

Date : January 26, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21A12-MPE03

Customer identification : Lime - Italy - 104

Type : Essential oil

Source : *Citrus aurantifolia* ct. Distilled

Customer : My Pure Earth Pte Ltd

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 : January 24, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4760 ± 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
Ethanol	0.02	Aliphatic alcohol
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Heptane	tr	Alkane
4,5-Dihydrotoluene	0.10	Alkene
Cyclofenchene	0.01	Monoterpene
Nonane	0.02	Alkane
Heptanal	0.02	Aliphatic aldehyde
Bornylene	0.01	Monoterpene
Tricyclene	0.02	Monoterpene
α -Thujene	0.04	Monoterpene
α -Pinene	1.24	Monoterpene
β -Fenchene	0.01	Monoterpene
Camphene	0.38	Monoterpene
α -Fenchene	0.16	Monoterpene
1,4-Dimethyl-4-vinylcyclohexene?	0.01	Monoterpene
Unknown	0.01	Monoterpene
Geranic oxide	0.20	Monoterpenic ether
Sabinene	0.02	Monoterpene
β -Pinene	2.61	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
<i>trans</i> -Dehydroxylinalool oxide	0.05	Monoterpenic ether
Myrcene	1.16	Monoterpene
Pseudolimonene	0.03	Monoterpene
α -Phellandrene	0.26	Monoterpene
Menthatriene isomer I	0.02	Monoterpene
Δ^3 -Carene	0.03	Monoterpene
1,4-Cineole	3.61*	Monoterpenic ether
α -Terpinene	[3.61]*	Monoterpene
para-Cymene	2.35	Monoterpene
Limonene	45.14	Monoterpene
β -Phellandrene	0.28	Monoterpene
1,8-Cineole	1.19	Monoterpenic ether
(<i>Z</i>)-Citroxide	0.02	Monoterpenic ether
(<i>Z</i>)- β -Ocimene	0.14	Monoterpene
(<i>E</i>)-Citroxide	0.15	Monoterpenic ether
(<i>E</i>)- β -Ocimene	0.33	Monoterpene
γ -Terpinene	10.61	Monoterpene
Unknown	0.05	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene isomer	0.09	Monoterpene
Terpinolene	6.51	Monoterpene
para-Cymenene	0.26	Monoterpene
Linalool	0.32	Monoterpenic alcohol

Nonanal	0.01	Aliphatic aldehyde
1,3,8-para-Menthatriene	0.03	Monoterpene
endo-Fenchol	0.59	Monoterpenic alcohol
<i>trans</i> -para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
Myrcenol	0.07	Monoterpenic alcohol
Limona ketone	0.01	Normonoterpenic ketone
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
allo-Ocimene	0.02	Monoterpene
1-Terpineol	1.07	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	0.02	Monoterpenic ether
Epoxyterpinolene	0.07	Monoterpenic ether
Unknown	0.01	Unknown
<i>cis</i> - β -Terpineol	0.87	Monoterpenic alcohol
Isoborneol	0.06	Monoterpenic alcohol
Borneol	0.72	Monoterpenic alcohol
δ -Terpineol	0.02	Monoterpenic alcohol
Isoneral	0.01	Monoterpenic aldehyde
(<i>E</i>)-Ocimenol	0.10	Monoterpenic alcohol
Isopinocampone	0.02	Monoterpenic ketone
α -Phellandren-8-ol	0.10	Monoterpenic alcohol
Terpinen-4-ol	0.86	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	8.43	Monoterpenic alcohol
<i>cis</i> -Piperitol	0.45	Monoterpenic alcohol
γ -Terpineol	1.30	Monoterpenic alcohol
Decanal	0.03	Aliphatic aldehyde
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
<i>cis</i> -Carveol	0.01	Monoterpenic alcohol
2,3-Epoxygeranial?	0.03	Monoterpenic aldehyde
Unknown	0.05	Oxygenated monoterpene
Neral	0.13	Monoterpenic aldehyde
Geraniol	0.05	Monoterpenic alcohol
Geranial	0.19	Monoterpenic aldehyde
Unknown	0.02	Unknown
Unknown	0.04	Oxygenated monoterpene
<i>cis</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Unknown	0.03	Unknown
Undecanal	0.03	Aliphatic aldehyde
Unknown	0.03	Monoterpenic alcohol
δ -Elemene	0.07	Sesquiterpene
Citronellyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.19	Monoterpenic ester
Geranyl acetate	0.09	Monoterpenic ester
β -Elemene	0.08	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
Dodecanal	0.01	Aliphatic aldehyde
β -Caryophyllene	0.41	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.05	Sesquiterpene
α -Santalene	0.03	Sesquiterpene
γ -Elemene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.76	Sesquiterpene
α -Humulene	0.09	Sesquiterpene

(E)-β-Farnesene	0.10	Sesquiterpene
β-Santalene	0.01	Sesquiterpene
Selina-4,11-diene	0.10	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
β-Selinene	0.05	Sesquiterpene
Unknown	0.04	Sesquiterpene
trans-β-Bergamotene	0.03	Sesquiterpene
δ-Selinene	0.15	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
(Z)-α-Bisabolene	0.13	Sesquiterpene
β-Bisabolene	1.09	Sesquiterpene
γ-Cadinene	0.05	Sesquiterpene
β-Curcumene	0.01	Sesquiterpene
(3E,6E)-α-Farnesene	0.45	Sesquiterpene
(Z)-γ-Bisabolene	0.06	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Selina-4(15),7(11)-diene	0.04	Sesquiterpene
Unknown	0.13	Sesquiterpene
Selina-3,7(11)-diene	0.04	Sesquiterpene
(E)-α-Bisabolene	0.05	Sesquiterpene
Germacrene B	0.07	Sesquiterpene
Caryophyllenyl alcohol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
10-epi-γ-Eudesmol	0.04	Sesquiterpenic alcohol
γ-Eudesmol	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.02	Sesquiterpenic alcohol
Unknown	0.01	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
α-Bisabolol	0.02	Sesquiterpenic alcohol
Juniper camphor	0.04	Sesquiterpenic alcohol
Consolidated total	97.92%	

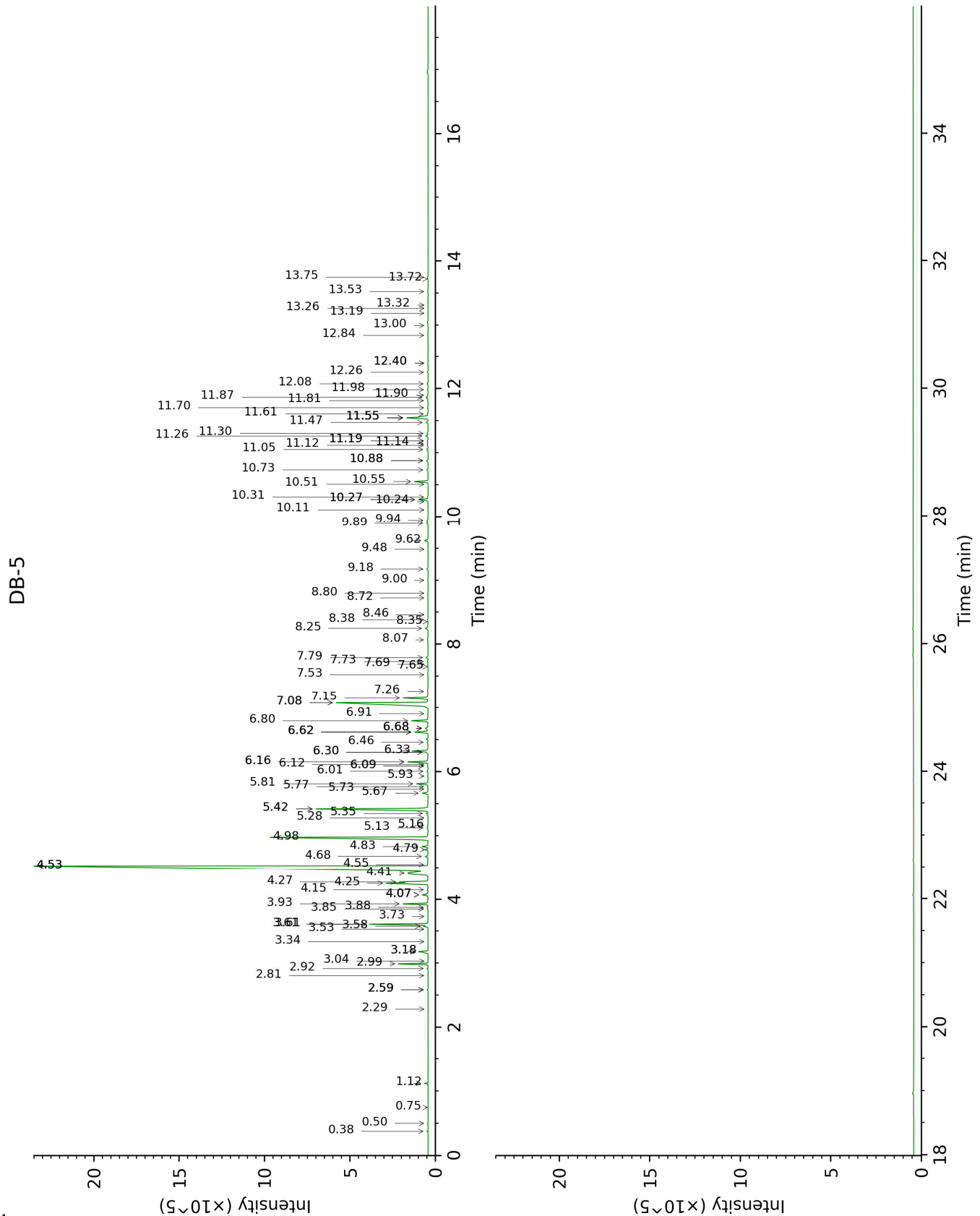
*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
tr: The compound has been detected below 0.005% of total signal.

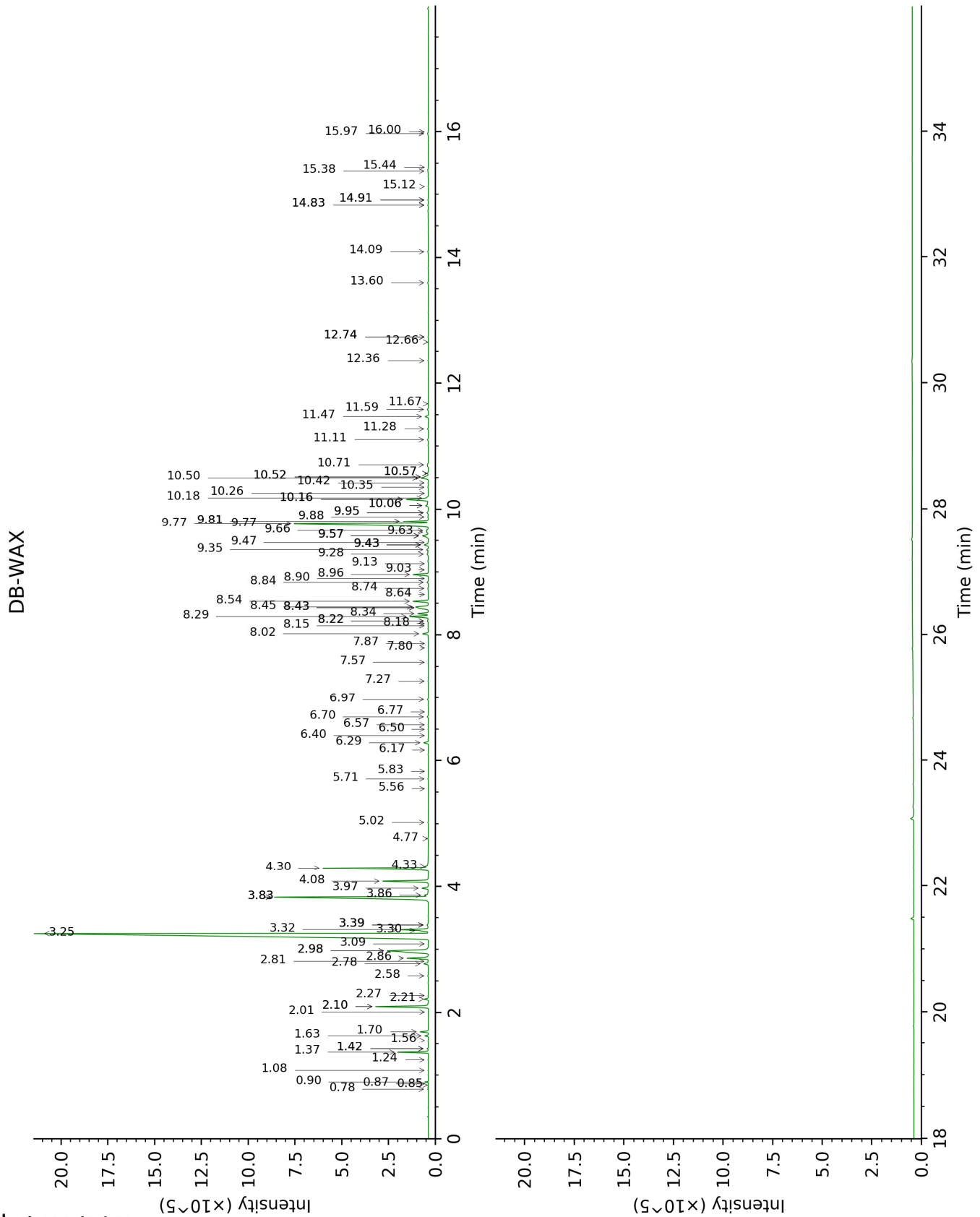
Note: no correction factor was applied

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	%
Ethanol	0.38	520	0.02	0.85	907	0.01
2-Methyl-3-buten-2-ol	0.50	589	0.01	1.56	1012	0.01
Heptane	0.75	707	tr			
4,5-Dihydrotoluene	1.12	764	0.10	0.90	915	0.09
Cyclofenchene	2.29	879	0.01	0.87	910	tr
Nonane	2.59*	905	0.04	0.78	896	0.02
Heptanal	2.59*	905	[0.04]	3.09	1151	0.02
Bornylene	2.59*	905	[0.04]	1.08	945	0.01
Tricyclene	2.81	919	0.02	1.24	972	0.02
α -Thujene	2.92	926	0.04	1.42*	999	0.06
α -Pinene	2.99	931	1.24	1.37	992	1.22
β -Fenchene	3.04	934	0.01	1.42*	999	[0.06]
Camphene	3.18*	944	0.56	1.70	1026	0.38
α -Fenchene	3.18*	944	[0.56]	1.63	1020	0.16
1,4-Dimethyl-4-vinylcyclohexene?	3.34	954	0.01	2.01	1057	0.01
Unknown [m/z 93, 91 (60), 121 (55), 136 (42), 79 (40)]	3.53	967	0.01	2.10*	1066	2.62
Geranic oxide	3.58	970	0.20	2.22	1078	0.21
Sabinene	3.61*	972	2.67	2.27	1084	0.02
β -Pinene	3.61*	972	[2.67]	2.10*	1066	[2.62]
3-Methyl-3-cyclohexenone	3.73	980	0.01	6.17	1376	0.01
6-Methyl-5-hepten-2-one	3.85	988	0.02	5.02	1297	0.03
<i>trans</i> -Dehydroxylinalool oxide	3.88	990	0.05	3.39*	1174	0.09
Myrcene	3.93	993	1.16	2.86	1133	1.17
Pseudolimonene	4.07*	1002	0.33	2.81	1129	0.03
α -Phellandrene	4.07*	1002	[0.33]	2.78	1126	0.26
Menthatriene isomer I	4.07*	1002	[0.33]	3.39*	1174	[0.09]
Δ 3-Carene	4.15	1008	0.03	2.58	1111	0.04
1,4-Cineole	4.25†	1014	3.61	2.98*	1142	3.58
α -Terpinene	4.27†	1015	[3.61]	2.98*	1142	[3.58]
para-Cymene	4.41	1024	2.35	4.08	1227	2.43
Limonene	4.53*	1031	47.04	3.25	1164	45.14
β -Phellandrene	4.53*	1031	[47.04]	3.30	1168	0.28
1,8-Cineole	4.53*	1031	[47.04]	3.32	1169	1.19
(<i>Z</i>)-Citroxide	4.55	1032	0.02	3.39*	1174	[0.09]
(<i>Z</i>)- β -Ocimene	4.68	1041	0.14	3.83*†	1208	10.78
(<i>E</i>)-Citroxide	4.78	1047	0.15	3.86†	1211	[10.78]
(<i>E</i>)- β -Ocimene	4.83	1050	0.33	3.97	1219	0.35
γ -Terpinene	4.98	1059	10.61	3.83*†	1208	[10.78]

Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.13	1069	0.05	4.77	1278	0.03
<i>cis</i> -Linalool oxide (fur.)	5.16	1071	0.02	6.50	1399	0.02
Octanol	5.28	1078	0.01	8.18	1526	0.01
Terpinolene isomer	5.35	1083	0.09	4.33	1245	0.21
Terpinolene	5.42*	1087	7.00	4.30	1243	6.51
para-Cymenene	5.42*	1087	[7.00]	6.29	1384	0.26
Linalool	5.67	1103	0.32	8.02	1513	0.33
Nonanal	5.73	1107	0.01	5.83	1351	0.01
1,3,8-para-Menthatriene	5.77	1109	0.03	5.71	1343	0.04
endo-Fenchol	5.81	1112	0.59	8.34	1538	0.58
<i>trans</i> -para-Mentha-2,8-dien-1-ol	5.93	1120	0.02	8.90	1581	0.01
Myrcenol	6.01	1125	0.07	8.84	1576	0.08
Limona ketone	6.09*	1130	0.04	7.80	1496	0.01
<i>cis</i> -Limonene oxide	6.09*	1130	[0.04]	6.40	1392	0.01
allo-Ocimene	6.12	1131	0.02	5.56	1332	0.01
1-Terpineol	6.16*	1134	1.08	8.30	1534	1.07
<i>trans</i> -Limonene oxide	6.16*	1134	[1.08]	6.57	1405	0.02
Epoxyterpinolene	6.30*	1144	0.08	6.70	1414	0.07
Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.30*	1144	[0.08]	6.77	1420	0.01
<i>cis</i> -β-Terpineol	6.33	1145	0.87	8.96	1586	0.85
Isoborneol	6.46	1154	0.06	9.35	1617	0.10
Borneol	6.62*	1164	0.74	9.77*	1650	9.15
δ-Terpineol	6.62*	1164	[0.74]	9.47	1626	0.02
Isoneral	6.62*	1164	[0.74]	7.87	1501	0.01
(<i>E</i>)-Ocimenol	6.68*	1168	0.21	9.66†	1642	[0.25]
Isopinocampone	6.68*	1168	[0.21]	7.57	1479	0.02
α-Phellandren-8-ol	6.68*	1168	[0.21]	10.18†	1684	[1.51]
Terpinen-4-ol	6.80	1175	0.86	8.54	1553	0.87
para-Cymen-8-ol	6.91	1182	0.02	11.47	1793	0.18
α-Terpineol	7.08*	1194	8.88	9.77*	1650	[9.15]
<i>cis</i> -Piperitol	7.08*	1194	[8.88]	9.57*	1635	0.49
γ-Terpineol	7.15	1198	1.30	9.81*	1654	1.30
Decanal	7.26	1206	0.03	7.27	1457	0.03
2,3-Epoxyneral?	7.52	1224	0.02			
<i>cis</i> -Carveol	7.65	1232	0.01	11.67	1811	0.02
2,3-Epoxygeranial?	7.69	1235	0.03			

Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.73	1237	0.05	11.28	1776	0.06
Neral	7.79	1242	0.13	9.43*	1623	0.28
Geraniol	8.07	1260	0.05	11.58	1803	0.07
Geranial	8.25	1273	0.19	10.06*†	1674	0.27
Unknown [m/z 43, 79 (78), 128 (46), 58 (42), 127 (42)...]	8.35	1280	0.02	12.74*	1906	0.03
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.38	1282	0.04	12.36	1871	0.03
cis-Ascaridole glycol	8.46	1287	0.01	14.83*	2103	0.04
Unknown [m/z 112, 97 (93), 83 (60), 43 (46), 41 (20), 69 (19)...]	8.72	1301	0.03			
Undecanal	8.80	1306	0.03	8.64	1561	0.02
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	9.00	1320	0.03	14.91*	2111	0.04
δ-Elemene	9.18	1333	0.07	6.97	1435	0.06
Citronellyl acetate	9.48	1355	0.01	9.43*	1623	[0.28]
Neryl acetate	9.62	1365	0.19	10.16*†	1682	1.51
Geranyl acetate	9.89	1384	0.09	10.52*	1712	0.17
β-Elemene	9.94	1388	0.08	8.43*†	1545	1.25
Isocaryophyllene	10.11	1400	0.01	8.15	1523	0.02
Dodecanal	10.24	1409	0.01	10.06*†	1674	[0.27]
β-Caryophyllene	10.27*	1412	0.54	8.43*†	1545	[1.25]
cis-α-Bergamotene	10.27*	1412	[0.54]	8.22*	1529	0.08
α-Santalene	10.31	1415	0.03	8.22*	1529	[0.08]
γ-Elemene	10.51	1430	0.01	9.03	1591	0.02
trans-α-Bergamotene	10.55	1433	0.76	8.45†	1546	[1.25]
α-Humulene	10.73	1447	0.09	9.28	1611	0.10
(E)-β-Farnesene	10.88*	1458	0.11	9.57*	1635	[0.49]
β-Santalene	10.88*	1458	[0.11]	9.13	1599	0.01
Selina-4,11-diene	11.05	1471	0.10	9.43*	1623	[0.28]
Germacrene D	11.12	1476	0.04	9.81*	1654	[1.30]
β-Selinene	11.14	1478	0.05	9.88	1660	0.05
Unknown [m/z 41, 69 (90), 79 (78), 93 (72), 91 (70)...204]	11.19*	1481	0.07	8.74	1569	0.04
trans-β-Bergamotene	11.19*	1481	[0.07]	9.57*	1635	[0.49]
δ-Selinene	11.26	1486	0.15	9.63†	1640	0.25
α-Selinene	11.30	1489	0.07	9.95*	1665	0.11

(Z)- α -Bisabolene	11.47	1502	0.13			
β -Bisabolene	11.55*	1508	1.61	10.16*†	1682	[1.51]
γ -Cadinene	11.55*	1508	[1.61]	10.35	1698	0.05
β -Curcumene	11.55*	1508	[1.61]	10.26	1690	0.01
(3E,6E)- α -Farnesene	11.55*	1508	[1.61]	10.50	1711	0.45
(Z)- γ -Bisabolene	11.61	1513	0.06	9.95*	1665	[0.11]
δ -Cadinene	11.70	1520	0.04	10.42	1704	0.03
Selina-4(15),7(11)-diene	11.82	1529	0.04	10.57*	1717	0.07
Unknown [m/z 189, 204 (92), 161 (65), 133 (51), 105 (51), 91 (51), 119 (45)]	11.86	1533	0.13	10.52*	1712	[0.17]
Selina-3,7(11)-diene	11.90	1536	0.04	10.57*	1717	[0.07]
(E)- α -Bisabolene	11.98	1543	0.05	10.71	1728	0.13
Germacrene B	12.08	1550	0.07	11.11	1762	0.07
Caryophyllenyl alcohol	12.26	1564	0.05	13.60	1985	0.07
Caryophyllene oxide	12.40*	1575	0.03	12.74*	1906	[0.03]
Caryophyllene oxide isomer	12.40*	1575	[0.03]	12.66	1898	0.01
10-epi- γ -Eudesmol	12.84	1611	0.04	14.09	2032	0.05
γ -Eudesmol	13.00	1624	0.03	14.91*	2111	[0.04]
β -Eudesmol	13.19	1640	0.02	15.38	2158	0.03
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]	13.26	1646	0.01	15.12	2132	0.02
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.32	1650	0.01	14.83*	2103	[0.04]
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.53	1668	0.05	15.97	2218	0.06
α -Bisabolol	13.72	1684	0.02	15.44	2164	0.01
Juniper camphor	13.75	1686	0.04	16.00	2221	0.02
Total identified		98.31%			97.94%	
Total reported		98.74%			98.19%	

*: 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

