

Date : June 20, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22F14-PTH03


Customer identification : Lemon ORGANIC - Argentina - L70111R

Type : Essential oil

Source : *Citrus x limon*

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 20, 2022

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid

Refractive index: 1.4744 ± 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
Octane	tr	Alkane
Tricyclene	0.01	Monoterpene
α -Thujene	0.40	Monoterpene
α -Pinene	1.82	Monoterpene
Camphene	0.06	Monoterpene
β -Pinene	11.10	Monoterpene
Sabinene	1.93	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	1.54	Monoterpene
α -Phellandrene	0.04	Monoterpene
Pseudolimonene	tr	Monoterpene
Octanal	0.08	Aliphatic aldehyde
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.17	Monoterpene
para-Cymene	0.27	Monoterpene
β -Phellandrene	0.32	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
Limonene	67.27	Monoterpene
(Z)- β -Ocimene	0.06	Monoterpene
(E)- β -Ocimene	0.12	Monoterpene
γ -Terpinene	8.40	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.36	Monoterpene
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	0.10	Monoterpenic alcohol
Nonanal	0.12	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
Citronellal	0.08	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
Isoneral	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
Isogeranial	tr	Monoterpenic aldehyde
α -Terpineol	0.16	Monoterpenic alcohol
trans-Piperitol	0.01	Monoterpenic alcohol
Decanal	0.05	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
Nerol	0.05	Monoterpenic alcohol
2,3-Epoxygeranial?	0.05	Monoterpenic aldehyde
Neral	0.71	Monoterpenic aldehyde

Geraniol	0.03	Monoterpenic alcohol
Geranial	1.16	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.03	Aliphatic aldehyde
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
Citronellyl acetate	0.03	Monoterpenic ester
Neryl acetate	0.38	Monoterpenic ester
Geranyl acetate	0.22	Monoterpenic ester
Dodecanal	0.02	Aliphatic aldehyde
cis- α -Bergamotene	0.03	Sesquiterpene
β -Caryophyllene	0.20	Sesquiterpene
α -Santalene	0.01	Sesquiterpene
trans- α -Bergamotene	0.39	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
β -Santalene	0.01	Sesquiterpene
(E)- β -Farnesene	0.05	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Geranyl propionate	0.01	Monoterpenic ester
trans- β -Bergamotene	0.03	Sesquiterpene
Valencene	0.03	Sesquiterpene
Bicyclogermacrene	0.05	Sesquiterpene
(Z)- α -Bisabolene	0.06	Sesquiterpene
β -Bisabolene	0.58	Sesquiterpene
(Z)- γ -Bisabolene	0.01	Sesquiterpene
(E)- α -Bisabolene	0.02	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
α -Bisabolol	0.03	Sesquiterpenic alcohol
Myristic acid	0.01	Aliphatic acid
Nootkatone	0.01	Sesquiterpenic ketone
Pentadecylic acid	0.03	Aliphatic acid
Citropten	0.04	Furanocoumarin
Palmitic acid	0.05	Aliphatic acid
Linoleic acid	0.05	Aliphatic acid
Oleic acid	0.04	Aliphatic acid
Heraclenin	0.04	Furanocoumarin
Byakangelicol	0.02	Furanocoumarin
Nonacosane	0.01	Alkane
Untriacontane	0.01	Alkane
γ -Sitosterol?	0.02	Sterol
Consolidated total	99.37%	

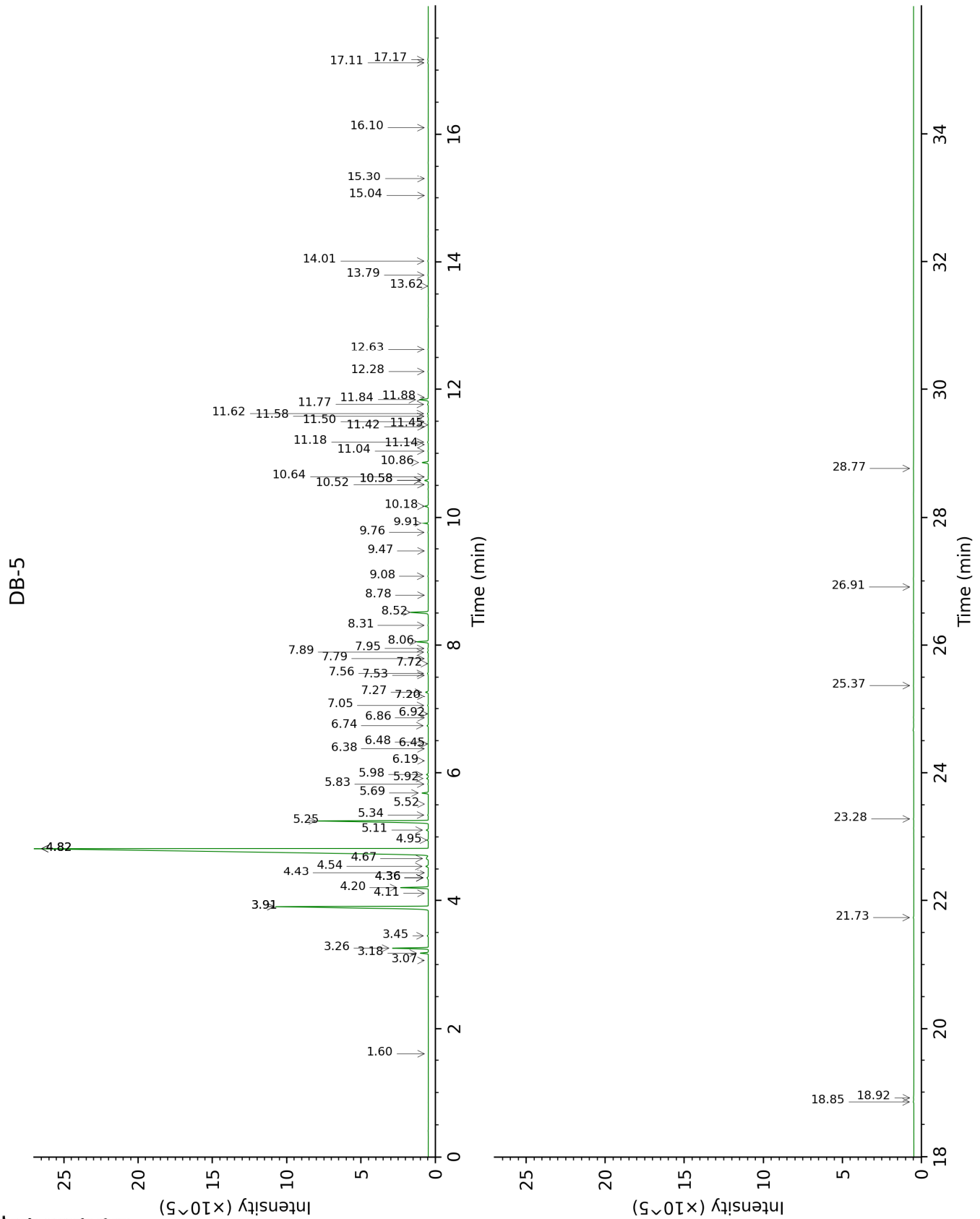
tr: The compound has been detected below 0.005% of total signal.

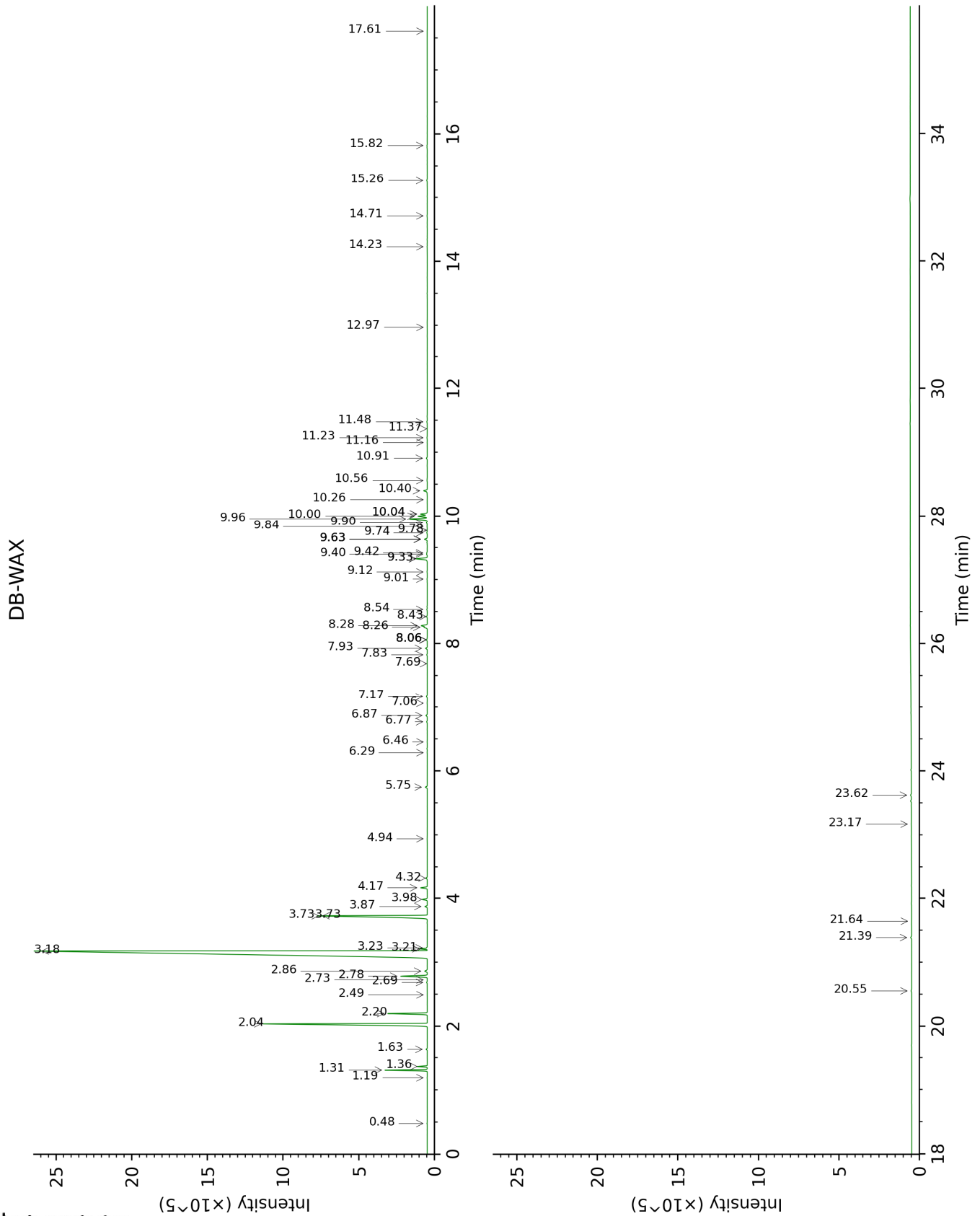
Note: no correction factor was applied

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	%
Octane	1.60	803	tr	0.48	783	0.01
Tricyclene	3.07	918	0.01	1.19	971	0.01
α -Thujene	3.18	925	0.40	1.36	1000	0.40
α -Pinene	3.26	930	1.82	1.31	991	1.81
Camphene	3.45	943	0.06	1.63	1027	0.06
β -Pinene	3.91*	973	13.08	2.04	1068	11.10
Sabinene	3.91*	973	[13.08]	2.20	1084	1.93
6-Methyl-5-hepten-2-one	4.11	987	0.01	4.94	1298	0.01
Myrcene	4.20	992	1.54	2.78	1134	1.54
α -Phellandrene	4.36*	1003	0.12	2.69	1126	0.04
Pseudolimonene	4.36*	1003	[0.12]	2.73	1129	tr
Octanal	4.36*	1003	[0.12]	4.32	1251	0.08
Δ^3 -Carene	4.43	1008	0.01	2.49	1110	tr
α -Terpinene	4.54	1014	0.17	2.86	1140	0.18
para-Cymene	4.67	1022	0.27	3.98	1227	0.28
β -Phellandrene	4.82*	1032	67.78	3.21	1167	0.32
1,8-Cineole	4.82*	1032	[67.78]	3.23	1168	0.02
Limonene	4.82*	1032	[67.78]	3.18	1165	67.27
(Z)- β -Ocimene	4.95	1040	0.06	3.73*	1208	8.44
(E)- β -Ocimene	5.11	1050	0.12	3.87	1218	0.13
γ -Terpinene	5.25	1059	8.40	3.73*	1208	[8.44]
cis-Sabinene hydrate	5.34	1065	0.04	6.77	1428	0.04
Octanol	5.52	1076	0.01	8.06*	1526	0.05
Terpinolene	5.69	1086	0.36	4.17	1240	0.36
trans-Sabinene hydrate	5.83	1095	0.03	7.83	1508	0.03
Linalool	5.92	1101	0.10	7.93	1516	0.10
Nonanal	5.98	1105	0.12	5.75	1354	0.11
trans-para-Mentha-2,8-dien-1-ol	6.19	1118	0.01			
cis-Limonene oxide	6.38	1130	0.01	6.29	1392	0.01
trans-Limonene oxide	6.45	1135	0.01	6.46	1405	0.01
Camphor	6.48	1137	0.01	7.06	1450	0.01
Citronellal	6.74	1154	0.08	6.87	1436	0.08
Borneol	6.86	1162	0.01	9.64*	1651	0.18
Isoneral	6.92	1166	0.01	7.69	1497	0.01
Terpinen-4-ol	7.05	1174	0.04	8.43	1554	0.04
para-Cymen-8-ol	7.20*	1184	0.01	11.37	1797	0.01
Isogeranial	7.20*	1184	[0.01]	8.06*	1526	[0.05]
α -Terpineol	7.27	1188	0.16	9.64*	1651	[0.18]
trans-Piperitol	7.53	1205	0.01	10.26	1702	0.01
Decanal	7.56	1207	0.05	7.17	1458	0.05
trans-Carveol	7.72	1218	0.01	11.23	1785	0.03

2,3-Epoxyneral?	7.79	1223	0.02			
Nerol	7.90	1230	0.05	10.91	1757	0.05
2,3-Epoxygeranial?	7.95	1234	0.05			
Neral	8.06	1241	0.71	9.33*	1626	0.73
Geraniol	8.31	1258	0.03	11.48	1806	0.03
Geranial	8.52	1272	1.16	9.96	1677	1.14
Limonen-10-ol	8.78	1290	0.01	12.97	1940	0.01
Undecanal	9.08	1306	0.03	8.54	1563	0.03
para-Mentha-1,8-diene-4-hydroperoxide	9.47	1334	0.01			
Citronellyl acetate	9.76	1355	0.03	9.33*	1626	[0.73]
Neryl acetate	9.91	1365	0.38	10.04*	1684	0.43
Geranyl acetate	10.18	1384	0.22	10.40	1714	0.25
Dodecanal	10.52	1408	0.02	9.84	1667	0.02
cis- α -Bergamotene	10.58*	1413	0.24	8.06*	1526	[0.05]
β -Caryophyllene	10.58*	1413	[0.24]	8.26†	1541	0.59
α -Santalene	10.64	1417	0.01	8.06*	1526	[0.05]
trans- α -Bergamotene	10.86	1434	0.39	8.28†	1543	[0.59]
α -Humulene	11.04	1447	0.02	9.12	1609	0.02
β -Santalene	11.14	1455	0.01	9.01	1600	0.02
(E)- β -Farnesene	11.18	1458	0.05	9.40	1632	0.04
Germacrene D	11.42	1475	0.01	9.64*	1651	[0.18]
Geranyl propionate	11.45	1478	0.01	11.16	1778	0.01
trans- β -Bergamotene	11.50	1482	0.03	9.42	1633	0.03
Valencene	11.58	1488	0.03	9.74	1659	0.03
Bicyclogermacrene	11.62	1491	0.05	9.90	1672	0.06
(Z)- α -Bisabolene	11.77	1502	0.06	10.04*	1684	[0.43]
β -Bisabolene	11.84	1507	0.58	10.00	1681	0.59
(Z)- γ -Bisabolene	11.88	1510	0.01	9.78	1662	0.01
(E)- α -Bisabolene	12.28	1542	0.02	10.56	1728	0.02
Spathulenol	12.63	1569	0.02	14.23	2059	0.01
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.62	1650	0.03	14.71	2106	0.02
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.80	1664	0.02	15.82	2219	0.02
α -Bisabolol	14.01	1682	0.03	15.26	2162	0.04
Myristic acid	15.04	1769	0.01			
Nootkatone	15.30	1792	0.01	17.61	2410	0.01
Pentadecylic acid	16.10	1865	0.03	20.55	2756	0.05
Citropten	17.12	1960	0.04	23.62	3162	0.07
Palmitic acid	17.17	1964	0.05	21.38	2861	0.08
Linoleic acid	18.85	2132	0.05			
Oleic acid	18.92	2138	0.04			
Heraclenin	21.73	2446	0.04			

Byakangelicol	23.28	2633	0.02			
Nonacosane	25.37	2904	0.01	21.64	2894	0.01
Untriacontane	26.91	3104	0.01	23.17	3098	0.02
γ -Sitosterol?	28.77	3274	0.02			
Total identified		99.55%			99.17%	
Total reported		99.60%			99.20%	

*: 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