

Date : October 22, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20J16-PTH04


Customer identification : Lemon Oil Steam Distilled - Argentina - LI0106208R

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

Analysis date : October 20, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4737 ± 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
Heptanal	tr	Aliphatic aldehyde
Nonane	tr	Alkane
Tricyclene	0.01	Monoterpene
α -Thujene	0.20	Monoterpene
α -Pinene	2.03	Monoterpene
Camphene	0.07	Monoterpene
α -Fenchene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β -Pinene	11.01	Monoterpene
Sabinene	0.42	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	1.44	Monoterpene
α -Phellandrene	0.06	Monoterpene
Octanal	0.06	Aliphatic aldehyde
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.33	Monoterpene
para-Cymene	0.67	Monoterpene
Limonene	69.05	Monoterpene
β -Phellandrene	0.31	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.09	Monoterpene
γ -Terpinene	8.73	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.66	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	0.10	Monoterpenic alcohol
Nonanal	0.05	Aliphatic aldehyde
endo-Fenchol	0.05	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
Camphene hydrate	0.01	Monoterpenic alcohol
Epoxyterpinolene	0.02	Monoterpenic ether
Citronellal	0.02	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.45	Monoterpenic alcohol
Isogeranial	0.01	Monoterpenic aldehyde
α -Terpineol	0.50	Monoterpenic alcohol
Decanal	0.02	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol

Nerol	0.04	Monoterpenic alcohol
2,3-Epoxygeranial?	tr	Monoterpenic aldehyde
Neral	0.53	Monoterpenic aldehyde
Geraniol	0.03	Monoterpenic alcohol
Perillaldehyde	tr	Monoterpenic aldehyde
Geranial	0.87	Monoterpenic aldehyde
Undecanal	0.01	Aliphatic aldehyde
Citronellyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.20	Monoterpenic ester
Geranyl acetate	0.10	Monoterpenic ester
Dodecanal	0.01	Aliphatic aldehyde
β -Caryophyllene	0.07	Sesquiterpene
<i>cis</i> - α -Bergamotene	tr	Sesquiterpene
α -Santalene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.20	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
Neryl propionate	0.01	Monoterpenic ester
(<i>E</i>)- β -Farnesene	0.03	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.01	Sesquiterpene
Valencene	0.02	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
β -Bisabolene	0.28	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.01	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Unknown	0.01	Oxygenated sesquiterpene
α -Bisabolol	0.01	Sesquiterpenic alcohol
Consolidated total	99.20%	

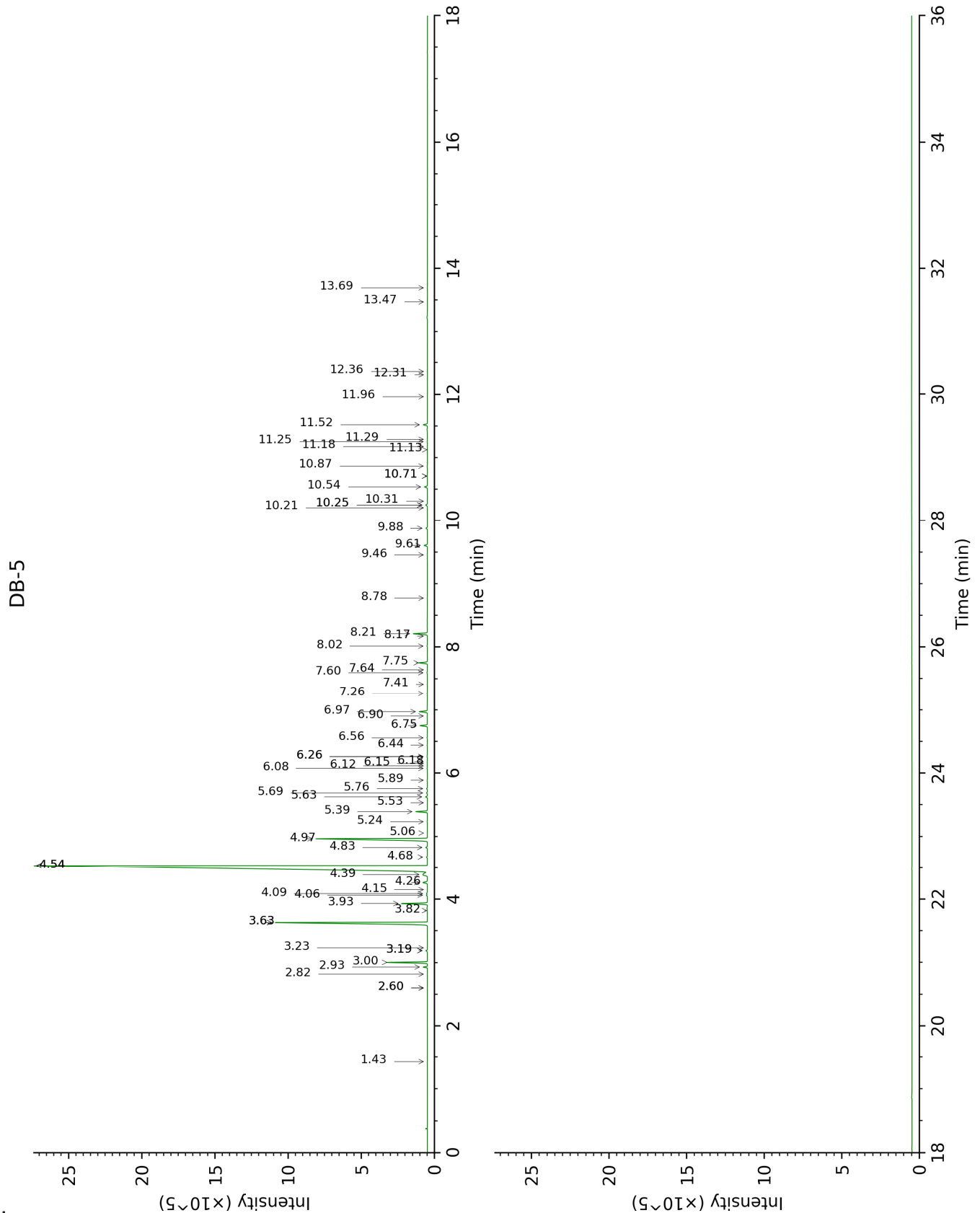
tr: The compound has been detected below 0.005% of total signal.

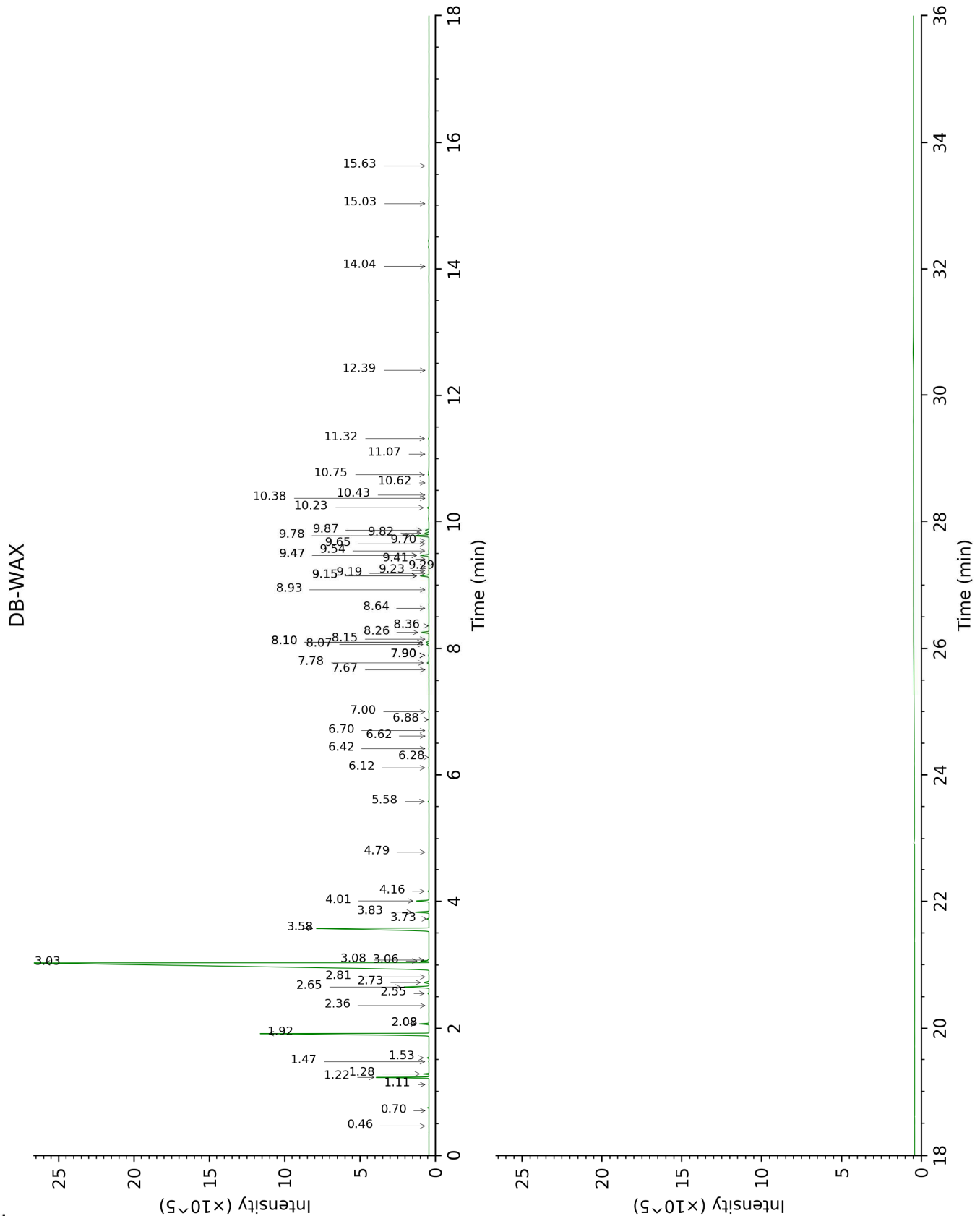
Note: no correction factor was applied

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	1.43	803	tr	0.46	791	tr
Heptanal	2.60*	903	0.01	2.81	1148	tr
Nonane	2.60*	903	[0.01]	0.70	896	tr
Tricyclene	2.82	918	0.01	1.11	972	tr
α -Thujene	2.93	925	0.20	1.28	1001	0.21
α -Pinene	3.00	930	2.03	1.22	993	2.02
Camphene	3.19*	943	0.09	1.53	1027	0.07
α -Fenchene	3.19*	943	[0.09]	1.47	1021	0.02
Thuja-2,4(10)-diene	3.23	946	0.01	2.08*	1085	0.43
β -Pinene	3.63*	972	11.46	1.92	1068	11.01
Sabinene	3.63*	972	[11.46]	2.08*	1085	[0.43]
6-Methyl-5-hepten-2-one	3.82	985	0.01	4.79	1301	0.01
Myrcene	3.93	992	1.44	2.66	1135	1.43
α -Phellandrene	4.06	1001	0.06	2.55	1127	0.06
Octanal	4.09	1003	0.06	4.16	1254	0.05
Δ^3 -Carene	4.15	1007	0.01	2.36	1112	tr
α -Terpinene	4.26	1014	0.33	2.72	1141	0.33
para-Cymene	4.39	1022	0.67	3.83	1229	0.71
Limonene	4.54*	1031	69.58	3.03	1166	69.05
β -Phellandrene	4.54*	1031	[69.58]	3.06	1169	0.31
1,8-Cineole	4.54*	1031	[69.58]	3.08	1170	0.03
(Z)- β -Ocimene	4.68	1040	0.05	3.58*	1210	8.76
(E)- β -Ocimene	4.83	1050	0.09	3.73	1221	0.10
γ -Terpinene	4.97	1058	8.73	3.58*	1210	[8.76]
cis-Sabinene hydrate	5.06	1064	0.01	6.62	1431	0.01
Octanol	5.24	1075	0.02	7.90*	1528	0.05
Terpinolene	5.39	1086	0.66	4.01	1242	0.66
trans-Sabinene hydrate	5.53	1094	0.01	7.67	1510	0.01
Linalool	5.63	1100	0.10	7.78	1519	0.10
Nonanal	5.69	1104	0.05	5.58	1355	0.05
endo-Fenchol	5.76	1109	0.05	8.07†	1542	0.32
trans-para-Mentha-2,8-dien-1-ol	5.89	1117	0.02	8.64	1586	0.02
cis-Limonene oxide	6.08	1129	0.02	6.12	1393	0.02
cis-para-Mentha-2,8-dien-1-ol	6.12	1132	0.01	9.19	1630	0.01
trans-Limonene oxide	6.15	1134	0.01	6.28	1406	0.01
Camphor	6.18	1136	0.02	6.88	1450	0.01
Camphene hydrate	6.26*†	1141	0.03	8.15	1548	0.01
Epoxyterpinolene	6.26*†	1141	[0.03]	6.42	1416	0.02

Citronellal	6.44	1153	0.02	6.70	1437	0.02
Borneol	6.56	1160	0.02	9.47*	1654	0.54
Terpinen-4-ol	6.75	1173	0.45	8.26	1557	0.45
Isogeranial	6.90	1183	0.01	7.90*	1528	[0.05]
α -Terpineol	6.97	1187	0.50	9.47*	1654	[0.54]
Decanal	7.26	1206	0.02	7.00	1460	0.03
<i>trans</i> -Carveol	7.41	1216	0.01	11.08	1789	0.01
Nerol	7.60	1229	0.04	10.75	1761	0.04
2,3-Epoxygeranial?	7.64	1232	tr			
Neral	7.75	1240	0.53	9.15*	1627	0.54
Geraniol	8.02	1257	0.03	11.32	1810	0.04
Perillaldehyde	8.17	1268	tr	10.38	1729	0.01
Geranial	8.21	1271	0.87	9.78	1679	0.88
Undecanal	8.78	1306	0.01	8.36	1564	0.01
Citronellyl acetate	9.46	1354	0.01	9.15*	1627	[0.54]
Neryl acetate	9.61	1365	0.20	9.87	1686	0.23
Geranyl acetate	9.88	1384	0.10	10.23	1717	0.09
Dodecanal	10.21	1408	0.01	9.65	1668	0.01
β -Caryophyllene	10.25*	1411	0.12	8.10*†	1544	[0.32]
<i>cis</i> - α -Bergamotene	10.25*	1411	[0.12]	7.90*	1528	[0.05]
α -Santalene	10.31	1416	0.01	7.90*	1528	[0.05]
<i>trans</i> - α -Bergamotene	10.54	1433	0.20	8.10*†	1544	[0.32]
α -Humulene	10.71*	1445	0.03	8.93	1609	0.01
Neryl propionate	10.71*	1445	[0.03]	10.62	1750	0.01
(<i>E</i>)- β -Farnesene	10.87	1457	0.03	9.23	1634	0.03
Germacrene D	11.13	1476	0.01	9.41	1649	0.01
<i>trans</i> - β -Bergamotene	11.18	1480	0.01	9.30	1639	0.01
Valencene	11.25	1486	0.02	9.54	1659	0.03
Bicyclogermacrene	11.29	1489	0.01	9.70	1672	0.01
β -Bisabolene	11.52	1506	0.28	9.82	1682	0.27
(<i>E</i>)- α -Bisabolene	11.96	1541	0.01	10.43	1734	0.02
Spathulenol	12.31	1568	0.01	14.04	2063	0.01
Caryophyllene oxide	12.36	1572	0.01	12.39	1907	0.01
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.47	1663	0.01	15.63	2223	0.01
α -Bisabolol	13.69	1681	0.01	15.03	2161	0.02
Total identified		99.47%			99.28%	
Total reported		99.48%			99.29%	

*: 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