01	Monoterpene
α -Thujene	0.41	Monoterpene
α -Pinene	1.95	Monoterpene
Camphene	0.07	Monoterpene
Sabinene	2.32	Monoterpene
β -Pinene	13.99	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	1.40	Monoterpene
α -Phellandrene	0.04	Monoterpene
Octanal	0.08	Aliphatic aldehyde
α -Terpinene	0.19	Monoterpene
<i>para</i> -Cymene	0.28	Monoterpene
Limonene	64.19	Monoterpene
(<i>Z</i>)- β -Ocimene	0.04	Monoterpene
(<i>E</i>)- β -Ocimene	0.09	Monoterpene
γ -Terpinene	8.04	Monoterpene
<i>cis</i> -Sabinene hydrate	0.06	Monoterpenic alcohol
Terpinolene	0.35	Monoterpene
<i>trans</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.11	Monoterpenic alcohol
Nonanal	0.12	Aliphatic aldehyde
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.01	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
Citronellal	0.07	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
β -Phellandrene	0.44	Monoterpene
Terpinen-4-ol	0.03	Monoterpenic alcohol
Isogeranial	0.01	Monoterpenic aldehyde
α -Terpineol	0.22	Monoterpenic alcohol
Decanal	0.05	Aliphatic aldehyde
Nerol	0.05	Monoterpenic alcohol
2,3-Epoxygeranial?	0.02	Monoterpenic aldehyde
Neral	0.65	Monoterpenic aldehyde
Geraniol	0.04	Monoterpenic alcohol
Geranial	1.05	Monoterpenic aldehyde
Undecanal	0.03	Aliphatic aldehyde
Citronellyl acetate	0.03	Monoterpenic ester
Neryl acetate	0.53	Monoterpenic ester

Geranyl acetate	0.35	Monoterpenic ester
Dodecanal	0.02	Aliphatic aldehyde
<i>cis</i> - α -Bergamotene	0.04	Sesquiterpene
β -Caryophyllene	0.19	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.38	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
β -Santalene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.05	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.02	Sesquiterpene
Valencene	0.04	Sesquiterpene
Bicyclogermacrene	0.09	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.06	Sesquiterpene
β -Bisabolene	0.57	Sesquiterpene
(<i>Z</i>)- γ -Bisabolene	0.01	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.02	Sesquiterpene
Germacrene D-4-ol	0.02	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
α -Bisabolol	0.04	Sesquiterpenic alcohol
Nootkatone	0.01	Sesquiterpenic ketone
Hexadecanal	0.02	Aliphatic aldehyde
Citropten	0.06	Furanocoumarin
Palmitic acid	0.14	Aliphatic acid
Linoleic acid	0.05	Aliphatic acid
Oleic acid	0.06	Aliphatic acid
Stearic acid	0.05	Aliphatic acid
Tricosane	0.01	Alkane
Pentacosane	0.01	Alkane
Byakangelicol	0.03	Furanocoumarin
Heptacosane	0.01	Alkane
Consolidated total	99.55	

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

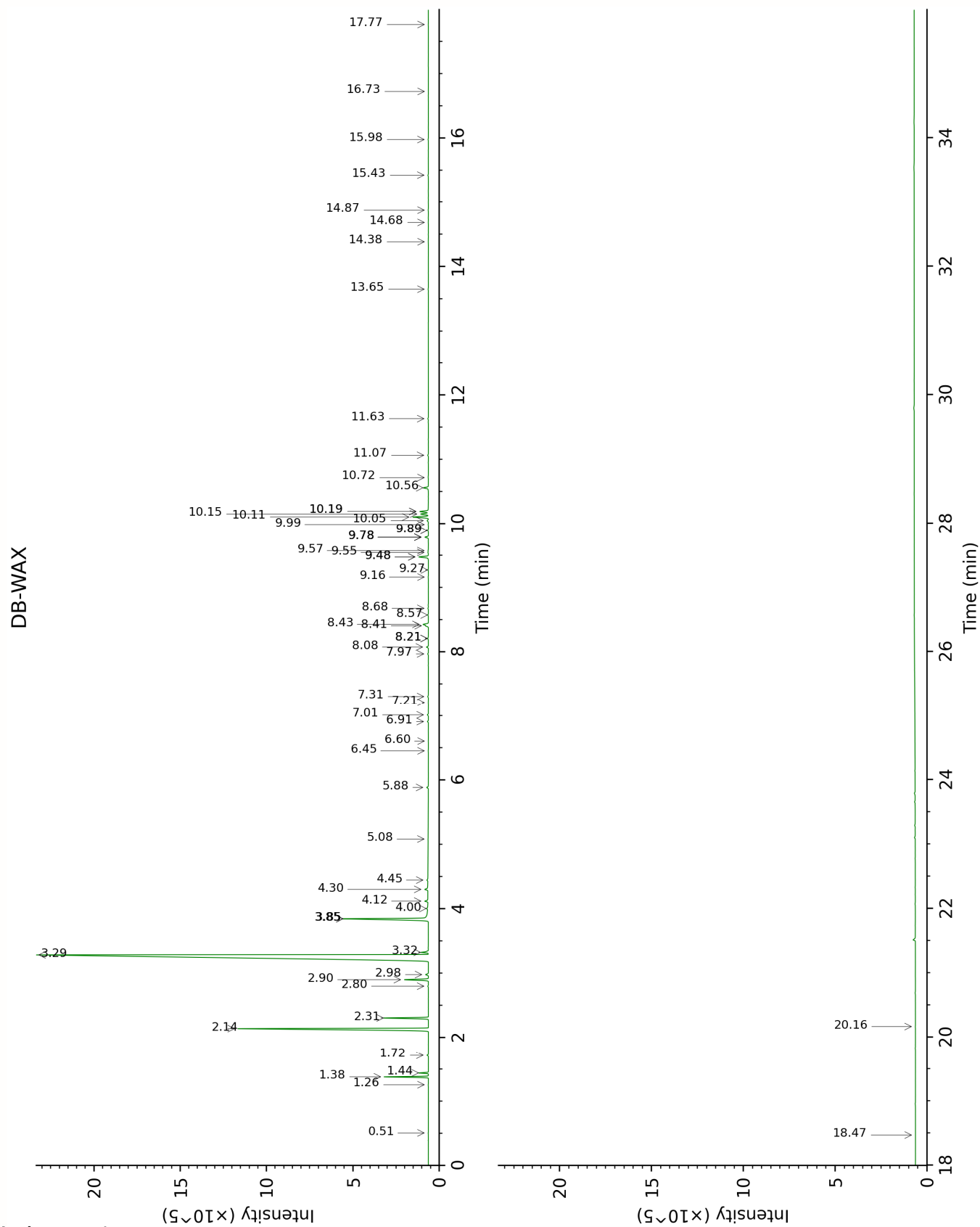
Note: no correction factor was applied

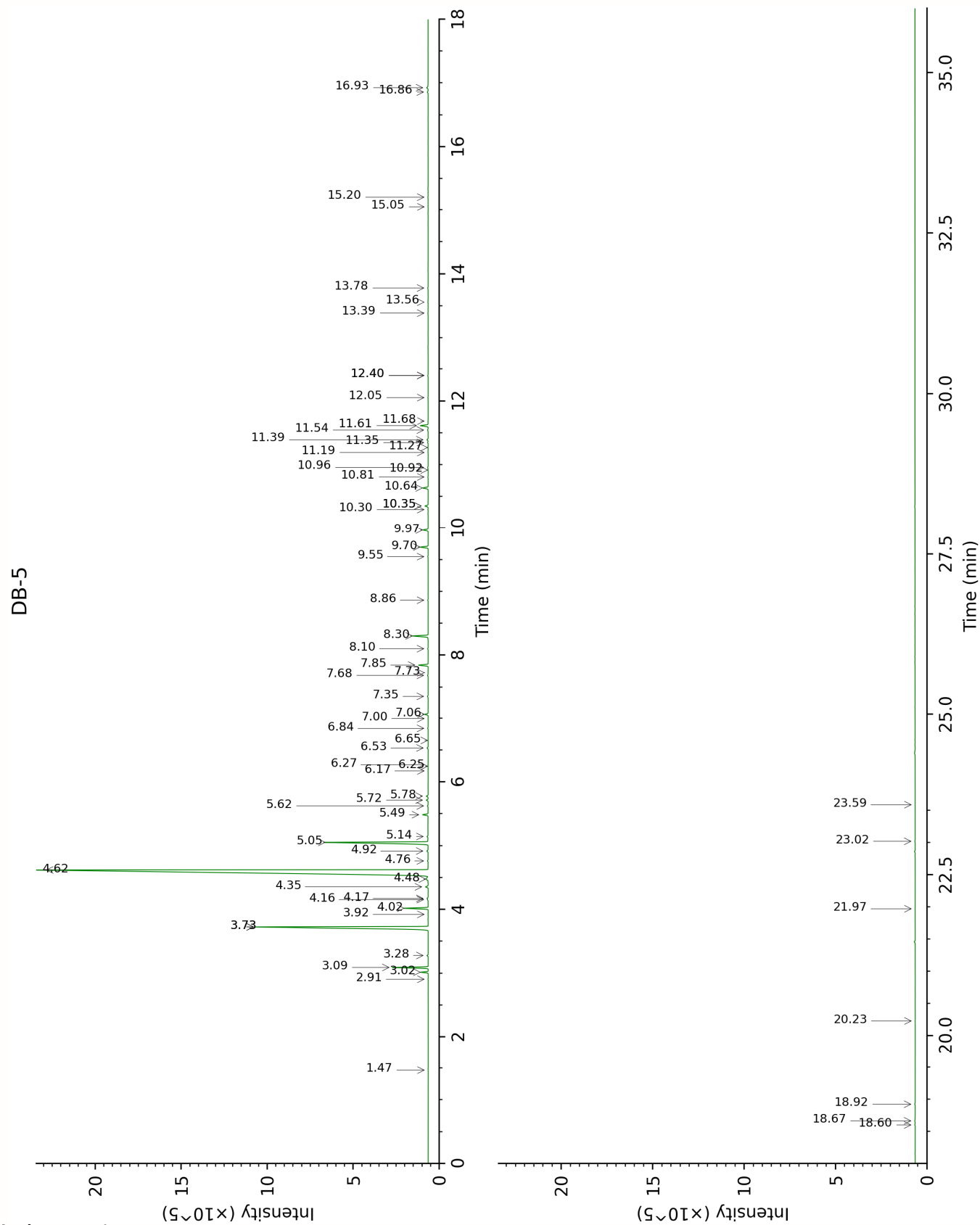
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Octane	Column DB-WAX			Column DB-5		
	0.51	788.5	0.01	1.47	802.4	tr
Tricyclene	1.26	972.2	0.01	2.91	919.8	0.01
α -Thujene	1.44	1000.1	0.41	3.02	927.1	0.41
α -Pinene	1.38	992.2	1.97	3.09	932.1	1.95
Camphene	1.72	1027.5	0.07	3.28	944.7	0.07
Sabinene	2.30	1085.6	2.32	3.73*	974.7	[16.11]
β -Pinene	2.14	1069.2	13.99	3.73*	974.7	[16.11]
6-Methyl-5-hepten-2-one	5.08	1300.8	0.01	3.92	987.9	0.02
Myrcene	2.90	1134.9	1.42	4.02	994.4	1.40
α -Phellandrene	2.80	1127.0	0.04	4.16	1003.4	0.04
Octanal	4.45	1253.5	0.09	4.17	1004.6	0.08
α -Terpinene	2.98	1141.2	0.19	4.35	1016.1	0.19
<i>para</i> -Cymene	4.12	1229.3	0.26	4.48	1023.9	0.28
Limonene	3.28	1165.4	64.70	4.62	1032.9	64.19
(Z)- β -Ocimene	3.85*	1209.1	[6.81]	4.76	1041.9	0.04
(E)- β -Ocimene	4.00	1220.8	0.24	4.92	1051.8	0.09
γ -Terpinene	3.85*	1209.1	[6.81]	5.05	1060.4	8.04
<i>cis</i> -Sabinene hydrate	6.91	1429.1	0.06	5.14	1066.2	0.06
Terpinolene	4.30	1242.8	0.35	5.49	1087.9	0.35
<i>trans</i> -Sabinene hydrate	7.97	1508.5	0.05	5.62	1096.7	0.04
Linalool	8.08	1516.8	0.12	5.72	1102.5	0.11
Nonanal	5.88	1354.5	0.11	5.78	1106.5	0.12
<i>cis</i> -Limonene oxide	6.45	1395.4	0.01	6.17	1132.1	0.01
<i>trans</i> -Limonene oxide	6.60	1406.6	0.01	6.25	1136.9	0.01
Camphor	7.21	1451.7	0.01	6.27	1138.5	0.01
Citronellal	7.01	1436.9	0.07	6.53	1155.5	0.07
Borneol	9.78*	1651.5	[0.23]	6.65	1163.2	0.01
β -Phellandrene	3.32	1168.5	0.44			
Terpinen-4-ol	8.57	1555.3	0.03	6.84	1175.5	0.03
Isogeranial	8.21*	1527.0	[0.06]	7.00	1185.4	0.01
α -Terpineol	9.78*	1651.5	[0.23]	7.06	1189.7	0.22
Decanal	7.31	1458.7	0.05	7.35	1209.0	0.05
Nerol	11.07	1758.2	0.05	7.68	1231.4	0.05
2,3-Epoxygeranial?				7.73	1234.3	0.02
Neral	9.48*	1626.6	[0.67]	7.85	1242.4	0.65
Geraniol	11.63	1806.9	0.03	8.10	1259.9	0.04
Geranial	10.11	1677.6	1.05	8.30	1273.6	1.05
Undecanal	8.68	1563.3	0.03	8.86	1308.4	0.03

Citronellyl acetate	9.48*	1626.6	[0.67]	9.55	1357.0	0.03
Neryl acetate	10.15	1681.5	0.54	9.70	1367.8	0.53
Geranyl acetate	10.56	1715.4	0.36	9.97	1386.9	0.35
Dodecanal	9.99	1668.1	0.02	10.30	1410.7	0.02
cis- α -Bergamotene	8.21*	1527.0	[0.06]	10.35*	1414.9	[0.23]
β -Caryophyllene	8.41	1542.4	0.19	10.35*	1414.9	[0.23]
trans- α -Bergamotene	8.43	1544.0	0.38	10.64	1436.1	0.38
α -Humulene	9.27	1610.2	0.02	10.81	1449.0	0.02
β -Santalene	9.16	1601.2	0.02	10.92	1457.1	0.01
(E)- β -Farnesene	9.55	1632.2	0.04	10.96	1460.2	0.05
Germacrene D	9.78*	1651.5	[0.23]	11.19	1477.8	0.01
trans- β -Bergamotene	9.58	1634.6	0.03	11.27	1483.6	0.02
Valencene	9.89*	1660.2	[0.04]	11.35	1489.5	0.04
Bicyclogermacrene	10.05	1673.1	0.10	11.39	1492.8	0.09
(Z)- α -Bisabolene	10.19*	1684.7	[0.62]	11.54	1504.1	0.06
β -Bisabolene	10.19*	1684.7	[0.62]	11.61	1509.6	0.57
(Z)- γ -Bisabolene	9.89*	1660.2	[0.04]	11.68	1515.2	0.01
(E)- α -Bisabolene	10.72	1728.8	0.01	12.05	1544.3	0.02
Germacrene D-4-ol	13.65	1989.6	0.02	12.40*	1571.7	[0.03]
Spathulenol	14.38	2060.0	0.01	12.40*	1571.7	[0.03]
Unknown CILI I [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	14.87	2107.7	0.02	13.39	1651.9	0.04
Unknown CILI II [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	15.98	2219.6	0.02	13.56	1666.1	0.02
α -Bisabolol	15.43	2163.1	0.04	13.78	1684.5	0.04
Nootkatone	17.77	2410.6	0.01	15.05	1793.8	0.01
Hexadecanal	14.68	2088.9	0.02	15.20	1807.0	0.02
Citropten				16.86	1960.6	0.06
Palmitic acid				16.93	1967.1	0.14
Linoleic acid				18.60	2132.9	0.05
Oleic acid				18.67	2139.6	0.06
Stearic acid				18.92	2166.3	0.05
Tricosane	16.73	2297.6	0.01	20.23	2305.3	0.01
Pentacosane	18.47	2489.2	0.01	21.97	2504.0	0.01
Byakangelicol				23.02	2630.7	0.03
Heptacosane	20.16	2689.4	0.01	23.59	2701.5	0.01
Total reported		98.48%			98.91%	

*: 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