Date : 2024-12-13

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24K29-PTH03
Customer Identification : Pine - Hungary - P70112R
Type : Essential Oil
Source : *Pinus sylvestris*
Customer : Plant Therapy

Checked an approved by:

Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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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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 : Alexis St-Gelais, Ph. D., Chimiste 2013-174
Date : 2024-12-13

Physicochemical data

Refractive index : 1.4719 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-12-03

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
Santene	0.39	Normonoterpene
Tricyclene	0.43	Monoterpene
α-Thujene	0.02	Monoterpene
α-Pinene	34.74	Monoterpene
Camphene	3.61	Monoterpene
α-Fenchene	0.03	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.03	Monoterpene
Sabinene	0.03	Monoterpene
β-Pinene	14.30	Monoterpene
Unknown	0.06	Monoterpene
Myrcene	2.99	Monoterpene
2,7-Dimethyl-2,6-octadiene	0.06	Monoterpene
Pseudolimonene	0.19	Monoterpene
α-Phellandrene	0.08	Monoterpene
Δ3-Carene	13.53	Monoterpene
1,4-Cineole	0.11	Monoterpenic ether
α-Terpinene	0.41	Monoterpene
Carvomenthene	0.09	Aliphatic alcohol
para-Cymene	0.31	Monoterpene
β-Phellandrene	0.59	Monoterpene
Limonene	16.49	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	0.84	Monoterpene
Isoterpinolene	0.02	Monoterpene
Fenchone	0.01	Monoterpenic ketone
para-Cymenene	0.04	Monoterpene
Terpinolene	2.61	Monoterpene
α-Pinene oxide	0.06	Monoterpenic ether
Verbenol analog?	0.06	Monoterpenic alcohol
endo-Fenchol	0.02	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
Nopinone	0.02	Normonoterpenic ketone
cis-para-Mentha-2,8-dien-1-ol	0.05	Monoterpenic alcohol
trans-Pinocarveol	0.04	Monoterpenic alcohol
Camphor	0.04	Monoterpenic ketone
trans-Verbenol	0.02	Monoterpenic alcohol
Camphene hydrate	tr	Monoterpenic alcohol
Epoxyterpinolene	0.04	Monoterpenic ether
Isoborneol	0.02	Monoterpenic alcohol

Borneol	0.60	Monoterpenic alcohol
Terpinen-4-ol	0.39	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
α-Terpineol	0.44	Monoterpenic alcohol
Myrtenol	0.03	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
Unknown	0.03	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Thymol methyl ether	0.02	Monoterpenic ether
(7*Z*)-Undecen-2-one	0.01	Aliphatic ketone
Bornyl acetate	3.83	Monoterpenic ester
Unknown	0.02	Unknown
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
Longifolene	0.03	Sesquiterpene
β-Caryophyllene	1.04	Sesquiterpene
α-Humulene	0.11	Sesquiterpene
α-Muurolene	0.03	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
Caryophyllene oxide	0.04	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
α-Bisabolol	0.02	Sesquiterpenic alcohol
meta-Camphorene	0.15	Diterpene
para-Camphorene	0.06	Diterpene
Consolidated total	**99.47**	

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.

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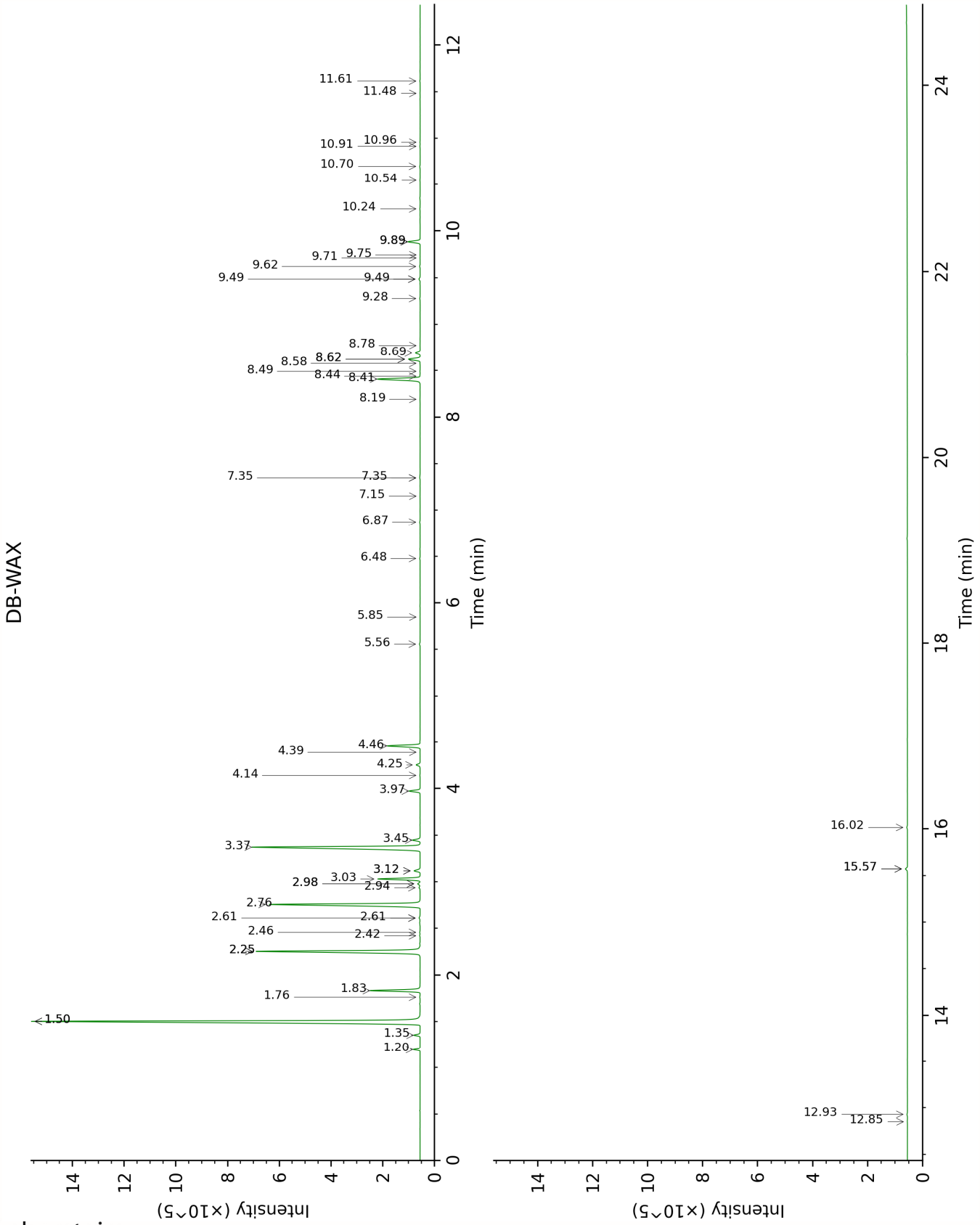

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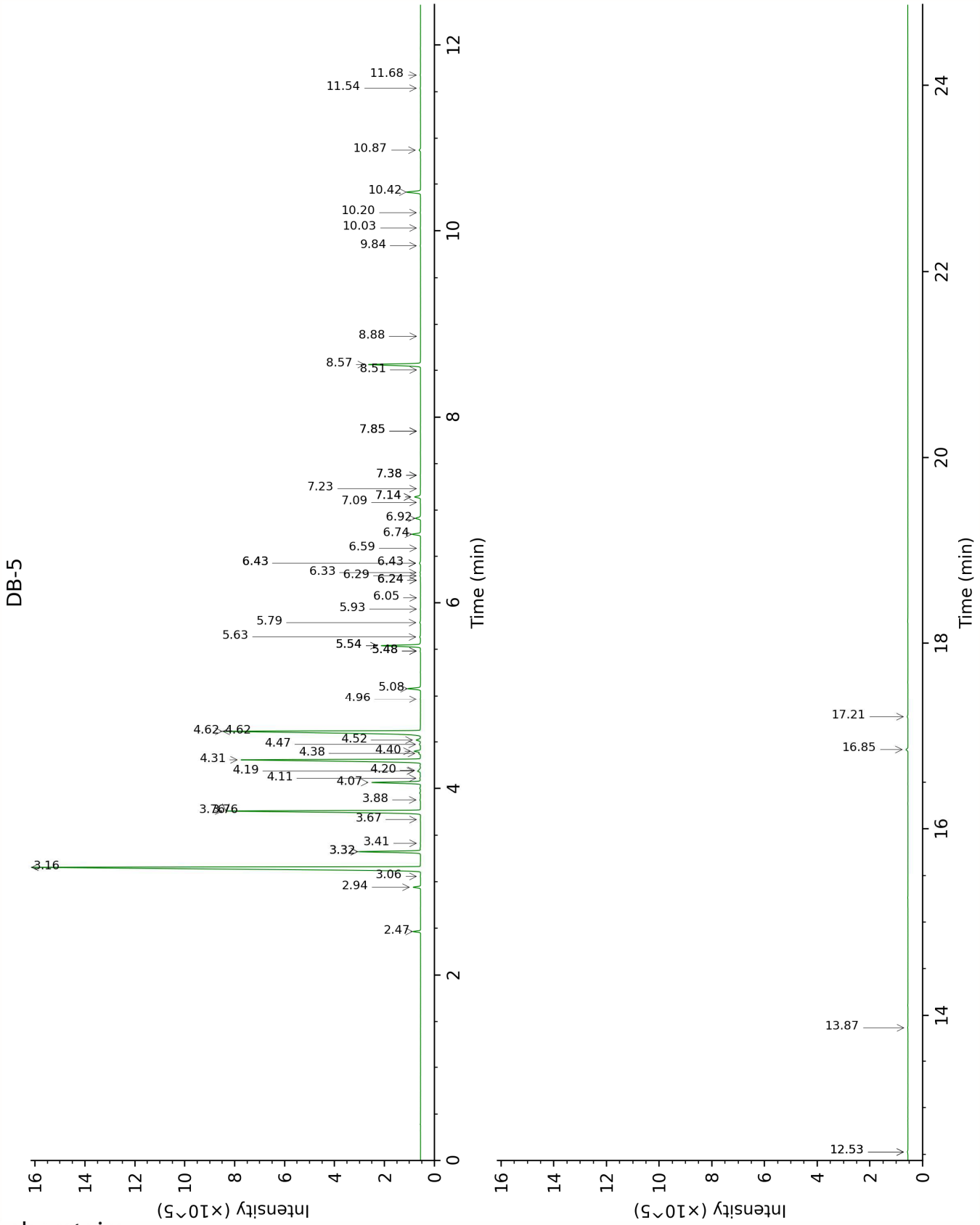
DB-5
Time (min)
Intensity (×10^5)
11.68
11.54
10.87
10.42
10.20
10.03
9.84
8.88
8.57
8.51
7.85
7.38
7.23
7.14
7.09
6.92
6.74
6.59
6.43
6.43
6.33
6.29
6.24
6.05
5.93
5.79
5.63
5.54
5.48
5.08
4.96
4.62
4.62
4.52
4.47
4.40
4.38
4.31
4.20
4.19
4.11
4.07
3.88
3.67
3.41
3.32
3.16
3.06
2.94
2.47
17.21
16.85
13.87
12.53

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Santene	1.20	950.9	0.40	2.47	883.2	0.39
Tricyclene	1.35	974.5	0.42	2.94	919.0	0.43
α-Thujene	1.50*	996.9	[34.66]	3.06	926.7	0.02
α-Pinene	1.50*	996.9	[34.66]	3.16	933.2	34.74
Camphene	1.83	1029.0	3.61	3.32*	944.3	[3.65]
α-Fenchene	1.76	1022.3	0.03	3.32*	944.3	[3.65]
Thuja-2,4(10)-diene	2.42	1085.1	0.03	3.41	950.3	0.02
3,7,7-Trimethylcyclohepta-1,3,5-triene	2.98*	1131.2	[0.19]	3.67	967.1	0.03
Sabinene	2.46	1088.6	0.03	3.76*	973.2	[14.33]
β-Pinene	2.25*	1069.1	[14.39]	3.76*	973.2	[14.33]
Unknown ORVU I [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	2.61*	1102.6	[0.10]	3.88	981.1	0.06
Myrcene	3.03	1135.2	3.04	4.07	993.5	2.99
2,7-Dimethyl-2,6-octadiene	2.25*	1069.1	[14.39]	4.11	996.5	0.06
Pseudolimonene	2.98*	1131.2	[0.19]	4.19*†	1001.6	[0.18]
α-Phellandrene	2.94	1127.9	0.08	4.20*†	1002.0	[0.10]
Δ3-Carene	2.76	1113.9	13.51	4.31	1009.3	13.53
1,4-Cineole	3.12*	1142.0	[0.50]	4.38	1013.6	0.11
α-Terpinene	3.12*	1142.0	[0.50]	4.40	1015.1	0.41
Carvomenthene	2.61*	1102.6	[0.10]	4.48	1019.7	0.09
para-Cymene	4.26	1230.0	0.33	4.52	1022.6	0.31
β-Phellandrene	3.45	1167.9	0.59	4.62*	1028.5	[17.07]
Limonene	3.37	1162.0	16.49	4.62*	1028.5	[17.07]
(*E*)-β-Ocimene	4.14	1221.6	0.03	4.96	1050.4	0.02
γ-Terpinene	3.97	1209.0	0.87	5.08	1057.7	0.84
Isoterpinolene	4.39	1240.2	0.02	5.48*	1083.0	[0.03]
Fenchone	5.85	1339.9	0.01	5.48*	1083.0	[0.03]
para-Cymenene	6.48	1385.3	0.04	5.54*	1086.7	[2.64]
Terpinolene	4.46	1245.3	2.61	5.54*	1086.7	[2.64]
α-Pinene oxide	5.56	1318.9	0.06	5.64	1092.5	0.06
Verbenol analog?				5.79	1102.2	0.06
endo-Fenchol	8.49	1536.9	0.02	5.93	1111.4	0.02
α-Campholenal	7.15	1435.3	0.01	6.06	1119.1	0.01
Nopinone	8.44	1532.8	0.02	6.24*	1131.1	[0.02]
cis-para-Mentha-2,8-dien-1-ol	9.62	1625.9	0.05	6.24*	1131.1	[0.02]
trans-Pinocarveol	9.28	1598.0	0.05	6.29	1134.2	0.04
Camphor	7.35*	1449.9	[0.06]	6.33	1136.5	0.04

trans-Verbenol	9.71	1633.2	0.02	6.43*	1142.9	[0.09]
Camphene hydrate	8.62*	1547.0	[1.04]	6.43*	1142.9	[0.09]
Epoxyterpinolene	6.87	1414.5	0.04	6.43*	1142.9	[0.09]
Isoborneol	9.49*	1614.9	[0.12]	6.59	1153.2	0.02
Borneol	9.89*	1647.3	[1.04]	6.74	1162.8	0.60
Terpinen-4-ol	8.69	1552.3	0.38	6.92	1174.2	0.39
para-Cymen-8-ol	11.61	1791.9	0.03	7.09	1185.1	0.03
Myrtenal	8.78	1558.9	0.02	7.14*	1188.9	[0.46]
α-Terpineol	9.89*	1647.3	[1.04]	7.14*	1188.9	[0.46]
Myrtenol	10.96	1736.2	0.02	7.23	1194.6	0.03
Verbenone	9.75	1636.0	0.02	7.38*	1203.7	[0.03]
Unknown PINI IV [m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)]	10.91	1732.4	0.03	7.38*	1203.7	[0.03]
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.48	1780.8	0.02	7.85*	1235.4	[0.02]
Thymol methyl ether	8.58	1543.6	0.02	7.85*	1235.4	[0.02]
(7*Z*)-Undecen-2-one				8.51	1279.4	0.01
Bornyl acetate	8.41	1530.4	3.88	8.57	1283.3	3.83
Unknown PIPO I [m/z 69, 41 (79), 91 (59), 92 (55), 79 (52), 107 (40)...]				8.88	1304.1	0.02
α-Copaene	7.35*	1449.9	[0.06]	9.84	1372.3	0.03
Geranyl acetate	10.70	1714.1	0.05	10.03	1385.8	0.03
Longifolene	8.19	1513.4	0.03	10.20	1397.3	0.03
β-Caryophyllene	8.62*	1547.0	[1.04]	10.42	1413.3	1.04
α-Humulene	9.49*	1614.9	[0.12]	10.87	1447.4	0.11
α-Muurolene	10.24	1675.9	0.04	11.54	1496.9	0.03
γ-Cadinene	10.54	1701.0	0.02	11.68	1507.5	0.03
Caryophyllene oxide	12.93	1908.9	0.04	12.53*	1574.1	[0.05]
Caryophyllene oxide isomer	12.85	1901.5	0.01	12.53*	1574.1	[0.05]
α-Bisabolol	15.57*	2162.1	[0.19]	13.87	1683.5	0.02
meta-Camphorene	15.57*	2162.1	[0.19]	16.85	1950.2	0.15
para-Camphorene	16.02	2206.9	0.06	17.21	1983.7	0.06
Total reported		99.38%			99.42%	

*: 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

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