Date : May 22, 2020

Certificate of Analysis – GC Profiling

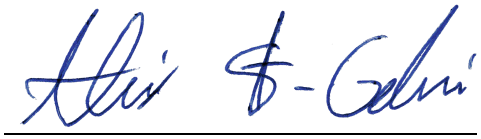
Sample identification

Internal code : 20E21-PTH06
Customer identification : Eucalyptus Radiata - S. Africa - E4010586R
Type : Essential oil
Source : *Eucalyptus radiata*
Customer : Plant Therapy

Analysis

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc.
Analysis date : May 21, 2020

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Laboratoire PhytoChemia
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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4638 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

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Analysis summary – Consolidated contents

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

Identification	%	Class
α-Thujene	0.21	Monoterpene
α-Pinene	1.71	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	0.01	Monoterpene
β-Pinene	0.54	Monoterpene
Sabinene	1.09	Monoterpene
trans-para-Menthane	0.01	Monoterpene
Unknown	0.03	Unknown
Myrcene	0.96	Monoterpene
trans-Dehydroxylinalool oxide	tr	Monoterpenic ether
α-Phellandrene	0.50	Monoterpene
Pseudolimonene	0.02	Monoterpene
α-Terpinene	0.31	Monoterpene
Limonene	4.72	Monoterpene
1,8-Cineole	68.62	Monoterpenic ether
(*Z*)-β-Ocimene	0.03	Monoterpene
(*E*)-β-Ocimene	0.26	Monoterpene
γ-Terpinene	0.59	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.16	Monoterpene
para-Cymenene	0.02	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	0.41	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.15	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.10	Monoterpenic alcohol
Isopulegol	0.03	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Citronellal	0.03	Monoterpenic aldehyde
Nerol oxide	0.01	Aliphatic ether
Borneol	0.02	Monoterpenic alcohol
δ-Terpineol	0.22	Monoterpenic alcohol
Terpinen-4-ol	1.68	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	10.36	Monoterpenic alcohol
Myrtenol	0.06	Monoterpenic alcohol
cis-α-Phellandrene epoxide (IPP vs Me)	0.01	Monoterpenic ether
trans-Piperitol	0.06	Monoterpenic alcohol
exo-2-Hydroxycineole	0.01	Monoterpenic alcohol
Nerol	0.08	Monoterpenic alcohol
Citronellol	0.06	Monoterpenic alcohol
Neral	0.70	Monoterpenic aldehyde
Piperitone	0.26	Monoterpenic ketone

Geraniol	0.90	Monoterpenic alcohol
trans-Ascaridole glycol	0.03	Monoterpenic alcohol
Geranial	0.96	Monoterpenic aldehyde
Unknown	0.01	Unknown
cis-Ascaridole glycol	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
exo-2-Hydroxycineole acetate	0.01	Monoterpenic ester
α-Terpinyl acetate	1.64	Monoterpenic ester
Unknown	0.01	Unknown
Methyl (*E*)-cinnamate	0.10	Phenylpropanoid ester
Geranyl acetate	0.04	Monoterpenic ester
Unknown	0.01	Sesquiterpene
Unknown	0.02	Unknown
β-Caryophyllene	0.08	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
Bicyclogermacrene	0.15	Sesquiterpene
α-Elemol	0.03	Sesquiterpenic alcohol
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
Cubeban-11-ol	0.01	Sesquiterpenic alcohol
Ledol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
Consolidated total	**98.33%**	

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.

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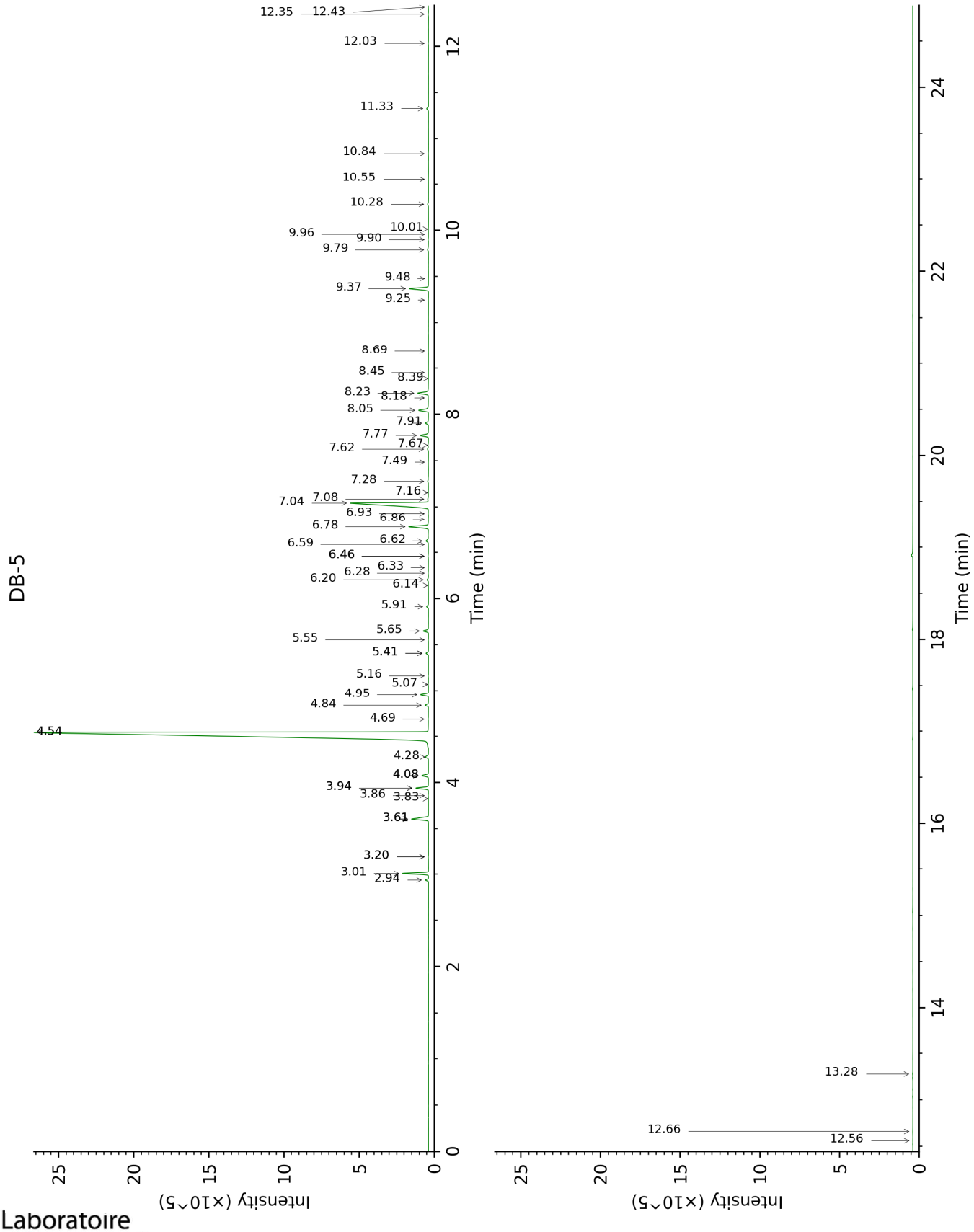
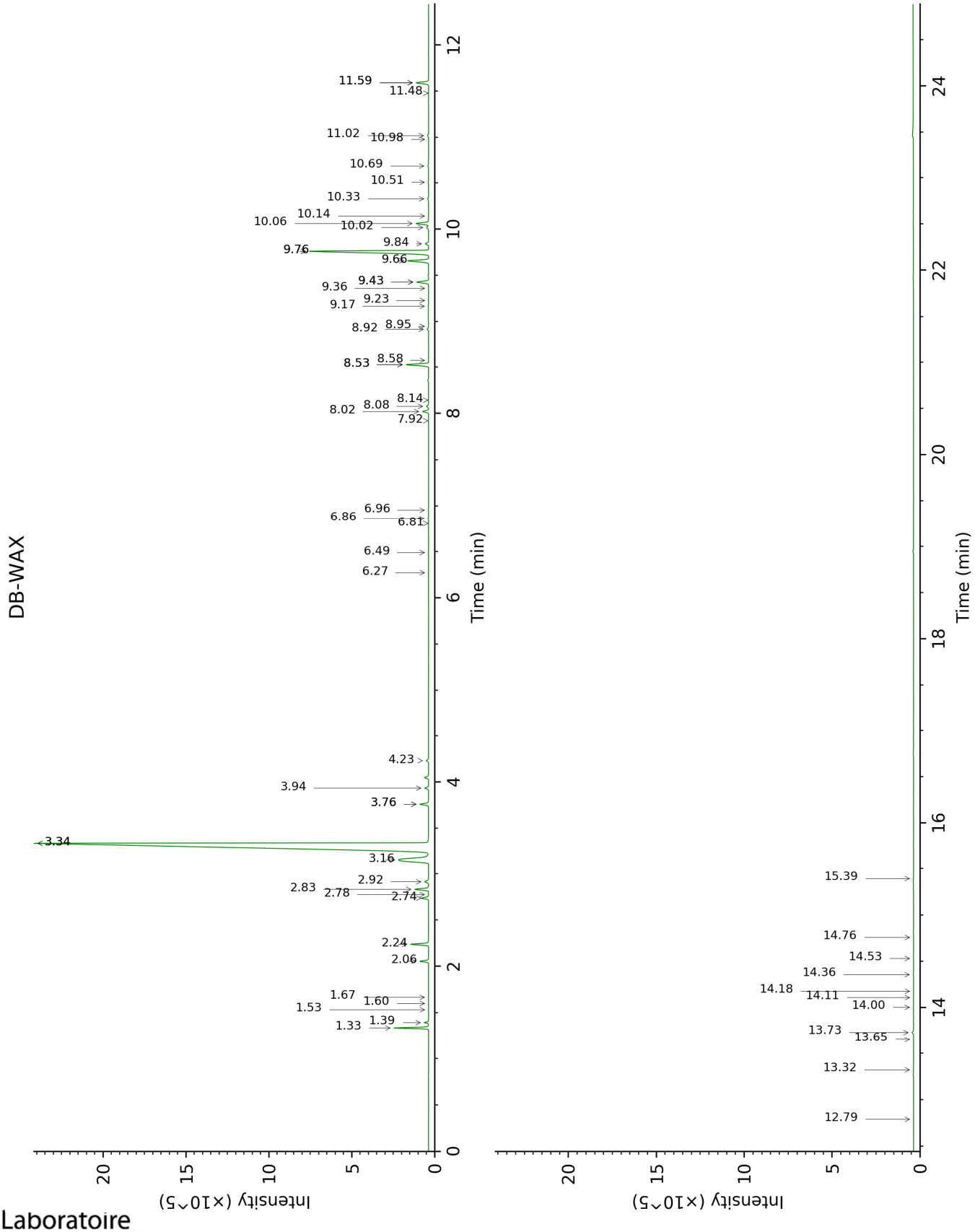

DB-5
12.35
12.43
12.03
11.33
10.84
10.55
10.28
9.96
10.01
9.90
9.79
9.48
9.37
9.25
8.69
8.45
8.39
8.23
8.18
8.05
7.91
7.77
7.62
7.67
7.49
7.28
7.16
7.04
7.08
6.93
6.86
6.78
6.59
6.62
6.46
6.33
6.20
6.28
6.14
5.91
5.65
5.55
5.41
5.16
5.07
4.95
4.84
4.69
4.54
4.28
4.08
3.94
3.86
3.83
3.61
3.20
3.01
2.94
Time (min)
Intensity (×10^5)
13.28
12.66
12.56
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
11.59
11.48
11.02
10.98
10.69
10.51
10.33
10.14
10.06
10.02
9.84
9.76
9.66
9.43
9.36
9.23
9.17
8.95
8.92
8.58
8.53
8.14
8.08
8.02
7.92
6.96
6.86
6.81
6.49
6.27
4.23
3.94
3.76
3.34
3.16
2.92
2.83
2.78
2.74
2.24
2.06
1.67
1.60
1.53
1.39
1.33
15.39
14.76
14.53
14.36
14.18
14.11
14.00
13.73
13.65
13.32
12.79

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Thujene	2.94	925	0.21	1.39	997	0.21
α-Pinene	3.01	930	1.71	1.34	989	1.68
Camphene	3.20*	942	0.03	1.67	1024	0.02
α-Fenchene	3.20*	942	[0.03]	1.60	1018	0.01
β-Pinene	3.61*	969	1.65	2.06	1063	0.54
Sabinene	3.61*	969	[1.65]	2.24	1081	1.09
trans-para-Menthane	3.83	984	0.01	1.53	1011	tr
Unknown [m/z 67, 68 (95), 43 (73), 94 (65), 79 (54), 41 (50)...]	3.86	986	0.03			
Myrcene	3.94*	992	0.96	2.83	1131	0.96
trans-Dehydroxylinalool oxide	3.94*	992	[0.96]	3.34*	1171	68.63
α-Phellandrene	4.08*	1000	0.53	2.74	1123	0.50
Pseudolimonene	4.08*	1000	[0.53]	2.78	1126	0.02
α-Terpinene	4.28	1013	0.31	2.92	1137	0.30
Limonene	4.54*	1030	74.20	3.16	1156	4.72
1,8-Cineole	4.54*	1030	[74.20]	3.34*	1171	[68.63]
(*Z*)-β-Ocimene	4.69	1039	0.03	3.76*	1203	0.61
(*E*)-β-Ocimene	4.84	1048	0.26	3.94	1216	0.26
γ-Terpinene	4.95	1056	0.59	3.76*	1203	[0.61]
cis-Sabinene hydrate	5.07	1063	0.02	6.86	1426	0.05
cis-Linalool oxide (fur.)	5.16	1069	0.02	6.49	1398	0.02
Terpinolene	5.41*	1084	0.19	4.23	1238	0.16
para-Cymenene	5.41*	1084	[0.19]	6.27	1382	0.02
trans-Sabinene hydrate	5.55	1094	0.02	7.92	1505	0.01
Linalool	5.65	1100	0.41	8.02	1513	0.42
cis-para-Menth-2-en-1-ol	5.91	1117	0.15	8.08	1517	0.16
trans-Pinocarveol	6.14	1132	0.01	9.23	1607	0.02
trans-para-Menth-2-en-1-ol	6.20	1136	0.10	8.92	1582	0.12
Isopulegol	6.28	1140	0.03	8.14	1522	0.02
meta-Mentha-4,6-dien-8-ol	6.34	1144	0.01	9.36	1617	0.01
Citronellal	6.46*	1152	0.05	6.96	1433	0.03
Nerol oxide	6.46*	1152	[0.05]	6.81	1422	0.01
Borneol	6.59	1161	0.02	9.76*†	1650	10.60
δ-Terpineol	6.62	1163	0.22	9.43*	1623	0.89
Terpinen-4-ol	6.78	1173	1.68	8.53*	1552	1.66
Cryptone	6.86	1178	0.02	9.17	1602	0.04
para-Cymen-8-ol	6.93	1183	0.02	11.48	1793	0.02

α-Terpineol	7.04	1190	10.36	9.76*†	1650	[10.60]
Myrtenol	7.08	1193	0.06			
cis-α-Phellandrene epoxide (IPP vs Me)	7.16	1198	0.01	10.98	1751	0.01
trans-Piperitol	7.28	1206	0.06	10.33	1696	0.08
exo-2-Hydroxycineole	7.48	1220	0.01	11.59*	1803	0.94
Nerol	7.62	1230	0.08	11.02	1754	0.10
Citronellol	7.67	1233	0.06	10.69	1726	0.07
Neral	7.77	1240	0.70	9.43*	1623	[0.89]
Piperitone	7.91	1249	0.26	9.84†	1656	[10.60]
Geraniol	8.05	1259	0.90	11.59*	1803	[0.94]
trans-Ascaridole glycol	8.18	1268	0.03	14.18	2039	0.01
Geranial	8.23	1272	0.96	10.06	1674	0.98
Unknown [m/z 94, 79 (78), 59 (59), 43 (25)...]	8.39	1282	0.01	14.53	2072	0.01
cis-Ascaridole glycol	8.45	1287	0.01	14.76	2094	0.01
Unknown [m/z 59, 94 (99), 79 (68), 43 (32), 97 (17)... 137 (8)...]	8.69	1303	0.01			
exo-2-Hydroxycineole acetate	9.25	1338	0.01	10.14	1681	0.02
α-Terpinyl acetate	9.37	1346	1.64	9.66	1642	1.64
Unknown [m/z 43, 95 (62), 107 (45), 110 (41), 55 (28), 67 (25)...]	9.48	1354	0.01	14.00	2022	0.02
Methyl (*E*)-cinnamate	9.79	1376	0.10	13.73	1996	0.12
Geranyl acetate	9.90	1384	0.04	10.51	1711	0.04
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	9.96	1388	0.01			
Unknown [m/z 79, 59 (80), 94 (49), 43 (41), 109 (30), 93 (25)...]	10.01	1392	0.02			
β-Caryophyllene	10.28	1411	0.08	8.53*	1552	[1.66]
Aromadendrene	10.56	1431	0.01	8.58	1556	0.02
allo-Aromadendrene	10.84	1453	0.02	8.95	1585	0.02
Bicyclogermacrene	11.33	1489	0.15	10.02	1671	0.17
α-Elemol	12.03	1544	0.03	14.11	2032	0.01
Spathulenol	12.35	1568	0.02	14.36	2056	0.03
Caryophyllene	12.43	1575	0.03	12.79	1909	0.01

oxide						
Cubeban-11-ol	12.56	1585	0.01	13.65	1988	0.01
Ledol	12.66	1593	0.02	13.32	1958	0.02
β-Eudesmol	13.28	1644	0.03	15.39	2158	0.02
Total identified		**99.15%**			**98.14%**	
Total reported		**99.23%**			**98.17%**	

*: 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

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