

Date : 2024-06-27

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24F12-PTH02

Customer Identification : Lime Steam Distilled - Mexico - LL0111R

Type : Essential Oil

Source : *Citrus aurantifolia* ct. Distilled

Customer : Plant Therapy

Checked and approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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

Date : 2024-06-18

PHYSICOCHEMICAL DATA

Refractive index : 1.4751 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-06-14

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
Ethanol	0.05	Aliphatic alcohol
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Heptane	tr	Alkane
4,5-Dihydrotoluene	0.09	Alkene
3-Methylenecyclohexadiene	0.01	Alkene
Cyclofenchene	0.01	Monoterpene
Bornylene	0.03	Monoterpene
Nonane	tr	Alkane
Heptanal	0.02	Aliphatic aldehyde
Tricyclene	0.03	Monoterpene
α -Thujene	0.04	Monoterpene
α -Pinene	1.44	Monoterpene
β -Fenchene?	0.02	Monoterpene
Camphene	0.55	Monoterpene
α -Fenchene	0.24	Monoterpene
1,4-Dimethyl-4-vinylcyclohexene?	0.02	Monoterpene
Unknown	0.03	Monoterpene
Geranic oxide	0.22	Monoterpenic ether
Sabinene	0.06	Monoterpene
β -Pinene	2.55	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
<i>trans</i> -Dehydroxylinalool oxide	0.04	Monoterpenic ether
Myrcene	1.31	Monoterpene
Pseudolimonene	0.05	Monoterpene
Octanal	0.01	Aliphatic aldehyde
α -Phellandrene	0.33	Monoterpene
Δ^3 -Carene	0.02	Monoterpene
1,4-Cineole	1.65	Monoterpenic ether
α -Terpinene	2.09	Monoterpene
<i>para</i> -Cymene	2.81	Monoterpene
Limonene	52.64	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
β -Phellandrene	1.49	Monoterpene
(<i>Z</i>)-Citroxide	0.02	Monoterpenic ether
(<i>Z</i>)- β -Ocimene	0.18	Monoterpene
(<i>E</i>)-Citroxide	0.19	Monoterpenic ether
(<i>E</i>)- β -Ocimene	0.41	Monoterpene
γ -Terpinene	11.35	Monoterpene
Unknown	0.04	Oxygenated monoterpene

Fenchone	0.04	Monoterpenic ketone
Terpinolene isomer	0.14	Monoterpene
<i>para</i> -Cymenene	0.19	Monoterpene
Terpinolene	7.04	Monoterpene
Linalool	0.09	Monoterpenic alcohol
<i>para</i> -Mentha-1,3,8-triene	0.02	Monoterpene
endo-Fenchol	0.22	Monoterpenic alcohol
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
Myrcenol	0.01	Monoterpenic alcohol
Limona ketone	0.02	Normonoterpenic ketone
<i>cis</i> -Limonene oxide	0.02	Monoterpenic ether
1-Terpineol	0.16	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	0.03	Monoterpenic ether
Cosmene isomer II	0.02	Monoterpene
Epoxyterpinolene	0.10	Monoterpenic ether
<i>cis</i> - β -Terpineol	0.16	Monoterpenic alcohol
Unknown	0.02	Unknown
Isoborneol	0.02	Monoterpenic alcohol
(<i>Z</i>)-Ocimenol	0.01	Monoterpenic alcohol
Borneol	0.13	Monoterpenic alcohol
<i>trans</i> - β -Terpineol	0.08	Monoterpenic alcohol
Terpinen-4-ol	0.62	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.07	Monoterpenic alcohol
α -Terpineol	6.18	Monoterpenic alcohol
γ -Terpineol	0.29	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.01	Monoterpenic alcohol
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
2,3-Epoxyneral?	0.01	Monoterpenic aldehyde
Nerol	0.07	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
Neral	0.16	Monoterpenic aldehyde
Geraniol	0.03	Monoterpenic alcohol
Geranial	0.24	Monoterpenic aldehyde
Unknown	0.03	Oxygenated monoterpene
<i>cis</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Unknown	0.04	Unknown
δ -Elemene	0.05	Sesquiterpene
α -Terpinyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.12	Monoterpenic ester
Geranyl acetate	0.05	Monoterpenic ester
β -Elemene	0.04	Sesquiterpene
Dodecanal	0.01	Aliphatic aldehyde
β -Caryophyllene	0.26	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.03	Sesquiterpene
α -Santalene	0.02	Sesquiterpene

γ -Elemene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.47	Sesquiterpene
α -Humulene	0.05	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.04	Sesquiterpene
β -Santalene	0.03	Sesquiterpene
Selina-4,11-diene	0.05	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Unknown	0.04	Sesquiterpene
β -Selinene	0.01	Sesquiterpene
Unknown	0.03	Sesquiterpene
δ -Selinene	0.10	Sesquiterpene
α -Selinene	0.04	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.09	Sesquiterpene
β -Bisabolene	0.80	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.13	Sesquiterpene
γ -Cadinene	0.07	Sesquiterpene
(<i>Z</i>)- γ -Bisabolene	0.04	Sesquiterpene
δ -Cadinene	0.03	Sesquiterpene
Selina-4(15),7(11)-diene	0.03	Sesquiterpene
Selina-4,7(11)-diene?	0.07	Sesquiterpene
Selina-3,7(11)-diene	0.02	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.03	Sesquiterpene
Germacrene B	0.03	Sesquiterpene
Caryophyllenyl alcohol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
Junenol	0.02	Sesquiterpenic alcohol
10-epi- γ -Eudesmol	0.01	Sesquiterpenic alcohol
γ -Eudesmol	0.02	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
α -Bisabolol	0.02	Sesquiterpenic alcohol
Hexadecanal	0.02	Aliphatic aldehyde
Consolidated total	99.39	

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

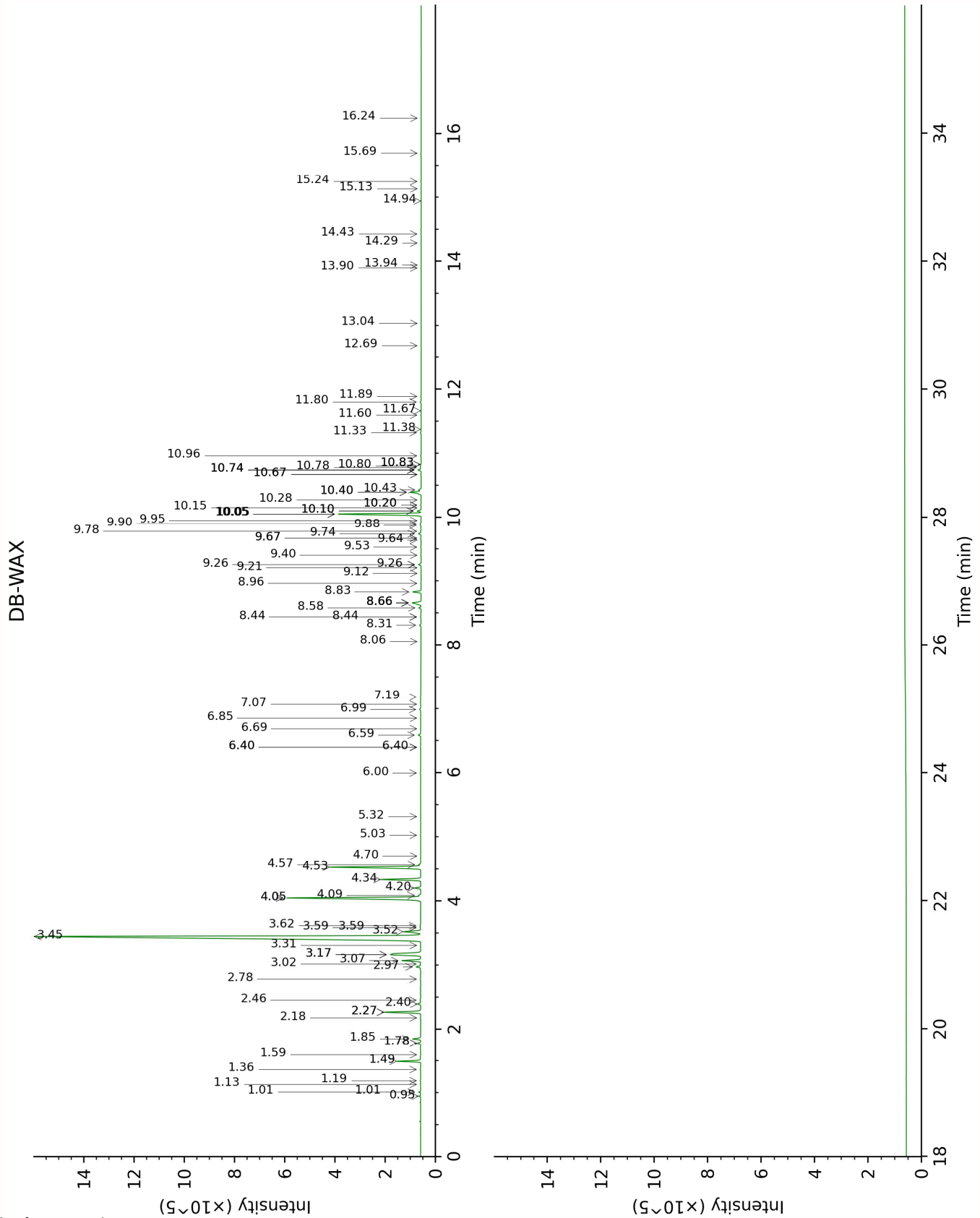
Note: no correction factor was applied

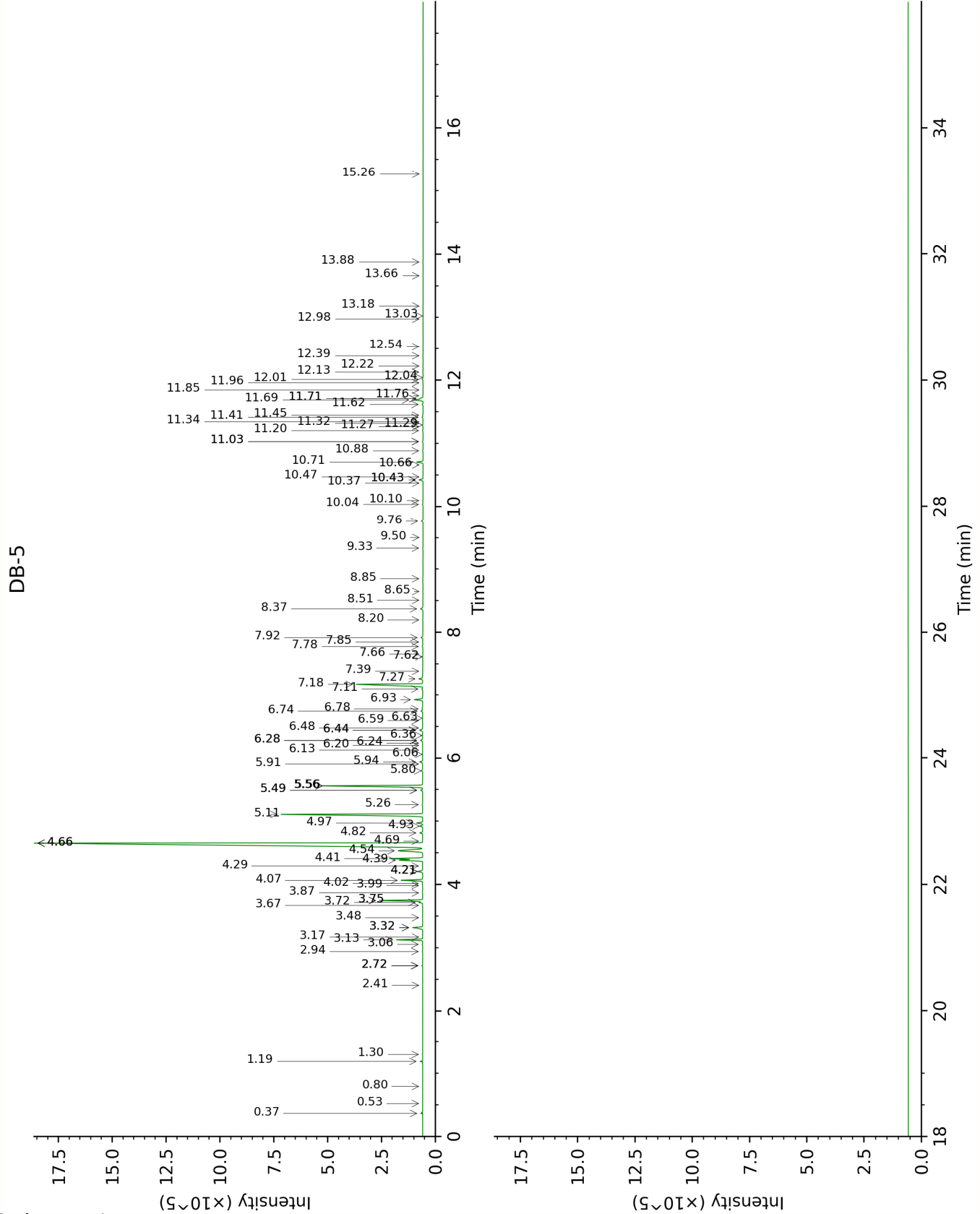
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Ethanol	Column DB-WAX			Column DB-5		
	0.95	903.7	0.07	0.37	499.5	0.05
2-Methyl-3-buten-2-ol	1.78*	1018.1	[0.22]	0.52	604.8	0.01
Heptane				0.80	698.7	tr
4,5-Dihydrotoluene	1.01*	913.6	[0.09]	1.19	757.9	0.09
3-Methylenecyclohexadiene	1.13	932.5	0.02	1.30	773.3	0.01
Cyclofenchene	1.01*	913.6	[0.09]	2.41	877.7	0.01
Bornylene	1.19	941.5	0.03	2.72*	903.6	[0.05]
Nonane				2.72*	903.6	[0.05]
Heptanal	3.31	1149.5	0.02	2.72*	903.6	[0.05]
Tricyclene	1.36	968.7	0.03	2.94	918.6	0.03
α -Thujene	1.59	1000.3	0.01	3.06	926.1	0.04
α -Pinene	1.49	988.7	1.44	3.13	930.9	1.44
β -Fenchene?				3.17	933.7	0.02
Camphene	1.85	1024.8	0.55	3.32*	943.6	[0.79]
α -Fenchene	1.78*	1018.1	[0.22]	3.32*	943.6	[0.79]
1,4-Dimethyl-4-vinylcyclohexene?	2.18	1056.3	0.01	3.48	954.0	0.02
Unknown CIAU I [m/z 93, 91 (60), 121 (55), 136 (42), 79 (40)]	2.27*	1064.7	[2.58]	3.67	966.9	0.03
Geranic oxide	2.40	1076.9	0.22	3.72	970.0	0.22
Sabinene	2.46	1082.6	0.06	3.75*	972.0	[2.61]
β -Pinene	2.27*	1064.7	[2.58]	3.75*	972.0	[2.61]
3-Methyl-3-cyclohexenone	6.40*	1373.1	[0.02]	3.87	980.0	0.01
6-Methyl-5-hepten-2-one	5.32	1295.7	0.01	3.99	987.7	0.02
<i>trans</i> -Dehydroxylinool oxide	3.62	1172.6	0.06	4.02	989.7	0.04
Myrcene	3.07	1131.6	1.33	4.07	993.2	1.31
Pseudolimonene	3.02	1127.5	0.05	4.21*	1002.4	[0.40]
Octanal	4.70	1249.7	0.01	4.21*	1002.4	[0.40]
α -Phellandrene	2.97	1124.2	0.33	4.21*	1002.4	[0.40]
Δ^3 -Carene	2.78	1109.7	0.05	4.30	1008.0	0.02
1,4-Cineole	3.17*	1138.7	[3.76]	4.39	1013.7	1.65
α -Terpinene	3.17*	1138.7	[3.76]	4.41	1015.3	2.09
<i>para</i> -Cymene	4.34	1224.4	2.77	4.54	1023.1	2.81
Limonene	3.45	1160.0	52.64	4.66*	1030.6	[54.29]
1,8-Cineole	3.59*	1170.4	[0.04]	4.66*	1030.6	[54.29]
β -Phellandrene	3.52	1165.6	1.49	4.66*	1030.6	[54.29]
(Z?)-Citroxide	3.59*	1170.4	[0.04]	4.69	1032.6	0.02
(Z)- β -Ocimene	4.05*	1204.3	[11.52]	4.82	1040.8	0.18
(E?)-Citroxide	4.09	1206.9	0.15	4.93	1047.5	0.19

(E)- β -Ocimene	4.20	1215.1	0.41	4.97	1050.6	0.41
γ -Terpinene	4.05*	1204.3	[11.52]	5.11	1059.2	11.35
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.03	1272.4	0.03	5.26	1068.8	0.04
Fenchone	6.00	1344.4	0.04	5.49*	1083.1	[0.14]
Terpinolene isomer	4.57	1240.5	0.14	5.49*	1083.1	[0.14]
<i>para</i> -Cymenene	6.59	1386.6	0.19	5.56*	1087.5	[7.22]
Terpinolene	4.53	1237.9	7.04	5.56*	1087.5	[7.22]
Linalool	8.31	1514.7	0.10	5.80	1102.4	0.09
<i>para</i> -Mentha-1,3,8-triene	6.40*	1373.1	[0.02]	5.91	1109.3	0.02
endo-Fenchol	8.66*	1541.5	[0.94]	5.94	1111.3	0.22
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.21	1583.7	0.01	6.06	1119.0	0.02
Myrcenol	9.12	1576.9	0.01	6.13	1123.3	0.01
Limona ketone	8.06	1495.1	0.02	6.20	1128.0	0.02
<i>cis</i> -Limonene oxide	6.69	1393.8	0.02	6.24	1130.4	0.02
1-Terpineol	8.58	1535.6	0.16	6.28*	1133.1	[0.19]
<i>trans</i> -Limonene oxide	6.85	1406.0	0.03	6.28*	1133.1	[0.19]
Cosmene isomer II	6.40*	1373.1	[0.02]	6.36	1138.1	0.02
Epoxyterpinolene	6.99	1416.0	0.10	6.44*	1143.4	[0.26]
<i>cis</i> - β -Terpineol	9.26*	1587.4	[0.21]	6.44*	1143.4	[0.26]
Unknown MEAL II [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	7.07	1422.1	0.02	6.48	1145.7	0.02
Isoborneol	9.64	1618.2	0.02	6.60	1153.2	0.02
(Z)-Ocimenol	9.67*	1620.5	[0.06]	6.63	1155.6	0.01
Borneol	10.06*	1651.5	[6.23]	6.74	1162.7	0.13
<i>trans</i> - β -Terpineol	9.90	1639.1	0.09	6.78	1165.0	0.08
Terpinen-4-ol	8.83	1554.7	0.59	6.93	1174.4	0.62
<i>para</i> -Cymen-8-ol	11.80	1796.8	0.08	7.10	1185.8	0.07
α -Terpineol	10.06*	1651.5	[6.23]	7.18	1190.6	6.18
γ -Terpineol	10.10*	1655.3	[0.29]	7.27	1196.1	0.29
<i>trans</i> -Piperitol	10.67*	1701.6	[0.03]	7.39	1203.8	0.01
<i>trans</i> -Carveol	11.67	1785.0	0.02	7.62	1219.1	0.01
2,3-Epoxyneral?				7.66	1222.0	0.01
Nerol	11.33	1756.4	0.07	7.78	1230.0	0.07
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.60	1779.3	0.04	7.85	1234.8	0.03
Neral	9.74	1626.1	0.21	7.92	1239.4	0.16
Geraniol	11.89	1804.5	0.04	8.20	1258.2	0.03
Geranial	10.40*	1678.8	[1.02]	8.37	1269.9	0.24
Unknown CIAU V [m/z 95,	12.69	1874.5	0.03	8.51	1279.0	0.03

67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]						
<i>cis</i> -Ascaridole glycol	15.13	2101.3	0.02	8.65	1288.3	0.01
Unknown CICA VI [m/z 112, 97 (93), 83 (60), 43 (46), 41 (20), 69 (19)...]	14.29	2020.7	0.03	8.85	1301.8	0.04
δ -Elemene	7.19	1430.8	0.04	9.33	1335.9	0.05
α -Terpinyl acetate	9.95	1643.2	0.03	9.50	1347.8	0.01
Neryl acetate	10.43	1681.8	0.19	9.76	1366.2	0.12
Geranyl acetate	10.80	1712.7	0.06	10.04	1385.4	0.05
β -Elemene	8.66*	1541.5	[0.94]	10.10	1389.7	0.04
Dodecanal	10.28	1669.2	0.02	10.37	1409.5	0.01
β -Caryophyllene	8.66*	1541.5	[0.94]	10.42*	1413.4	[0.29]
<i>cis</i> - α -Bergamotene	8.44*	1524.7	[0.06]	10.42*	1413.4	[0.29]
α -Santalene	8.44*	1524.7	[0.06]	10.47	1416.9	0.02
γ -Elemene	9.26*	1587.4	[0.21]	10.66	1431.1	0.01
<i>trans</i> - α -Bergamotene	8.66*	1541.5	[0.94]	10.71	1434.3	0.47
α -Humulene	9.53	1609.3	0.05	10.88	1447.6	0.05
(<i>E</i>)- β -Farnesene	9.78	1629.3	0.04	11.03*	1458.5	[0.06]
β -Santalene	9.40	1599.2	0.03	11.03*	1458.5	[0.06]
Selina-4,11-diene	9.67*	1620.5	[0.06]	11.20	1471.4	0.05
Germacrene D	10.06*	1651.5	[6.23]	11.27	1476.0	0.02
Unknown BOSE VII [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	10.15	1659.2	0.02	11.29	1478.1	0.04
β -Selinene	10.10*	1655.3	[0.29]	11.32	1480.0	0.01
Unknown CILI III [m/z 41, 69 (90), 79 (78), 93 (72), 91 (70)...204]	8.96	1565.0	0.03	11.34	1481.7	0.03
δ -Selinene	9.88	1637.0	0.06	11.41	1487.1	0.10
α -Selinene	10.20*	1662.7	[0.05]	11.45	1489.6	0.04
(<i>Z</i>)- α -Bisabolene	10.74*	1707.5	[0.24]	11.62	1502.2	0.09
β -Bisabolene	10.40*	1678.8	[1.02]	11.69	1507.7	0.80
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	10.74*	1707.5	[0.24]	11.71*	1509.3	[0.20]
γ -Cadinene	10.67*	1701.6	[0.03]	11.71*	1509.3	[0.20]
(<i>Z</i>)- γ -Bisabolene	10.20*	1662.7	[0.05]	11.76	1513.1	0.04
δ -Cadinene	10.74*	1707.5	[0.24]	11.85	1520.1	0.03
Selina-4(15),7(11)-diene	10.83*	1714.8	[0.03]	11.96	1529.0	0.03
Selina-4,7(11)-diene?	10.78	1710.7	0.07	12.01	1533.2	0.07
Selina-3,7(11)-diene	10.83*	1714.8	[0.03]	12.04	1535.6	0.02
(<i>E</i>)- α -Bisabolene	10.96	1726.1	0.06	12.13	1542.4	0.03
Germacrene B	11.38	1760.7	0.03	12.22	1549.8	0.03
Caryophyllenyl alcohol	13.94	1988.3	0.01	12.39	1562.7	0.03
Caryophyllene oxide	13.04	1905.7	0.02	12.54	1574.4	0.02

Junenol	13.90	1983.9	0.03	12.98	1609.2	0.02
10-epi- γ -Eudesmol	14.43	2034.0	0.03	13.03	1613.3	0.01
γ -Eudesmol	15.24	2112.6	0.03	13.18	1626.2	0.02
Unknown CILI II [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	16.24	2211.7	0.01	13.66	1665.6	0.02
α -Bisabolol	15.69	2156.8	0.02	13.88	1683.6	0.02
Hexadecanal	14.94	2082.6	0.01	15.26	1803.0	0.02
Total reported		99.20%			99.51%	

*: 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