

Date : 2025-12-03

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25L01-PTH01

Customer Identification : Cardamom - India - CA3113R

Type : Essential Oil

Source : *Elettaria cardamomum*

Customer : Plant Therapy

Checked and approved by:

Sylvain Mercier, M. Sc., Chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005

Date : 2025-12-02

PHYSICOCHEMICAL DATA

Refractive index : 1.4639 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2025-12-01

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	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Hexanal	tr	Aliphatic aldehyde
α -Thujene	0.11	Monoterpene
α -Pinene	1.46	Monoterpene
Camphene	0.03	Monoterpene
α -Fenchene	tr	Monoterpene
β -Pinene	0.59	Monoterpene
Sabinene	2.43	Monoterpene
6-Methyl-5-hepten-2-one	0.04	Aliphatic ketone
Myrcene	0.65	Monoterpene
α -Phellandrene	0.06	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.02	Aliphatic aldehyde
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.14	Monoterpene
<i>para</i> -Cymene	0.36	Monoterpene
Limonene	7.47	Monoterpene
1,8-Cineole	31.99	Monoterpenic ether
(Z)- β -Ocimene	0.03	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	0.27	Monoterpene
<i>cis</i> -Sabinene hydrate	0.08	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.11	Monoterpene
<i>trans</i> -Sabinene hydrate	0.07	Monoterpenic alcohol
Linalool	5.42	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
(E)-4,8-Dimethylnona-1,3,7-triene	0.04	Terpene derivative
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans-para</i> -Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	0.07	Monoterpenic ketone
Borneol	0.02	Monoterpenic alcohol
δ -Terpineol	0.05	Monoterpenic alcohol
Terpinen-4-ol	1.59	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	4.19	Monoterpenic alcohol

Myrtenal	0.01	Monoterpenic aldehyde
cis-Piperitol	0.01	Monoterpenic alcohol
γ-Terpineol	0.03	Monoterpenic alcohol
trans-Piperitol	0.01	Monoterpenic alcohol
Decanal	0.01	Aliphatic aldehyde
cis-Carveol	0.01	Monoterpenic alcohol
Nerol	0.03	Monoterpenic alcohol
Unknown	0.01	Unknown
Neral	0.09	Monoterpenic aldehyde
Geraniol	0.24	Monoterpenic alcohol
(2E)-Decenal	0.01	Aliphatic aldehyde
Linalyl acetate	3.81	Monoterpenic ester
Geranial	0.10	Monoterpenic aldehyde
Bornyl acetate	0.01	Monoterpenic ester
Safrole	0.04	Phenylpropanoid
2-Undecanone	0.01	Aliphatic ketone
Terpinen-4-yl acetate	0.04	Monoterpenic ester
δ-Terpinyl acetate	0.14	Monoterpenic ester
Methyl geranate	0.05	Monoterpenic ester
δ-Elemene	0.01	Sesquiterpene
α-Terpinyl acetate	35.19	Monoterpenic ester
Neryl acetate	0.02	Monoterpenic ester
α-Copaene	0.03	Sesquiterpene
Methyl (E)-cinnamate	0.02	Phenylpropanoid ester
Geranyl acetate	0.20	Monoterpenic ester
Decenyl acetate isomer II?	0.02	Aliphatic ester
β-Elemene	0.04	Sesquiterpene
β-Caryophyllene	0.14	Sesquiterpene
α-Terpinyl propionate	0.03	Monoterpenic ester
α-Humulene	0.04	Sesquiterpene
Unknown	0.01	Sesquiterpene
Geranylacetone	0.02	Monoterpenic ketone
Geranyl propionate	tr	Monoterpenic ester
Germacrene D	0.03	Sesquiterpene
β-Selinene	0.13	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
Unknown	0.01	Unknown
γ-Cadinene	0.02	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
δ-Cadinene	0.03	Sesquiterpene
Germacrene B	0.04	Sesquiterpene
8-Acetoxy-carvotanacetone	0.04	Monoterpenic ester
(E)-Nerolidol	1.22	Sesquiterpenic alcohol
Unknown	0.03	Unknown
Humulene epoxide II	0.01	Sesquiterpenic ether

Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
(2E,6Z)-Farnesal	0.01	Sesquiterpenic aldehyde
(2E,6E)-Farnesol	0.02	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.01	Sesquiterpenic aldehyde
(2E,6E)-Farnesyl acetate	0.01	Sesquiterpenic ester
Coronarlin E	0.03	Diterpene
Consolidated total	99.69	

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

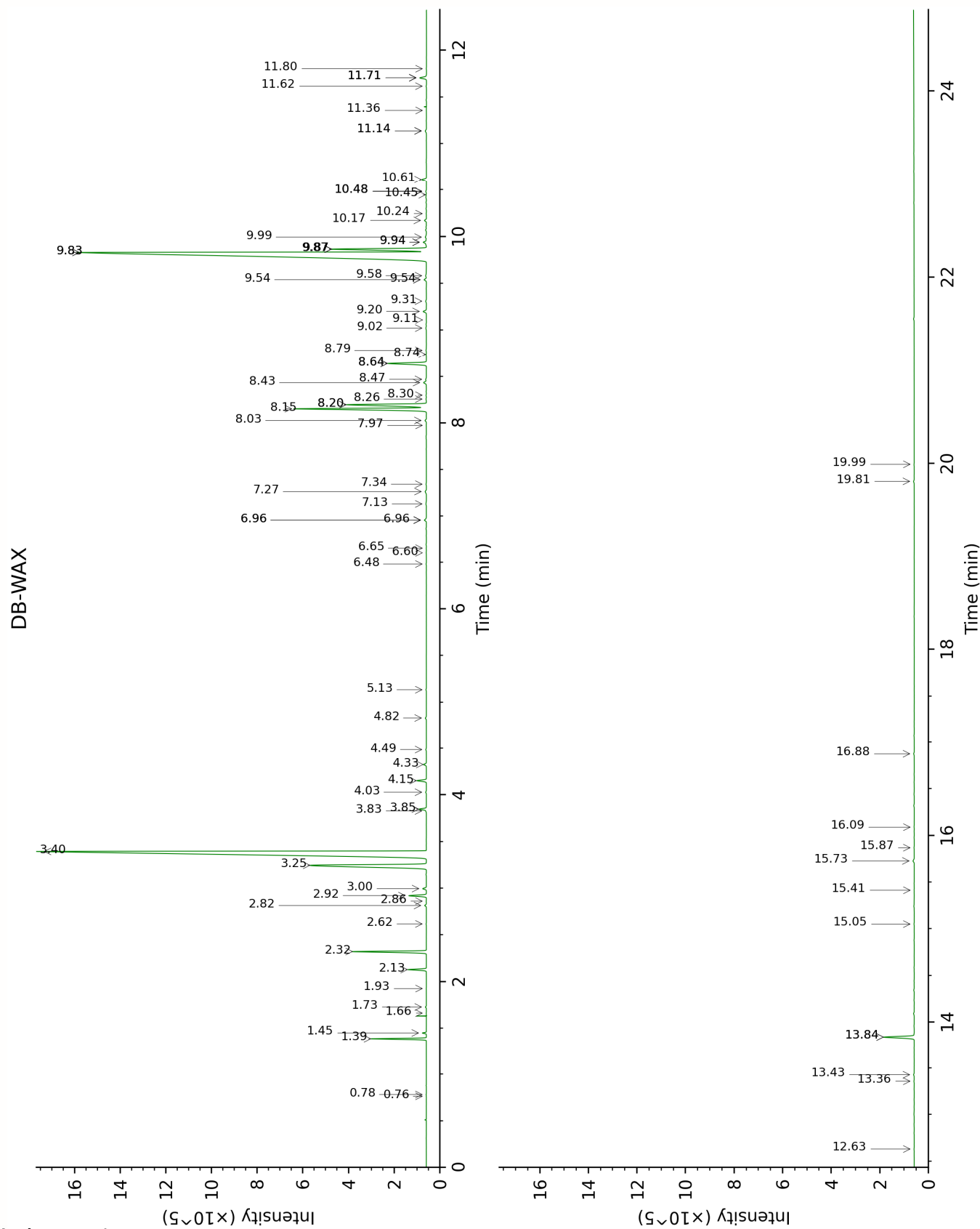
Note: no correction factor was applied

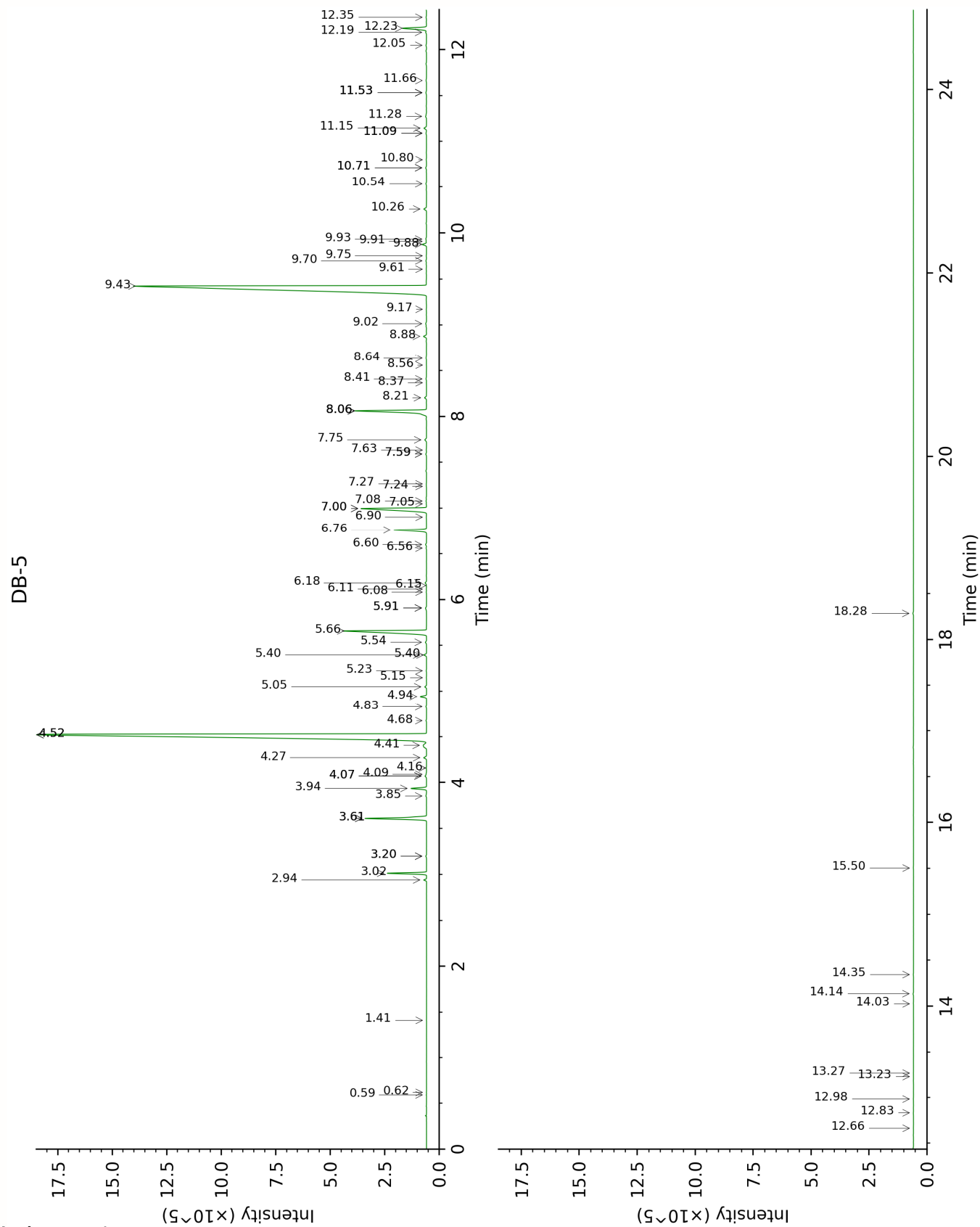
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.78	887.4	tr	0.59	642.9	tr
2-Methylbutyral	0.76	880.3	tr	0.62	653.0	tr
Hexanal	1.93	1044.4	tr	1.41	800.6	tr
α -Thujene	1.45	996.9	0.10	2.94	926.2	0.11
α -Pinene	1.39	989.5	1.44	3.02	931.1	1.46
Camphene	1.73	1024.6	0.03	3.20*	943.6	[0.04]
α -Fenchene	1.66	1018.1	tr	3.20*	943.6	[0.04]
β -Pinene	2.13	1064.7	0.59	3.61*	971.2	[3.05]
Sabinene	2.32	1084.0	2.43	3.61*	971.2	[3.05]
6-Methyl-5-hepten-2-one	5.14	1299.5	0.02	3.86	987.6	0.04
Myrcene	2.92	1133.1	0.62	3.94	993.2	0.65
α -Phellandrene	2.82	1124.8	0.06	4.07*	1002.3	[0.08]
Pseudolimonene	2.86	1128.4	0.01	4.07*	1002.3	[0.08]
Octanal	4.49	1251.7	0.02	4.09	1003.5	0.02
Δ^3 -Carene	2.62	1109.2	0.01	4.16	1007.9	0.02
α -Terpinene	3.00	1139.0	0.14	4.27	1015.1	0.14
<i>para</i> -Cymene	4.15	1227.4	0.35	4.41	1023.6	0.36
Limonene	3.25	1158.6	7.47	4.52*	1030.9	[39.16]
1,8-Cineole	3.40	1170.3	31.99	4.52*	1030.9	[39.16]
(Z)- β -Ocimene	3.83	1203.7	0.02	4.68	1040.7	0.03
(E)- β -Ocimene	4.03	1218.3	0.03	4.83	1050.4	0.03
γ -Terpinene	3.85	1205.1	0.27	4.94	1057.7	0.27
<i>cis</i> -Sabinene hydrate	6.96*	1429.6	[0.09]	5.05	1064.5	0.08
<i>cis</i> -Linalool oxide (fur.)	6.60	1403.4	0.01	5.15	1070.8	0.01
Octanol	8.26	1525.8	0.02	5.23	1075.7	0.02
<i>trans</i> -Linalool oxide (fur.)	6.96*	1429.6	[0.09]	5.40*	1086.6	[0.12]
Terpinolene	4.33	1240.1	0.11	5.40*	1086.6	[0.12]
<i>trans</i> -Sabinene hydrate	8.03	1508.4	0.06	5.54	1095.4	0.07
Linalool	8.15†	1518.0	5.45	5.66	1103.3	5.42
<i>cis-para</i> -Menth-2-en-1-ol	8.20*†	1521.3	[3.74]	5.91*	1119.5	[0.07]
(E)-4,8-Dimethylnona-1,3,7-triene	4.82	1276.4	0.04	5.91*	1119.5	[0.07]
<i>cis</i> -Limonene oxide	6.48	1394.7	0.01	6.08	1130.6	0.01
<i>trans</i> -Limonene oxide	6.65	1407.1	0.01	6.11	1132.8	0.01
<i>trans-para</i> -Menth-2-en-1-ol	9.02	1584.4	0.03	6.15	1135.3	0.01
Camphor	7.27	1452.0	0.07	6.18	1137.2	0.07
Borneol	9.87*	1651.6	[4.17]	6.56	1161.8	0.02
δ -Terpineol	9.54*	1625.5	[0.11]	6.60	1164.3	0.05
Terpinen-4-ol	8.64*	1555.1	[1.59]	6.76	1174.9	1.59
<i>para</i> -Cymen-8-ol	11.62	1797.1	0.02	6.90	1184.1	0.02
α -Terpineol	9.87*	1651.6	[4.17]	7.00*	1190.3	[4.21]

Myrtenal	8.74	1562.9	0.01	7.00*	1190.3	[4.21]
cis-Piperitol	9.58	1628.9	0.06	7.05	1193.6	0.01
γ-Terpineol	9.94*	1657.5	[0.17]	7.08	1195.6	0.03
trans-Piperitol	10.48*	1701.6	[0.03]	7.24	1206.0	0.01
Decanal	7.34	1457.8	0.02	7.27	1207.9	0.01
cis-Carveol	11.80	1813.4	0.01	7.59*	1230.0	[0.04]
Nerol	11.14*	1756.4	[0.07]	7.59*	1230.0	[0.04]
Unknown MISC III [m/z 43, 71 (64), 68 (54), 81 (49), 93 (34), 121 (33)...]	7.98	1504.3	0.01	7.64	1232.9	0.01
Neral	9.54*	1625.5	[0.11]	7.75	1240.5	0.09
Geraniol	11.71*	1804.9	[0.29]	8.06*	1262.1	[4.06]
(2E)-Decenal	9.11	1591.1	0.01	8.06*	1262.1	[4.06]
Linalyl acetate	8.20*†	1521.3	[3.74]	8.06*	1262.1	[4.06]
Geranial	10.17	1676.1	0.08	8.20	1271.9	0.10
Bornyl acetate	8.30	1529.0	0.02	8.37	1283.1	0.01
Safrole	11.71*	1804.9	[0.29]	8.41	1285.9	0.04
2-Undecanone	8.64*	1555.1	[1.59]	8.56	1296.2	0.01
Terpinen-4-yl acetate	8.78	1566.2	0.03	8.64	1301.6	0.04
δ-Terpinyl acetate	9.20	1598.4	0.14	8.88	1315.3	0.14
Methyl geranate	9.83*	1648.8	[35.03]	9.02	1325.1	0.05
δ-Elementene	6.96*	1429.6	[0.09]	9.17	1336.2	0.01
α-Terpinyl acetate	9.83*	1648.8	[35.03]	9.42	1354.1	35.19
Neryl acetate	10.24	1682.0	0.01	9.61	1367.1	0.02
α-Copaene	7.13	1442.3	0.03	9.70	1373.6	0.03
Methyl (E)-cinnamate	13.84*	1997.3	[1.23]	9.75	1377.4	0.02
Geranyl acetate	10.61	1712.6	0.20	9.88	1386.2	0.20
Decenyl acetate isomer II?				9.91	1388.5	0.02
β-Elementene	8.47	1542.0	0.04	9.93	1390.3	0.04
β-Caryophyllene	8.43	1539.3	0.13	10.26	1413.9	0.14
α-Terpinyl propionate	10.48*	1701.6	[0.03]	10.54	1434.6	0.03
α-Humulene	9.31	1607.2	0.04	10.71*	1448.1	[0.05]
Unknown ELCA I [m/z 43, 109 (35), 96 (23), 93 (22), 137 (21), 81 (20)...204 (5)]				10.71*	1448.1	[0.05]
Geranylacetone	11.71*	1804.9	[0.29]	10.80	1454.6	0.02
Geranyl propionate	11.36	1774.8	tr	11.09*	1476.3	[0.04]
Germacrene D	9.87*	1651.6	[4.17]	11.09*	1476.3	[0.04]
β-Selinene	9.94*	1657.5	[0.17]	11.15	1480.4	0.13
α-Selinene	9.99	1661.9	0.06	11.28	1490.1	0.07
Unknown ELCA IX [m/z 43, 152 (64), 59 (30), 69 (28), 112 (26), 109 (25),				11.53*	1509.6	[0.04]

11 (22)...						
γ-Cadinene	10.45	1698.5	0.02	11.53*	1509.6	[0.04]
Cubebol	12.63	1886.1	0.01	11.53*	1509.6	[0.04]
δ-Cadinene	10.48*	1701.6	[0.03]	11.66	1520.0	0.03
Germacrene B	11.14*	1756.4	[0.07]	12.05	1550.3	0.04
8-Acetoxy-carvotanacetone	15.73	2181.9	0.07	12.19	1561.4	0.04
(E)-Nerolidol	13.84*	1997.3	[1.23]	12.23	1565.0	1.22
Unknown MISC CLVII [m/z 109, 69 (60), 43 (40), 93 (28), 41 (25), 111 (22)...	13.36	1952.7	0.01	12.35	1574.4	0.03
Humulene epoxide II	13.43	1959.1	0.03	12.66	1599.0	0.01
Unknown SWGL V [m/z 81, 43 (52), 161 (49), 105 (30), 207 (27), 95 (26), 93 (24), 109 (24)...	15.05	2114.4	0.01	12.83	1612.6	0.02
Unknown ELCA II [m/z 43, 71 (53), 108 (47), 126 (41), 109 (35), 93 (25)...	19.99	2656.4	0.01	12.98	1625.0	0.01
Unknown ELCA III [m/z 43, 135 (59), 94 (33), 59 (25), 137 (25), 93 (19)...				13.23	1645.4	0.01
Unknown ELCA IV [m/z 43, 93 (84), 109 (51), 135 (23), 95 (20), 59 (18)...				13.26	1648.5	0.01
(2E,6Z)-Farnesal	15.41	2150.6	0.01	14.03	1712.1	0.01
(2E,6E)-Farnesol	16.88	2301.8	0.03	14.14	1721.7	0.02
(2E,6E)-Farnesal	15.87	2196.6	0.01	14.35	1739.8	0.01
(2E,6E)-Farnesyl acetate	16.09	2219.4	0.01	15.50	1842.4	0.01
Coronarlin E	19.81	2634.5	0.03	18.28	2108.9	0.03
Total reported		99.13%			99.44%	

*: 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