PhytoChemia

Date : 2026-11-09

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 26J06-PTH03
Customer Identification : Cardamom - India – CA3117
Type : Essential Oil
Source : *Elettaria cardamomum*
Customer : Plant Therapy

Checked and 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The compliance status of the sample is provided to facilitate the reading of the report. The client remains ultimately responsible for reviewing the results presented within this report and to establish compliance of the tested batch against relevant quality criteria.

This report is an update from the first version issued on 2026-10-07 to correct the customer identification.

Méthode certifiée ISO 17025:2017 Certified Method

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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 : Jean-Christophe Fortin, M. Sc.
Date : 2026-10-07

Physicochemical data

Physical aspect : Faintly yellow liquid
Analyst : Cindy Caron B. Sc.
Date : 2026-10-07

Refractive index : 1.4643 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2026-10-07

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
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Hexanal	0.01	Aliphatic aldehyde
Isoamyl acetate	tr	Aliphatic ester
2-Methylbutyl acetate	tr	Aliphatic ester
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.35	Monoterpene
α-Pinene	2.11	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.04	Monoterpene
β-Pinene	0.78	Monoterpene
Sabinene	4.11	Monoterpene
6-Methyl-5-hepten-2-one	0.05	Aliphatic ketone
Methyl 2-hydroxy-3-methylvalerate	0.01	Aliphatic ester
Myrcene	2.06	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.09	Aliphatic aldehyde
Δ3-Carene	0.04	Monoterpene
α-Terpinene	0.48	Monoterpene
para-Cymene	0.25	Monoterpene
Limonene	5.31	Monoterpene
1,8-Cineole	32.24	Monoterpenic ether
(*Z*)-β-Ocimene	0.03	Monoterpene
(*E*)-β-Ocimene	0.07	Monoterpene
γ-Terpinene	0.86	Monoterpene
cis-Sabinene hydrate	0.29	Monoterpenic alcohol
Octanol	0.05	Aliphatic alcohol
Terpinolene	0.38	Monoterpene
trans-Sabinene hydrate	0.20	Monoterpenic alcohol
6,7-Epoxymyrcene	0.03	Monoterpenic ether
Linalool	0.38	Monoterpenic alcohol
cis-*para*-Menth-2-en-1-ol	0.07	Monoterpenic alcohol
(*E*)-4,8-Dimethylnona-1,3,7-triene	0.18	Terpene derivative
trans-*para*-Menth-2-en-1-ol	0.04	Monoterpenic alcohol

Borneol	0.08	Monoterpenic alcohol
δ-Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	1.44	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	1.47	Monoterpenic alcohol
cis-Piperitol	0.02	Monoterpenic alcohol
(4*Z*)-Decenal	0.05	Aliphatic aldehyde
trans-Piperitol	0.02	Monoterpenic alcohol
Decanal	0.04	Aliphatic aldehyde
Octyl acetate	0.07	Aliphatic ester
cis-Sabinene hydrate acetate?	0.01	Monoterpenic ester
cis-Carveol	0.03	Monoterpenic alcohol
Unknown	0.01	Unknown
Neral	0.16	Monoterpenic aldehyde
Geraniol	0.85	Monoterpenic alcohol
Linalyl acetate	0.70	Monoterpenic ester
(2*E*)-Decenal	0.02	Aliphatic aldehyde
Geranial	0.20	Monoterpenic aldehyde
Bornyl acetate	0.03	Monoterpenic ester
Terpinen-4-yl acetate	0.06	Monoterpenic ester
Geranyl formate	0.02	Monoterpenic ester
δ-Terpinyl acetate	0.18	Monoterpenic ester
Methyl geranate	0.17	Monoterpenic ester
δ-Elemene	0.02	Sesquiterpene
α-Terpinyl acetate	39.03	Monoterpenic ester
Neryl acetate	0.02	Monoterpenic ester
α-Copaene	0.05	Sesquiterpene
Geranyl acetate	0.56	Monoterpenic ester
Decenyl acetate isomer II?	0.06	Aliphatic ester
β-Elemene	0.17	Sesquiterpene
β-Caryophyllene	0.04	Sesquiterpene
α-Terpinyl propionate	0.12	Monoterpenic ester
α-Humulene	0.02	Sesquiterpene
Geranylacetone	0.02	Monoterpenic ketone
8-Acetoxy-*trans*-*para*-Menth-2-en-1-ol [2-(4-Hydroxy-4-methylcyclohex-2-enyl)propan-2-yl acetate]	0.01	Monoterpenic ester
Germacrene D	0.02	Sesquiterpene
Geranyl propionate	0.03	Monoterpenic ester
β-Selinene	0.74	Sesquiterpene
α-Selinene	0.25	Sesquiterpene

δ-Amorphene	0.02	Sesquiterpene
γ-Cadinene	0.15	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
Germacrene B	0.05	Sesquiterpene
(*E*)-Nerolidol	0.80	Sesquiterpenic alcohol
Dendrolasin	0.01	Sesquiterpenic ether
(3*E*,7*E*)-4,8,12-Trimethyl-1,3,7,11-tridecatetraene	0.07	Terpene derivative
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Unknown	0.01	Oxygenated sesquiterpene
(2*E*,6*Z*)-Farnesal	0.01	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesol	0.08	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesal	0.02	Sesquiterpenic aldehyde
γ-Bicyclohomofarnesal	0.02	Terpenic aldehyde
(2*E*,6*E*)-Farnesyl acetate	0.03	Sesquiterpenic ester
Coronarin E	0.15	Diterpene
Consolidated total	99.00	

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

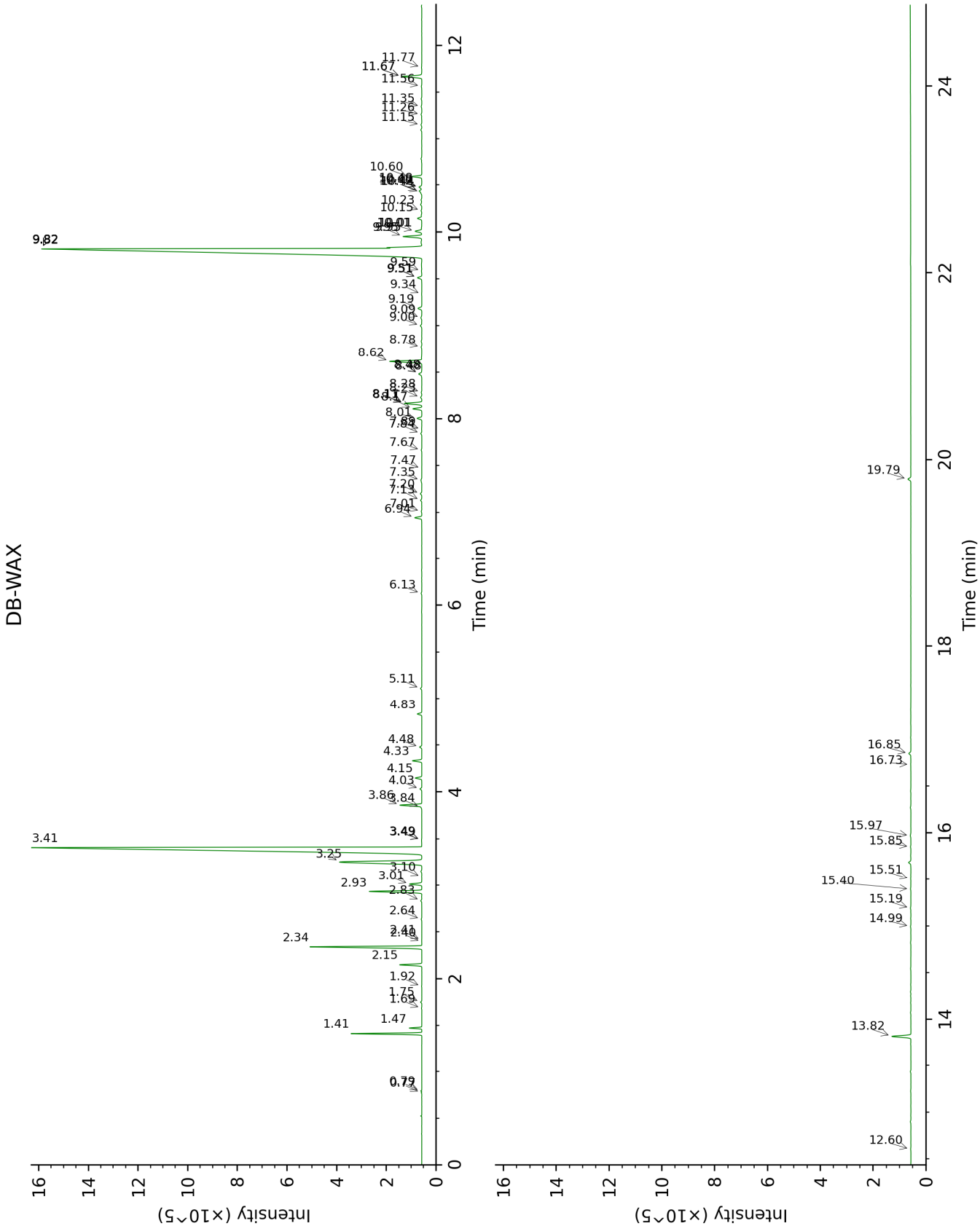
Note: no correction factor was applied

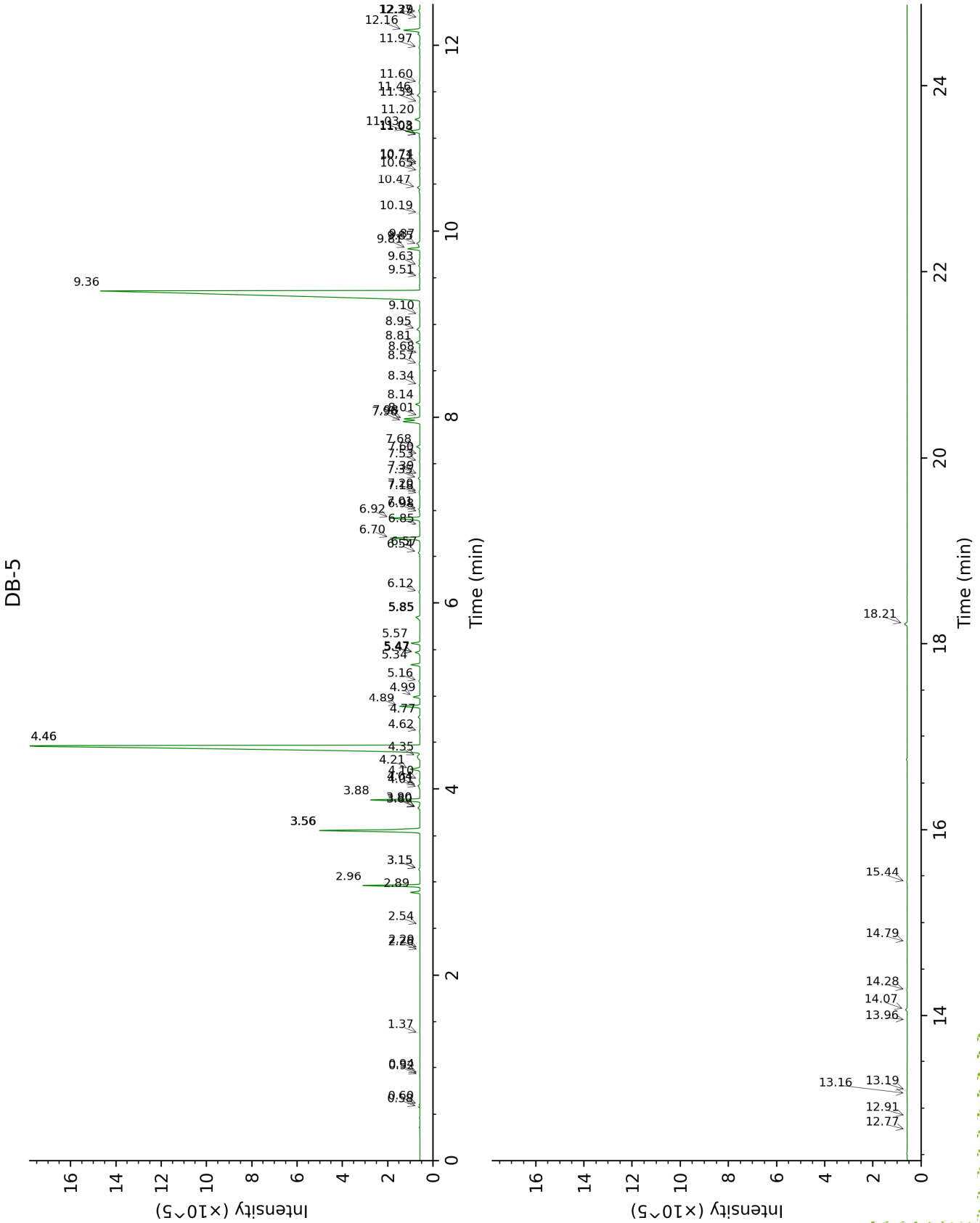
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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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DB-WAX
Intensity (×10^5)
Time (min)
9.82
3.41
3.25
2.34
2.93
1.41
19.79
16.85
16.73
15.97
15.85
15.51
15.40
15.19
14.99
13.82
12.60


DB-5
Time (min)
Intensity (×10^5)
4.46
9.36
3.88
3.56
2.96
18.21
15.44
14.79
14.28
14.07
13.96
13.19
13.16
12.91
12.77

Full analysis data

Isovaleral	Column DB-WAX			Column DB-5		
	0.79	886.9	0.02	0.58	643.1	0.02
2-Methylbutyral	0.77	880.5	0.01	0.60	653.2	0.01
Isoamyl alcohol	3.49*	1177.6	[0.01]	0.92	732.6	0.01
2-Methylbutanol	3.49*	1177.6	[0.01]	0.94	735.2	0.01
Hexanal	1.92	1043.0	0.01	1.37	800.5	0.01
Isoamyl acetate	2.41	1091.6	tr	2.26	878.6	tr
2-Methylbutyl acetate	2.40	1089.7	tr	2.29	880.8	tr
Heptanal	3.10	1146.3	0.01	2.54	902.2	0.01
α-Thujene	1.47	999.7	0.35	2.89	926.2	0.35
α-Pinene	1.41	991.5	2.10	2.96	931.1	2.11
α-Fenchene	1.69	1020.3	0.01	3.15*	943.4	[0.05]
Camphene	1.75	1026.7	0.04	3.15*	943.4	[0.05]
β-Pinene	2.15	1065.7	0.78	3.56*	971.2	[4.93]
Sabinene	2.34	1084.5	4.11	3.56*	971.2	[4.93]
6-Methyl-5-hepten-2-one	5.11	1298.9	0.05	3.80*	987.4	[0.11]
Methyl 2-hydroxy-3-methylvalerate	7.47	1467.2	0.01	3.80*	987.4	[0.11]
Myrcene	2.93	1133.6	1.99	3.88	993.3	2.06
α-Phellandrene	2.83	1125.7	0.04	4.02	1002.1	0.04
Octanal	4.48	1252.0	0.08	4.04	1003.5	0.09
Δ3-Carene	2.64	1110.2	0.03	4.10	1007.6	0.04
α-Terpinene	3.01	1139.8	0.48	4.21	1014.8	0.48
para-Cymene	4.15	1227.5	0.26	4.35	1023.3	0.25
Limonene	3.26	1158.9	5.31	4.46*	1030.7	[37.43]
1,8-Cineole	3.41	1171.0	32.24	4.46*	1030.7	[37.43]
(*Z*)-β-Ocimene	3.84	1204.6	0.02	4.62	1040.6	0.03
(*E*)-β-Ocimene	4.03	1219.0	0.07	4.77	1050.2	0.07
γ-Terpinene	3.86	1206.3	0.85	4.89	1057.5	0.86
cis-Sabinene hydrate	6.94	1428.2	0.29	4.99	1064.4	0.29
Octanol	8.23	1524.4	0.06	5.16	1075.2	0.05
Terpinolene	4.33	1241.2	0.37	5.34	1086.4	0.38
trans-Sabinene hydrate	8.01	1507.2	0.20	5.47*	1094.8	[0.23]
6,7-Epoxymyrcene	6.13	1368.7	0.03	5.47*	1094.8	[0.23]
Linalool	8.11	1515.2	0.37	5.57	1101.1	0.38

cis-*para*-Menth-2-en-1-ol	8.17*	1519.6	[0.76]	5.85*	1119.1	[0.25]
(*E*)-4,8-Dimethylnona-1,3,7-triene	4.83	1278.2	0.18	5.85*	1119.1	[0.25]
trans-*para*-Menth-2-en-1-ol	9.00	1584.3	0.07	6.12	1136.7	0.04
Borneol	9.82*	1649.8	[40.58]	6.54	1164.0	0.08
δ-Terpineol	9.51*	1625.1	[0.21]	6.57	1166.0	0.01
Terpinen-4-ol	8.62	1554.4	1.41	6.70	1174.3	1.44
para-Cymen-8-ol	11.56	1795.3	0.03	6.85	1184.0	0.01
α-Terpineol	9.82*	1649.8	[40.58]	6.92	1188.7	1.47
cis-Piperitol	9.58	1630.8	0.02	6.98	1192.9	0.02
(4*Z*)-Decenal	7.84	1494.7	0.05	7.01	1194.9	0.05
trans-Piperitol	10.42	1698.7	0.04	7.18	1205.6	0.02
Decanal	7.35	1458.0	0.04	7.20	1207.3	0.04
Octyl acetate	7.13	1441.9	0.05	7.35	1217.0	0.07
cis-Sabinene hydrate acetate?	7.67	1481.7	0.03	7.39	1219.8	0.01
cis-Carveol	11.76	1813.1	0.01	7.53	1229.4	0.03
Unknown MISC III [m/z 43, 71 (64), 68 (54), 81 (49), 93 (34), 121 (33)...]	7.89	1498.2	0.01	7.60	1234.5	0.01
Neral	9.51*	1625.1	[0.21]	7.68	1240.2	0.16
Geraniol	11.67*	1804.5	[0.89]	7.96	1258.7	0.85
Linalyl acetate	8.17*	1519.6	[0.76]	7.98	1260.7	0.70
(2*E*)-Decenal	9.09	1590.8	0.06	8.01	1262.6	0.02
Geranial	10.15	1676.2	0.19	8.14	1271.4	0.20
Bornyl acetate	8.28	1528.7	0.03	8.34	1285.3	0.03
Terpinen-4-yl acetate	8.78	1566.7	0.04	8.57	1300.8	0.06
Geranyl formate	9.95*	1660.5	[0.78]	8.68	1305.3	0.02
δ-Terpinyl acetate	9.19	1598.7	0.19	8.81	1314.5	0.18
Methyl geranate	9.82*	1649.8	[40.58]	8.95	1324.3	0.17
δ-Elemene	7.01	1433.2	0.03	9.10	1335.2	0.02
α-Terpinyl acetate	9.82*	1649.8	[40.58]	9.36	1353.6	39.03
Neryl acetate	10.23	1682.7	0.03	9.51	1364.5	0.02
α-Copaene	7.20	1447.1	0.06	9.63	1372.8	0.05
Geranyl acetate	10.60	1713.3	0.57	9.81	1385.7	0.56
Decenyl acetate				9.85	1388.7	0.06

isomer II?						
β-Elemene	8.48*	1544.0	[0.17]	9.87	1389.7	0.17
β-Caryophyllene	8.48*	1544.0	[0.17]	10.19	1413.3	0.04
α-Terpinyl propionate	10.44	1699.9	0.12	10.47	1433.8	0.12
α-Humulene	9.34	1610.9	0.02	10.65	1447.8	0.02
Geranylacetone	11.67*	1804.5	[0.89]	10.72	1452.5	0.02
8-Acetoxy-*trans*-*para*-Menth-2-en-1-ol [2-(4-Hydroxy-4-methylcyclohex-2-enyl)propan-2-yl acetate]	15.19	2132.6	0.03	10.74	1454.2	0.01
Germacrene D	9.82*	1649.8	[40.58]	11.03*	1476.3	[0.06]
Geranyl propionate	11.35	1777.0	0.03	11.03*	1476.3	[0.06]
β-Selinene	9.95*	1660.5	[0.78]	11.08	1479.8	0.74
α-Selinene	10.01*	1665.1	[0.31]	11.20	1489.2	0.25
δ-Amorphene	10.01*	1665.1	[0.31]	11.39	1502.9	0.02
γ-Cadinene	10.48*	1703.4	[0.14]	11.46	1508.9	0.15
δ-Cadinene	10.48*	1703.4	[0.14]	11.60	1519.8	0.05
Germacrene B	11.15	1760.4	0.04	11.98	1549.3	0.05
(*E*)-Nerolidol	13.82	1999.4	0.83	12.16	1564.1	0.80
Dendrolasin	12.60	1887.1	0.02	12.29	1574.3	0.01
(3*E*,7*E*)-4,8,12-Trimethyl-1,3,7,11-tridecatetraene	11.26	1769.9	0.04	12.37	1580.6	0.07
Unknown SWGL V [m/z 81, 43 (52), 161 (49), 105 (30), 207 (27), 95 (26), 93 (24), 109 (24)...]	14.99	2112.9	0.02	12.77	1612.4	0.02
Unknown ELCA II [m/z 43, 71 (53), 108 (47), 126 (41), 109 (35), 93 (25)...]				12.92	1624.5	0.01
Unknown ELCA III [m/z 43, 135 (59), 94 (33), 59 (25), 137 (25), 93 (19)...]				13.16	1644.8	0.02
Unknown JUVI XVI [m/z 43, 81 (84), 41	15.50	2164.1	0.01	13.19	1647.7	0.01

(64), 67 (62), 95 (58), 79 (58)... 204 (48), 220 (2)]						
(2*E*,6*Z*)-Farnesal	15.40	2153.2	0.02	13.96	1711.5	0.01
(2*E*,6*E*)-Farnesol	16.85	2302.7	0.10	14.07	1720.9	0.08
(2*E*,6*E*)-Farnesal	15.85	2199.2	0.02	14.28	1739.3	0.02
γ-Bicyclohomofarnesal	16.73	2289.8	0.01	14.79	1784.2	0.02
(2*E*,6*E*)-Farnesyl acetate	15.97	2211.5	0.04	15.44	1841.8	0.03
Coronarin E	19.79	2635.3	0.14	18.21	2107.8	0.15
Total reported		98.68%			98.95%	

*: 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