Date : January 14, 2021

Certificate of Analysis – GC Profiling

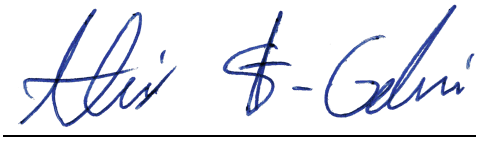
Sample identification

Internal code : 20L21-PSC04
Customer identification : Petitgrain Sweet Lime - CILI-2020-01
Type : Essential oil
Source : *Citrus limetta*
Customer : Pacha Soap Co.

Analysis

Method: PC-MAT-014 ISO - 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 13, 2021

Checked and approved by :



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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4641 ± 0.0003 (20 °C; method PC-MAT-016)
Optical rotation: -0.7° (20 °C, methanol, *c* = 1.4)

CONCLUSION

No clear contaminant or diluent has been detected using this method. Owing to the lack of literature for sweet lime petitgrain oil expected composition, the laboratory witholds its conclusions.

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Analysis summary – Consolidated contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
α-Thujene	0.02	Monoterpene
α-Pinene	0.22	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.29	Monoterpene
β-Pinene	2.32	Monoterpene
6-Methyl-5-hepten-2-one	0.08	Aliphatic ketone
Myrcene	2.22	Monoterpene
α-Phellandrene	0.02	Monoterpene
Δ3-Carene	0.04	Monoterpene
α-Terpinene	0.07	Monoterpene
para-Cymene	0.05	Monoterpene
Limonene	4.07	Monoterpene
β-Phellandrene	0.04	Monoterpene
1,8-Cineole	0.16	Monoterpenic ether
(*Z*)-β-Ocimene	0.85	Monoterpene
(*E*)-β-Ocimene	2.24	Monoterpene
γ-Terpinene	0.10	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Terpinolene	0.48	Monoterpene
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
Linalool	41.99	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
allo-Ocimene	0.02	Monoterpene
trans-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
Isopulegol	0.01	Monoterpenic alcohol
Citronellal	0.02	Monoterpenic aldehyde
Nerol oxide	0.01	Aliphatic ether
Terpinen-4-ol	0.26	Monoterpenic alcohol
Hodiendiol	0.04	Monoterpenic alcohol
α-Terpineol	7.76	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.01	Monoterpenic alcohol
Octyl acetate	0.04	Aliphatic ester
Nerol	1.59	Monoterpenic alcohol
Citronellol	0.07	Monoterpenic alcohol
Coumaran	0.04	Simple phenolic
Neral	0.22	Monoterpenic aldehyde
Linalyl acetate	19.77	Monoterpenic ester
Geraniol	4.30	Monoterpenic alcohol
Geranial	0.36	Monoterpenic aldehyde
Neryl formate	0.02	Monoterpenic ester

Bornyl acetate	0.01	Monoterpenic ester
Safrole	0.01	Phenylpropanoid
Geranyl formate	0.02	Monoterpenic ester
4-Vinylguaiacol	0.02	Simple phenolic
Linalyl propionate	0.01	Monoterpenic ester
δ-Elemene	tr	Sesquiterpene
exo-2-Hydroxycineole acetate	0.01	Monoterpenic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
α-Terpinyl acetate	0.12	Monoterpenic ester
Citronellyl acetate	0.03	Monoterpenic ester
Neryl acetate	2.38	Monoterpenic ester
Geranyl acetate	3.74	Monoterpenic ester
Methyleugenol	0.05	Phenylpropanoid
β-Caryophyllene	0.69	Sesquiterpene
cis-α-Bergamotene	0.11	Sesquiterpene
trans-α-Bergamotene	0.18	Sesquiterpene
α-Humulene	0.07	Sesquiterpene
(*E*)-β-Farnesene	0.04	Sesquiterpene
Bicyclogermacrene	0.08	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
Methyl (*E*)-isoeugenol	0.02	Phenylpropanoid
(*Z*)-α-Bisabolene	0.04	Sesquiterpene
β-Bisabolene	0.26	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
(*E*)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
γ-Asarone	0.08	Phenylpropanoid
Globulol	0.02	Sesquiterpenic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol
Isospathulenol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.03	Sesquiterpenic alcohol
α-Bisabolol	0.02	Sesquiterpenic alcohol
α-Asarone	0.03	Phenylpropanoid
Mint sulfide?	0.01	Sesquiterpenic sulfide
meta-Camphorene	0.02	Diterpene
para-Camphorene	0.03	Diterpene
Phytol	0.07	Diterpenic alcohol
Benzaldehyde	0.01	Simple phenolic
Borneol	0.04	Monoterpenic alcohol
Consolidated total	**98.32%**	

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.

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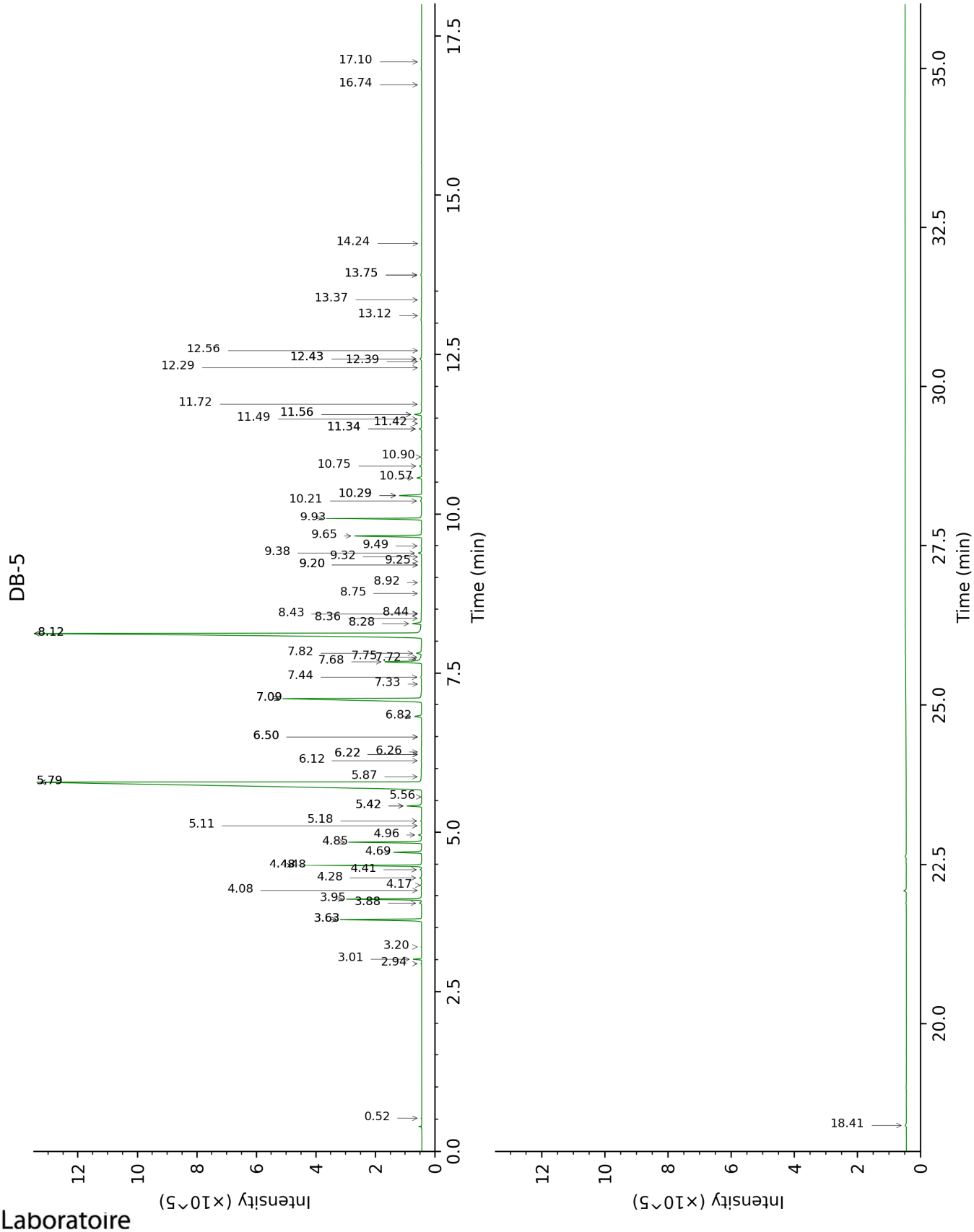
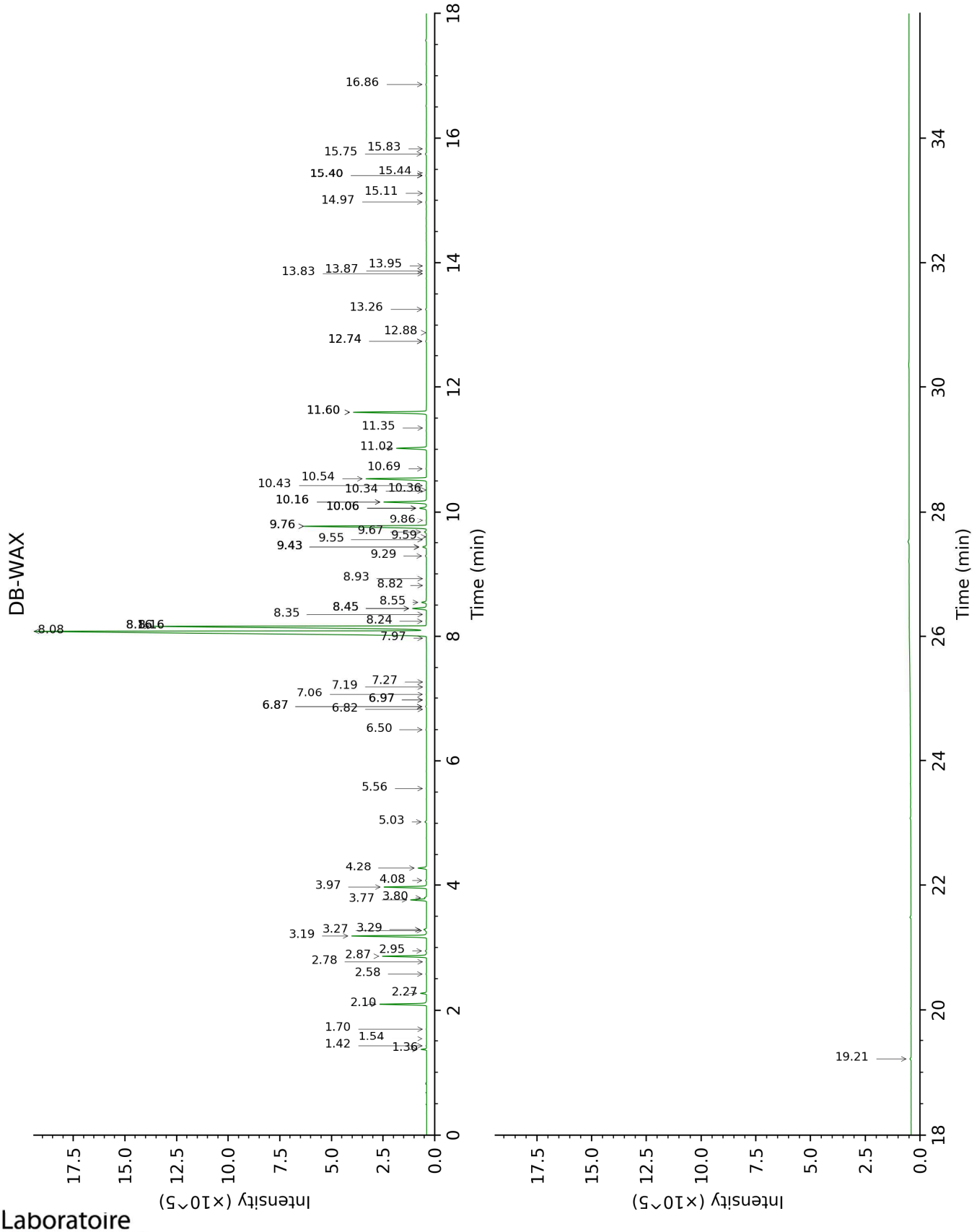

DB-5
17.10
16.74
14.24
13.75
13.37
13.12
12.56
12.43
12.39
12.29
11.72
11.49
11.56
11.42
11.34
10.90
10.75
10.57
10.29
10.21
9.93
9.65
9.49
9.38
9.32
9.25
9.20
8.92
8.75
8.44
8.43
8.36
8.28
8.12
7.82
7.75
7.72
7.68
7.44
7.33
7.09
6.82
6.50
6.26
6.22
6.12
5.87
5.79
5.56
5.42
5.18
5.11
4.96
4.85
4.69
4.41
4.28
4.17
4.08
3.95
3.88
3.63
3.20
3.01
2.94
0.52
18.41
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
16.86
15.75
15.83
15.40
15.44
14.97
15.11
13.83
13.87
13.95
13.26
12.74
12.88
11.60
11.35
11.02
10.69
10.43
10.54
10.34
10.36
10.16
10.06
9.86
9.76
9.67
9.59
9.55
9.43
9.29
8.93
8.82
8.55
8.45
8.35
8.24
8.08
7.97
7.27
7.19
7.06
6.97
6.87
6.82
6.50
5.56
5.03
4.28
4.08
3.97
3.80
3.77
3.27
3.29
3.19
2.95
2.87
2.78
2.58
2.27
2.10
1.70
1.54
1.42
1.36
19.21

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.52	600	0.01	1.54	1011	0.01
α-Thujene	2.94	928	0.02	1.42	999	0.02
α-Pinene	3.01	932	0.22	1.36	992	0.22
Camphene	3.20	945	0.02	1.70	1026	0.02
Sabinene	3.63*	973	2.64	2.27	1084	0.29
β-Pinene	3.63*	973	[2.64]	2.10	1066	2.32
6-Methyl-5-hepten-2-one	3.88	990	0.08	5.02	1297	0.09
Myrcene	3.95	994	2.22	2.86	1133	2.20
α-Phellandrene	4.08	1003	0.02	2.78	1126	0.02
Δ3-Carene	4.16	1008	0.04	2.58	1110	0.03
α-Terpinene	4.28	1016	0.07	2.95	1140	0.07
para-Cymene	4.41	1024	0.05	4.08	1227	0.05
Limonene	4.48*	1028	4.27	3.19	1158	4.07
β-Phellandrene	4.48*	1028	[4.27]	3.28	1165	0.04
1,8-Cineole	4.48*	1028	[4.27]	3.29	1167	0.16
(*Z*)-β-Ocimene	4.69	1041	0.85	3.77	1204	0.86
(*E*)-β-Ocimene	4.85	1051	2.24	3.97	1219	2.26
γ-Terpinene	4.96	1058	0.10	3.80	1206	0.11
cis-Sabinene hydrate	5.11	1067	0.02	6.87*	1427	0.05
cis-Linalool oxide (fur.)	5.18	1072	0.03	6.50	1399	0.05
Terpinolene	5.42*	1087	0.50	4.28	1241	0.48
trans-Linalool oxide (fur.)	5.42*	1087	[0.50]	6.87*	1427	[0.05]
trans-Sabinene hydrate	5.56	1096	0.01	7.97	1510	0.01
endo-Fenchol	5.79*	1110	42.00	8.35	1539	0.01
Linalool	5.79*	1110	[42.00]	8.08†	1518	61.90
cis-para-Menth-2-en-1-ol	5.87	1116	0.02	8.16*†	1524	[61.90]
allo-Ocimene	6.12	1132	0.02	5.56	1332	0.02
trans-para-Menth-2-en-1-ol	6.22*	1138	0.02	8.93	1583	0.01
Camphor	6.22*	1138	[0.02]	7.19	1451	0.01
Isopulegol	6.26	1141	0.01	8.16*†	1524	[61.90]
Citronellal	6.50*	1156	0.01	6.98*	1435	0.02
Nerol oxide	6.50*	1156	[0.01]	6.82	1424	0.01
Terpinen-4-ol	6.82	1177	0.26	8.55	1554	0.28
Hodiendiol	7.10*	1195	7.80	12.74*	1906	0.05
α-Terpineol	7.10*	1195	[7.80]	9.76*	1650	7.80
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.33	1210	0.01	11.35	1782	0.01
Octyl acetate	7.44	1218	0.04	7.06	1441	0.03
Nerol	7.68	1234	1.59	11.02	1755	1.75

Citronellol	7.72	1237	0.07	10.69	1727	0.04
Coumaran	7.75	1239	0.04	16.86	2311	0.04
Neral	7.82	1243	0.22	9.43*	1624	0.25
Linalyl acetate	8.12*	1264	24.77	8.16*†	1524	[61.90]
Geraniol	8.12*	1264	[24.77]	11.60*	1804	4.31
Geranial	8.28	1275	0.36	10.06*	1675	0.46
Neryl formate	8.36	1280	0.02	9.43*	1624	[0.25]
Bornyl acetate	8.43	1285	0.01	8.24	1530	0.04
Safrole	8.44	1286	0.01	11.60*	1804	[4.31]
Geranyl formate	8.75	1303	0.02	9.86	1658	0.02
4-Vinylguaiacol	8.92	1315	0.02	15.11	2131	0.01
Linalyl propionate	9.20*	1334	0.01	8.82	1575	0.01
δ-Elemene	9.20*	1334	[0.01]	6.98*	1435	[0.02]
exo-2-Hydroxycineole acetate	9.25	1338	0.01	10.06*	1675	[0.46]
Hodiendiol derivative	9.32	1344	0.01	12.88	1918	0.02
α-Terpinyl acetate	9.38	1348	0.12	9.67	1643	0.14
Citronellyl acetate	9.49	1356	0.03	9.43*	1624	[0.25]
Neryl acetate	9.65	1367	2.38	10.16*	1683	2.67
Geranyl acetate	9.93	1387	3.74	10.54	1714	3.77
Methyleugenol	10.21	1407	0.05	13.26	1953	0.06
β-Caryophyllene	10.29*	1414	0.80	8.45*	1546	0.87
cis-α-Bergamotene	10.29*	1414	[0.80]	8.16*†	1524	[61.90]
trans-α-Bergamotene	10.57	1434	0.18	8.45*	1546	[0.87]
α-Humulene	10.75	1448	0.07	9.29	1612	0.07
(*E*)-β-Farnesene	10.90	1459	0.04	9.55	1633	0.02
Bicyclogermacrene	11.34*	1492	0.10	10.06*	1675	[0.46]
Viridiflorene	11.34*	1492	[0.10]	9.59	1637	0.02
Methyl (*E*)-isoeugenol	11.42	1498	0.02	14.97	2117	0.06
(*Z*)-α-Bisabolene	11.49	1504	0.04	10.34	1697	0.02
β-Bisabolene	11.56*	1509	0.27	10.16*	1683	[2.67]
γ-Cadinene	11.56*	1509	[0.27]	10.36	1698	0.01
δ-Cadinene	11.72	1522	0.03	10.43	1704	0.03
(*E*)-Nerolidol	12.29	1567	0.02	13.83	2006	0.01
Caryophyllene oxide	12.39	1575	0.02	12.74*	1906	[0.05]
γ-Asarone	12.43*	1578	0.08	15.75	2195	0.08
Globulol	12.43*	1578	[0.08]	13.87	2010	0.02
Viridiflorol	12.56	1588	0.01	13.95	2018	0.01
Isospathulenol	13.12	1634	0.01	15.40*	2159	0.04
α-Cadinol	13.36	1654	0.03	15.40*	2159	[0.04]
α-Bisabolol	13.75*	1686	0.05	15.44	2164	0.02
α-Asarone	13.75*	1686	[0.05]			
Mint sulfide?	14.24	1728	0.01			
meta-Camphorene	16.74	1952	0.02	15.40*	2159	[0.04]
para-Camphorene	17.10	1986	0.03	15.83	2204	0.02
Phytol	18.41	2114	0.07	19.21	2574	0.08
Benzaldehyde				7.27	1457	0.01

Borneol		9.76*	1650	[7.80]
Total identified	**98.95%**		**98.57%**	
Total reported	**98.95%**		**98.57%**	

*: 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

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index

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