

Date : July 22, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20G08-PTH13


Customer identification : Lemon Oil CP Organic - Argentina - L70108205R

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 : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : July 13, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid

Refractive index: 1.4744 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 855:2004 - OIL OF LEMON, OBTAINED BY EXPRESSION - EQUATORIAL

Compound	Min. %	Max. %	Observed %	Complies?
Geranyl acetate	tr	0.30	0.18	Yes
Neryl acetate	0.10	0.50	0.35	Yes
β-Bisabolene	0.20	0.90	0.55	Yes
Geranial	0.5	2.0	1.2	Yes
Neral	0.2	1.2	0.7	Yes
α-Terpineol		0.40	0.18	Yes
γ-Terpinene	6.0	12.0	8.2	Yes
Limonene	59.0	75.0	67.4	Yes
para-Cymene	0.05	0.35	0.18	Yes
β-Pinene	7.0	16.0	9.7	Yes
Sabinene	1.4	3.0	1.8	Yes
α-Pinene	1.4	3.0	1.7	Yes
α-Thujene	0.2	0.5	0.4	Yes
Refractive index	1.4730	1.4790	1.4744	Yes

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
Tricyclene	0.01	Monoterpene
α -Thujene	0.39	Monoterpene
α -Pinene	1.74	Monoterpene
Camphene	0.06	Monoterpene
Sabinene	1.84	Monoterpene
β -Pinene	9.70	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	1.59	Monoterpene
α -Phellandrene	0.04	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.09	Aliphatic aldehyde
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.20	Monoterpene
para-Cymene	0.18	Monoterpene
Limonene	67.41	Monoterpene
1,8-Cineole	0.91	Monoterpenic ether
(Z)- β -Ocimene	0.11	Monoterpene
(E)- β -Ocimene	0.14	Monoterpene
γ -Terpinene	8.21	Monoterpene
cis-Sabinene hydrate	0.06	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.38	Monoterpene
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Linalool	0.10	Monoterpenic alcohol
Nonanal	0.11	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	Monoterpenic ether
trans-Limonene oxide	0.03	Monoterpenic ether
Epoxyterpinolene	0.01	Monoterpenic ether
Citronellal	0.07	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.04	Monoterpenic alcohol
Isogeranial	0.01	Monoterpenic aldehyde
α -Terpineol	0.18	Monoterpenic alcohol
Decanal	0.04	Aliphatic aldehyde
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
Nerol	0.05	Monoterpenic alcohol
2,3-Epoxygeranial?	0.02	Monoterpenic aldehyde
Citronellol	0.01	Monoterpenic alcohol
Neral	0.73	Monoterpenic aldehyde
Geraniol	0.02	Monoterpenic alcohol
Geranial	1.22	Monoterpenic aldehyde
Undecanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-diene-1-hydroperoxide	0.01	Monoterpenic peroxide
Citronellyl acetate	0.02	Monoterpenic ester

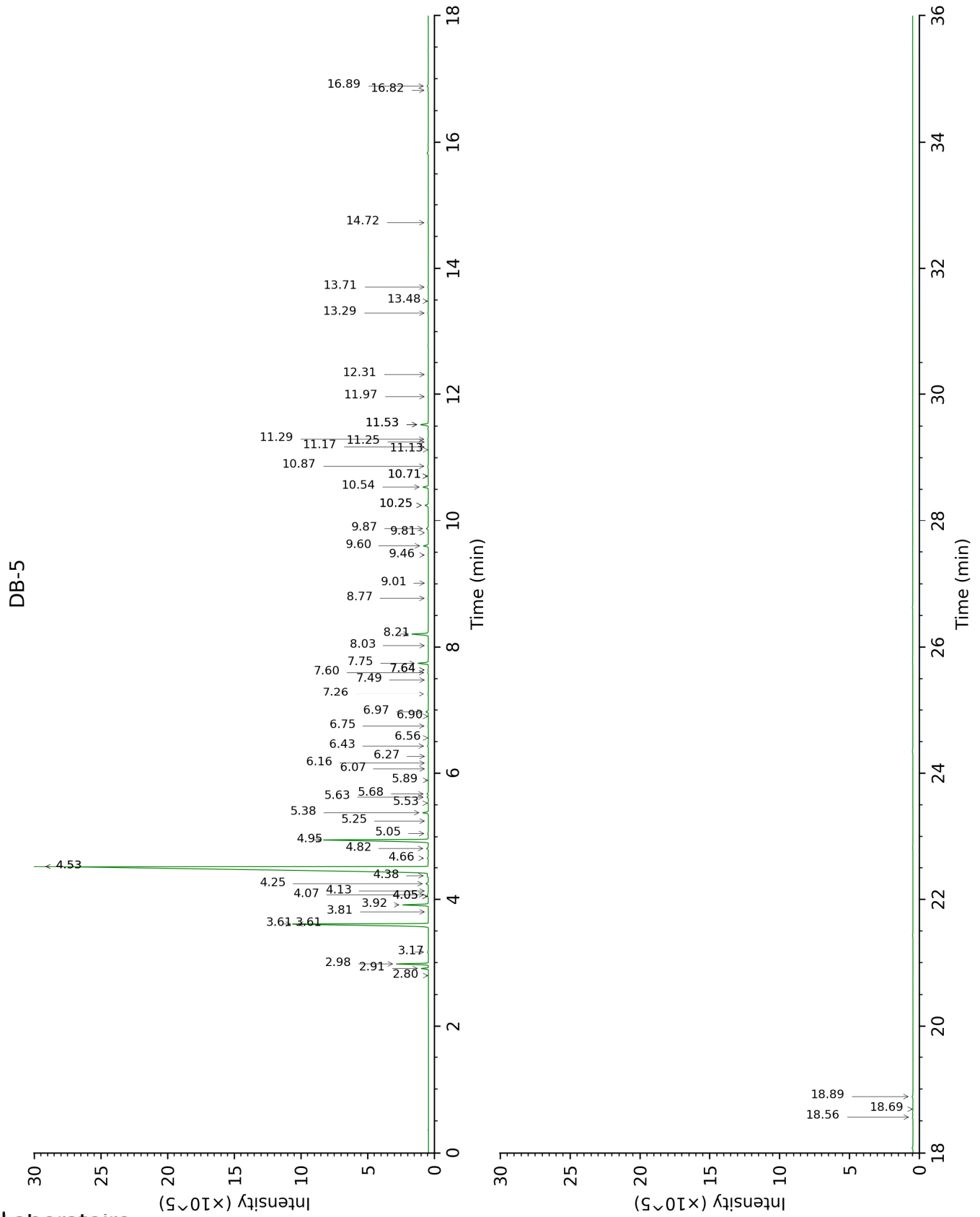
Neryl acetate	0.35	Monoterpenic ester
β -Bourbonene	0.02	Sesquiterpene
Geranyl acetate	0.18	Monoterpenic ester
β -Caryophyllene	0.06	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.40	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
Neryl propionate	0.01	Monoterpenic ester
(<i>E</i>)- β -Farnesene	0.07	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.03	Sesquiterpene
Valencene	0.04	Sesquiterpene
Bicyclogermacrene	0.05	Sesquiterpene
γ -Cadinene	0.01	Sesquiterpene
β -Bisabolene	0.55	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.02	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
α -Bisabolol	0.04	Sesquiterpenic alcohol
Myristic acid	0.04	Aliphatic acid
Citropten	0.05	Furanocoumarin
Palmitic acid	0.11	Aliphatic acid
Linoleic acid	0.04	Aliphatic acid
Oleic acid	0.02	Aliphatic acid
Stearic acid	0.08	Aliphatic acid
Consolidated total	98.29%	

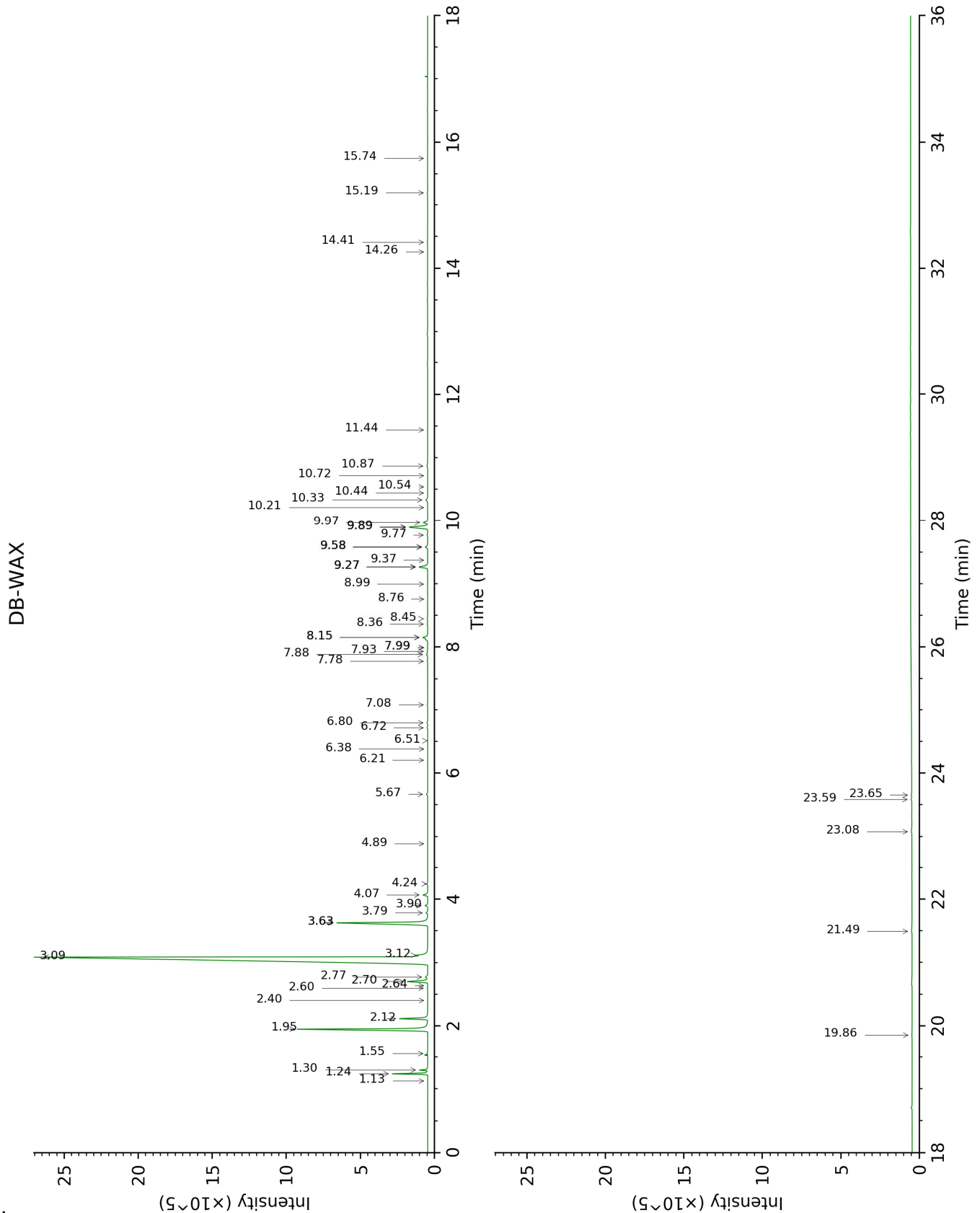
Note: no correction factor was applied

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	%
Tricyclene	2.80	919	0.01	1.13	966	0.01
α -Thujene	2.91	926	0.39	1.30	996	0.42
α -Pinene	2.98	931	1.74	1.24	986	1.71
Camphene	3.17	943	0.06	1.56	1023	0.05
Sabinene	3.61*	972	11.49	2.12	1082	1.84
β -Pinene	3.61*	972	[11.49]	1.95	1064	9.70
6-Methyl-5-hepten-2-one	3.80	985	0.02	4.89	1294	0.01
Myrcene	3.92	992	1.59	2.70	1132	1.55
α -Phellandrene	4.05*	1001	0.06	2.60	1124	0.04
Pseudolimonene	4.05*	1001	[0.06]	2.64	1127	0.01
Octanal	4.07	1002	0.09	4.24	1252	0.07
Δ^3 -Carene	4.13	1006	0.02	2.40	1108	0.01
α -Terpinene	4.25	1013	0.20	2.77	1138	0.23
para-Cymene	4.38	1021	0.18	3.90	1227	0.20
Limonene	4.53*	1031	68.07	3.09	1164	67.41
1,8-Cineole	4.53*	1031	[68.07]	3.12	1166	0.91
(Z)- β -Ocimene	4.66	1039	0.11	3.63*	1206	8.30
(E)- β -Ocimene	4.82	1049	0.14	3.78	1218	0.12
γ -Terpinene	4.95	1057	8.21	3.63*	1206	[8.30]
cis-Sabinene hydrate	5.05	1064	0.06	6.72	1428	0.05
Octanol	5.25	1076	0.01	7.99*	1524	0.02
Terpinolene	5.38	1084	0.38	4.07	1239	0.37
trans-Sabinene hydrate	5.53	1094	0.05	7.78	1508	0.04
Linalool	5.63	1100	0.10	7.88	1516	0.10
Nonanal	5.68	1103	0.11	5.67	1351	0.10
trans-para-Mentha-2,8-dien-1-ol	5.89	1117	0.01	8.76	1584	0.01
cis-Limonene oxide	6.07	1129	0.01	6.20	1390	0.02
trans-Limonene oxide	6.16	1135	0.03	6.38	1403	0.01
Epoxyterpinolene	6.27	1141	0.01	6.51	1413	0.01
Citronellal	6.43	1152	0.07	6.80	1434	0.07
Borneol	6.56	1160	0.01	9.58*	1650	0.20
Terpinen-4-ol	6.75	1172	0.04	8.36	1553	0.04
Isogeranial	6.90	1182	0.01	7.93	1520	0.04
α -Terpineol	6.97	1187	0.18	9.58*	1650	[0.20]
Decanal	7.26	1206	0.04	7.08	1455	0.04
2,3-Epoxyneral?	7.48	1221	0.02			
Nerol	7.60	1229	0.05	10.87	1757	0.10
2,3-Epoxygeranial?	7.64*	1232	0.04			
Citronellol	7.64*	1232	[0.04]	10.54	1729	0.01
Neral	7.75	1240	0.73	9.27*	1624	0.81
Geraniol	8.03	1259	0.02	11.44	1806	0.02

Geranial	8.21	1271	1.22	9.89*	1675	1.83
Undecanal	8.77	1306	0.03	8.45	1560	0.05
<i>trans</i> -para-Mentha-2,8-diene-1-hydroperoxide	9.01	1323	0.01			
Citronellyl acetate	9.46	1354	0.02	9.27*	1624	[0.81]
Neryl acetate	9.60	1364	0.35	9.97	1681	0.38
β -Bourbonene	9.81	1379	0.02			
Geranyl acetate	9.87	1384	0.18	10.33	1712	0.18
β -Caryophyllene	10.25*	1411	0.26	8.15*	1537	0.46
<i>cis</i> - α -Bergamotene	10.25*	1411	[0.26]	7.99*	1524	[0.02]
<i>trans</i> - α -Bergamotene	10.54	1432	0.40	8.15*	1537	[0.46]
α -Humulene	10.71*	1445	0.05	8.99	1602	0.02
Neryl propionate	10.71*	1445	[0.05]	10.72	1744	0.01
(<i>E</i>)- β -Farnesene	10.87	1457	0.07	9.27*	1624	[0.81]
Germacrene D	11.13	1476	0.02	9.58*	1650	[0.20]
<i>trans</i> - β -Bergamotene	11.17	1480	0.03	9.37	1633	0.01
Valencene	11.25	1485	0.04	9.77	1665	0.06
Bicyclogermacrene	11.29	1489	0.05	9.89*	1675	[1.83]
γ -Cadinene	11.52*	1506	0.58	10.21	1702	0.01
β -Bisabolene	11.52*	1506	[0.58]	9.89*	1675	[1.83]
(<i>E</i>)- α -Bisabolene	11.97	1541	0.02	10.44	1721	0.02
Spathulenol	12.32	1568	0.02	14.26	2065	0.01
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.30	1648	0.06	14.41	2080	0.05
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.48	1663	0.03	15.74	2213	0.03
α -Bisabolol	13.70	1681	0.04	15.19	2157	0.03
Myristic acid	14.72	1769	0.04	19.86	2668	0.04
Citropten	16.82	1960	0.05	23.65	3158	0.06
Palmitic acid	16.89	1967	0.11	21.49	2871	0.10
Linoleic acid	18.56	2132	0.04	23.58	3149	0.06
Oleic acid	18.69	2145	0.02			
Stearic acid	18.88	2166	0.08	23.08	3080	0.11
Total identified		98.14%			98.08%	
Total reported		98.23%			98.15%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index