

Date : June 17, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22F15-PTH01


Customer identification : Lemon Essence - LX0106R

Type : Essential oil

Source : *Citrus x limon* ct. Distilled

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005

Analysis date : June 17, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update from the first version issued on June 17, 2022, to update the batch number.

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4735 ± 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
2-Methyl-3-buten-2-ol	tr	Aliphatic alcohol
Heptanal	0.01	Aliphatic aldehyde
Tricyclene	0.01	Monoterpene
α -Thujene	0.37	Monoterpene
α -Pinene	1.80	Monoterpene
α -Fenchene	tr	Monoterpene
Camphene	0.07	Monoterpene
Sabinene	1.71	Monoterpene
β -Pinene	12.16	Monoterpene
6-Methyl-5-hepten-2-one	0.04	Aliphatic ketone
Myrcene	1.43	Monoterpene
α -Phellandrene	0.04	Monoterpene
Pseudolimonene	tr	Monoterpene
Octanal	0.06	Aliphatic aldehyde
Δ^3 -Carene	tr	Monoterpene
α -Terpinene	0.24	Monoterpene
para-Cymene	0.35	Monoterpene
Limonene	67.31	Monoterpene
β -Phellandrene	0.33	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.10	Monoterpene
γ -Terpinene	8.11	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
Terpinolene	0.40	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	0.13	Monoterpenic alcohol
Nonanal	0.10	Aliphatic aldehyde
endo-Fenchol	0.01	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.02	Monoterpenic ketone
Epoxyterpinolene	0.01	Monoterpenic ether
Citronellal	0.04	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.31	Monoterpenic alcohol
Isogeranial	0.02	Monoterpenic aldehyde
α -Terpineol	0.40	Monoterpenic alcohol
Decanal	0.05	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.07	Monoterpenic alcohol

2,3-Epoxygeranial?	0.02	Monoterpenic aldehyde
Neral	0.68	Monoterpenic aldehyde
Geraniol	0.10	Monoterpenic alcohol
Geranial	0.97	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
Citronellyl acetate	0.02	Monoterpenic ester
Neryl acetate	0.41	Monoterpenic ester
Geranyl acetate	0.19	Monoterpenic ester
Dodecanal	0.02	Aliphatic aldehyde
β -Caryophyllene	0.16	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.02	Sesquiterpene
α -Santalene	0.02	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.31	Sesquiterpene
Neryl propionate	0.02	Monoterpenic ester
β -Santalene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.04	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Geranyl propionate	0.01	Monoterpenic ester
<i>trans</i> - β -Bergamotene	0.02	Sesquiterpene
Valencene	0.03	Sesquiterpene
Bicyclogermacrene	0.04	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.04	Sesquiterpene
β -Bisabolene	0.42	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
(<i>Z</i>)- γ -Bisabolene	0.01	Sesquiterpene
δ -Cadinene	0.01	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.01	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Isospathulenol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
α -Bisabolol	0.02	Sesquiterpenic alcohol
Consolidated total	99.67%	

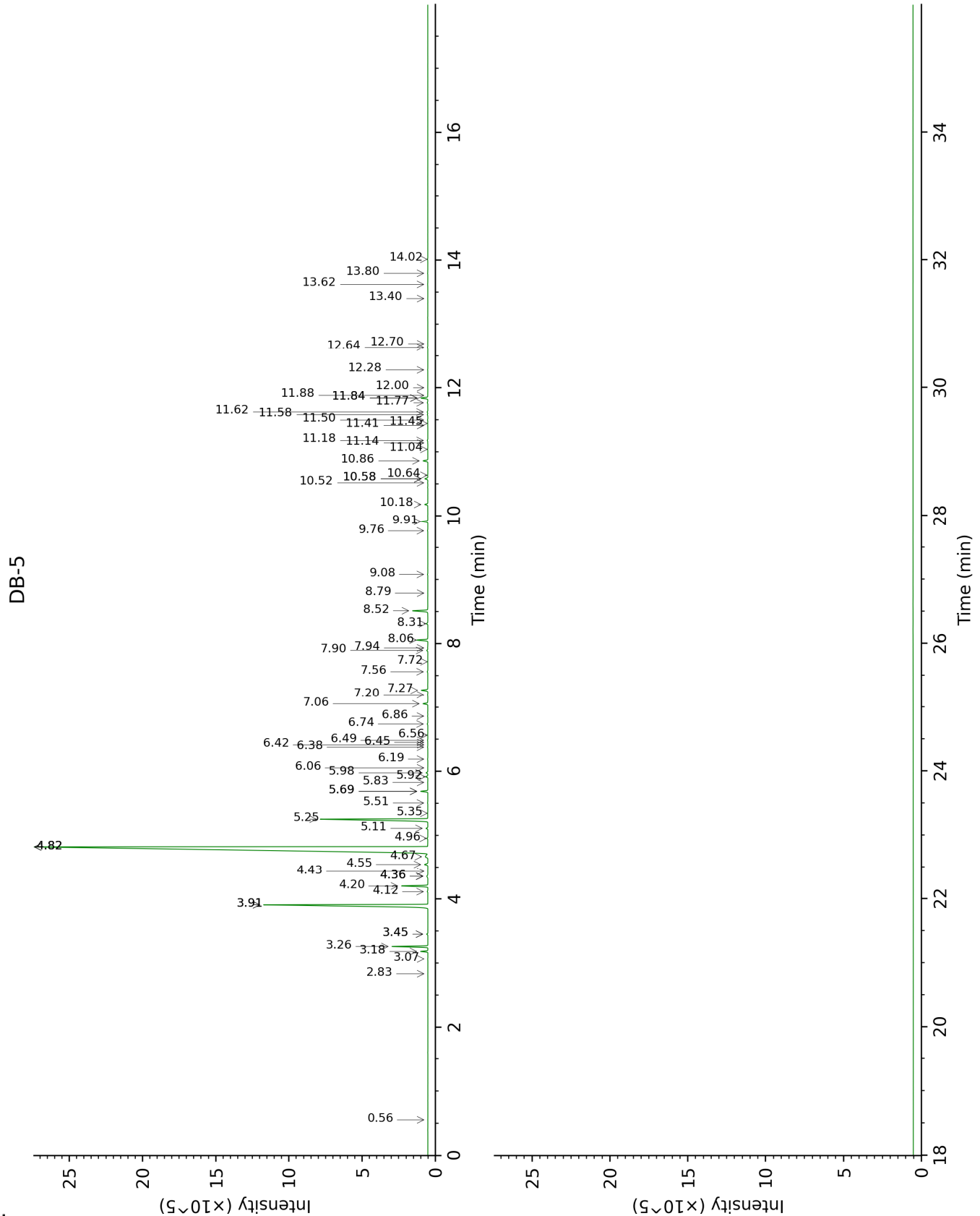
tr: The compound has been detected below 0.005% of total signal.

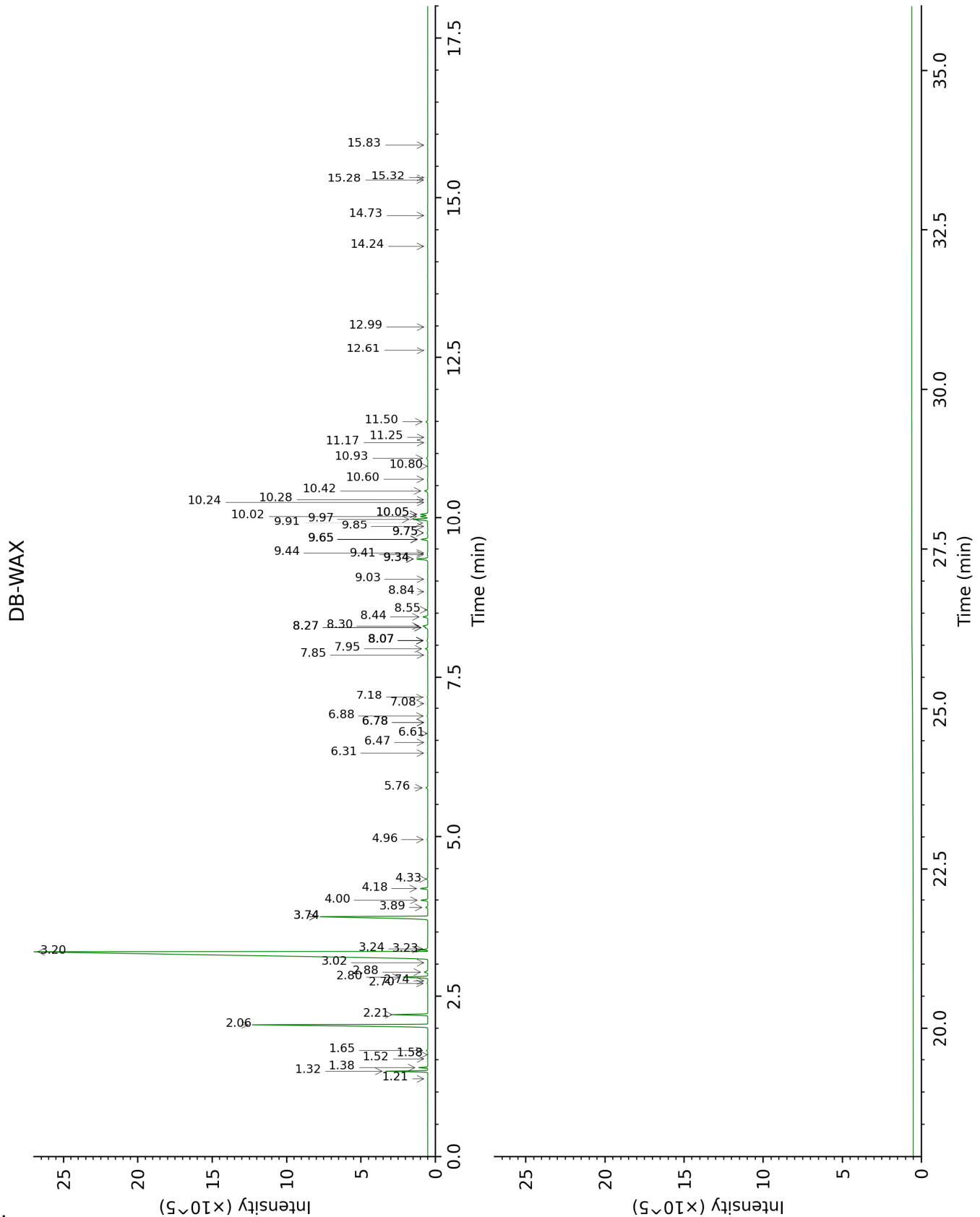
Note: no correction factor was applied

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	%
2-Methyl-3-buten-2-ol	0.56	608	tr	1.52	1015	0.01
Heptanal	2.84	903	0.01	3.02	1152	0.01
Tricyclene	3.07	918	0.01	1.21	974	0.01
α -Thujene	3.18	926	0.37	1.38	1002	0.36
α -Pinene	3.26	931	1.80	1.32	993	1.79
α -Fenchene	3.45*	943	0.07	1.58	1022	tr
Camphene	3.45*	943	[0.07]	1.65	1028	0.07
Sabinene	3.91*	973	13.90	2.22	1085	1.71
β -Pinene	3.91*	973	[13.90]	2.06	1069	12.16
6-Methyl-5-hepten-2-one	4.12	987	0.04	4.96	1299	0.04
Myrcene	4.20	993	1.43	2.80	1135	1.43
α -Phellandrene	4.36*	1003	0.10	2.70	1127	0.04
Pseudolimonene	4.36*	1003	[0.10]	2.74	1130	tr
Octanal	4.36*	1003	[0.10]	4.33	1252	0.06
Δ^3 -Carene	4.44	1008	tr			
α -Terpinene	4.55	1015	0.24	2.88	1141	0.24
para-Cymene	4.67	1022	0.35	4.00	1228	0.36
Limonene	4.82*	1032	67.76	3.20	1166	67.31
β -Phellandrene	4.82*	1032	[67.76]	3.23	1169	0.33
1,8-Cineole	4.82*	1032	[67.76]	3.24	1170	0.03
(Z)- β -Ocimene	4.96	1040	0.05	3.74*	1209	8.15
(E)- β -Ocimene	5.11	1050	0.10	3.89	1220	0.11
γ -Terpinene	5.26	1059	8.11	3.74*	1209	[8.15]
cis-Sabinene hydrate	5.35	1065	0.01	6.78*	1429	0.01
Octanol	5.51	1075	0.02	8.07*	1527	0.07
trans-Linalool oxide (fur.)	5.69*	1086	0.40	6.78*	1429	[0.01]
Terpinolene	5.69*	1086	[0.40]	4.18	1241	0.40
trans-Sabinene hydrate	5.83	1095	0.01	7.85	1509	0.01
Linalool	5.92	1101	0.13	7.94	1517	0.13
Nonanal	5.98	1105	0.10	5.76	1355	0.10
endo-Fenchol	6.06	1110	0.01	8.27*†	1542	0.48
trans-para-Mentha-2,8-dien-1-ol	6.19	1118	0.02	8.84	1586	0.01
cis-Limonene oxide	6.38	1130	0.02	6.31	1394	0.02
cis-para-Mentha-2,8-dien-1-ol	6.42	1133	0.01	9.34*	1627	0.71
trans-Limonene oxide	6.45	1135	0.01	6.47	1406	0.01
Camphor	6.48	1138	0.02	7.08	1451	0.01
Epoxyterpinolene	6.56	1143	0.01	6.61	1416	0.01
Citronellal	6.74	1154	0.04	6.88	1437	0.04

Borneol	6.86	1162	0.02	9.65*	1652	0.41
Terpinen-4-ol	7.06	1174	0.31	8.44	1556	0.30
Isogeranial	7.20	1184	0.02	8.07*	1527	[0.07]
α -Terpineol	7.27	1189	0.40	9.65*	1652	[0.41]
Decanal	7.56	1207	0.05	7.18	1459	0.04
<i>trans</i> -Carveol	7.72	1218	0.01	11.25	1787	0.01
Nerol	7.90	1230	0.07	10.93	1759	0.08
2,3-Epoxygeranial?	7.94	1233	0.02			
Neral	8.06	1241	0.68	9.34*	1627	[0.71]
Geraniol	8.31	1258	0.10	11.50	1807	0.11
Geranial	8.52	1272	0.97	9.97	1678	0.96
Limonen-10-ol	8.79	1291	0.01	12.99	1942	0.01
Undecanal	9.08	1307	0.02	8.55	1564	0.03
Citronellyl acetate	9.76	1355	0.02	9.34*	1627	[0.71]
Neryl acetate	9.91	1365	0.41	10.05*†	1685	[0.90]
Geranyl acetate	10.18	1384	0.19	10.42	1715	0.22
Dodecanal	10.52	1408	0.02	9.85	1669	0.02
β -Caryophyllene	10.58*	1413	0.20	8.27*†	1542	[0.48]
<i>cis</i> - α -Bergamotene	10.58*	1413	[0.20]	8.07*	1527	[0.07]
α -Santalene	10.64	1417	0.02	8.07*	1527	[0.07]
<i>trans</i> - α -Bergamotene	10.86	1434	0.31	8.30†	1544	[0.48]
Neryl propionate	11.04	1447	0.02	10.80	1748	0.01
β -Santalene	11.14	1455	0.01	9.03	1601	0.02
(<i>E</i>)- β -Farnesene	11.18	1458	0.04	9.41	1633	0.04
Germacrene D	11.42	1475	0.01	9.65*	1652	[0.41]
Geranyl propionate	11.45	1478	0.01	11.17	1780	0.01
<i>trans</i> - β -Bergamotene	11.50	1482	0.02	9.44	1635	0.02
Valencene	11.58	1488	0.03	9.75*	1660	0.04
Bicyclogermacrene	11.62	1491	0.04	9.91	1673	0.05
(<i>Z</i>)- α -Bisabolene	11.77	1502	0.04	10.05*†	1685	[0.90]
β -Bisabolene	11.84*	1507	0.43	10.02†	1682	0.90
γ -Cadinene	11.84*	1507	[0.43]	10.24	1700	0.02
(<i>Z</i>)- γ -Bisabolene	11.88	1510	0.01	9.75*	1660	[0.04]
δ -Cadinene	12.00	1520	0.01	10.28	1703	0.01
(<i>E</i>)- α -Bisabolene	12.28	1542	0.01	10.60	1731	0.04
Spathulenol	12.64	1570	0.02	14.24	2061	0.02
Caryophyllene oxide	12.70	1574	0.01	12.61	1907	0.01
Isospathulenol	13.40	1631	0.01	15.32	2168	0.01
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.62	1650	0.02	14.73	2108	0.01
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.80	1664	0.01	15.83	2220	0.02
α -Bisabolol	14.02	1682	0.02	15.28	2164	0.03
Total identified		99.78%			99.64%	

Total reported	99.82%	99.67%
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*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not 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