

Date : 2024-08-29

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24H16-PTH01

Customer Identification : Organic Citronella - Indonesia - CD0109R

Type : Essential Oil

Source : *Cymbopogon winterianus*

Customer : Plant Therapy

Checked and approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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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 : 2024-08-29

PHYSICOCHEMICAL DATA

Refractive index : 1.4696 ± 0.0003 (20 °C)

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

Analyst : Cassandra Baker

Date : 2024-08-19

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
Dimethylsulfide	tr	Aliphatic sulfide
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Methylcyclopentane ?	tr	Alkane
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	tr	Unknown
Tricyclene	0.04	Monoterpene
α -Thujene	0.01	Monoterpene
α -Pinene	0.20	Monoterpene
Camphene	0.11	Monoterpene
β -Pinene	0.01	Monoterpene
Sabinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.06	Aliphatic ketone
Myrcene	0.09	Monoterpene
α -Phellandrene	0.01	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.01	Monoterpene
<i>para</i> -Cymene	0.01	Monoterpene
β -Phellandrene	0.05	Monoterpene
Limonene	3.52	Monoterpene
Unknown	0.03	Unknown
(<i>Z</i>)- β -Ocimene	0.15	Monoterpene
(<i>E</i>)- β -Ocimene	0.09	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.07	Aliphatic aldehyde
γ -Terpinene	0.02	Monoterpene
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.08	Monoterpene
Linalool	0.74	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
Unknown	0.02	Oxygenated monoterpene
<i>cis</i> -Rose oxide	tr	Monoterpenic ether
<i>trans</i> -Rose oxide	0.01	Monoterpenic ether
Melonol ?	0.06	Normonoterpene
Isopulegol	1.47	Monoterpenic alcohol
Menthone	0.04	Monoterpenic ketone
iso-Isopulegol	0.37	Monoterpenic alcohol

Citronellal	36.83	Monoterpenic aldehyde
Isomenthone	0.06	Monoterpenic ketone
Borneol	0.03	Monoterpenic alcohol
neoiso-Isopulegol	0.08	Monoterpenic alcohol
Rosefuran oxide	0.02	Monoterpenic ether
Terpinen-4-ol	0.03	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
α -Terpineol	0.08	Monoterpenic alcohol
(4Z)-Decenal	0.04	Aliphatic aldehyde
<i>trans</i> -Isopiperitenol	0.01	Monoterpenic alcohol
Decanal	0.14	Aliphatic aldehyde
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
Nerol	0.18	Monoterpenic alcohol
Citronellol	10.27	Monoterpenic alcohol
Neral	0.50	Monoterpenic aldehyde
Piperitone	0.02	Monoterpenic ketone
Geraniol	24.08	Monoterpenic alcohol
Geranial	0.62	Monoterpenic aldehyde
8-Hydroxy-neo-menthol	0.02	Monoterpenic alcohol
Citronellic acid	0.23	Monoterpenic acid
α -Cubebene	0.02	Sesquiterpene
Citronellyl acetate	1.59	Monoterpenic ester
Eugenol	0.76	Phenylpropanoid
8-Hydroxy-iso-menthol	0.03	Monoterpenic alcohol
Neryl acetate	0.02	Monoterpenic ester
β -Bourbonene	0.10	Sesquiterpene
<i>cis</i> - β -Elemene	0.05	Sesquiterpene
Geranyl acetate	2.45	Monoterpenic ester
β -Elemene	1.32	Sesquiterpene
Methyleugenol	0.03	Phenylpropanoid
Dodecanal	0.02	Aliphatic aldehyde
β -Caryophyllene	0.45	Sesquiterpene
β -Copaene	0.03	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.06	Sesquiterpene
Isogermacrene D	0.02	Sesquiterpene
α -Humulene	0.12	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.14	Phenylpropanoid
Methyl (<i>Z</i>)-isoeugenol	0.07	Phenylpropanoid
<i>trans</i> -Cadina-1(6),4-diene	0.04	Sesquiterpene
γ -Murolene	0.12	Sesquiterpene
Germacrene D	1.72	Sesquiterpene
β -Selinene	0.04	Sesquiterpene
α -Selinene	0.04	Sesquiterpene
epi-Cubebol	0.09	Sesquiterpenic alcohol
Methyl (<i>E</i>)-isoeugenol	0.12	Phenylpropanoid

α-Muurolene	0.28	Sesquiterpene
Germacrene A	0.28	Sesquiterpene
γ-Cadinene	0.76	Sesquiterpene
Cubebol	0.12	Sesquiterpenic alcohol
<i>trans</i> -Calamenene	0.02	Sesquiterpene
δ-Cadinene	1.23	Sesquiterpene
Unknown	0.03	Sesquiterpene
α-Cadinene	0.10	Sesquiterpene
α-Elemol	2.21	Sesquiterpenic alcohol
Germacrene B	0.03	Sesquiterpene
Geranyl butyrate	0.09	Monoterpenic ester
(<i>E</i>)-Nerolidol	0.02	Sesquiterpenic alcohol
Germacrene D-4-ol	1.07	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
1,10-diepi-Cubenol	0.05	Sesquiterpenic alcohol
γ-Eudesmol	0.17	Sesquiterpenic alcohol
τ-Cadinol	0.16	Sesquiterpenic alcohol
τ-Muurolol	0.25	Sesquiterpenic alcohol
α-Muurolol	0.08	Sesquiterpenic alcohol
β-Eudesmol	0.22	Sesquiterpenic alcohol
α-Eudesmol	0.16	Sesquiterpenic alcohol
α-Cadinol	0.49	Sesquiterpenic alcohol
Unknown	0.50	Oxygenated sesquiterpene
(2 <i>E</i> ,6 <i>Z</i>)-Farnesal	0.02	Sesquiterpenic aldehyde
(2 <i>E</i> ,6 <i>E</i>)-Farnesol	0.05	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>E</i>)-Farnesal	0.02	Sesquiterpenic aldehyde
Cryptomeridiol	0.03	Sesquiterpenic alcohol
Geranyl caprylate	0.01	Monoterpenic ester
Unknown	0.01	Oxygenated diterpene
Unknown	0.07	Oxygenated diterpene
Unknown	0.01	Unknown
Unknown	0.04	Unknown
Unknown	0.13	Unknown
Unknown	0.18	Unknown
Consolidated total	99.03	

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

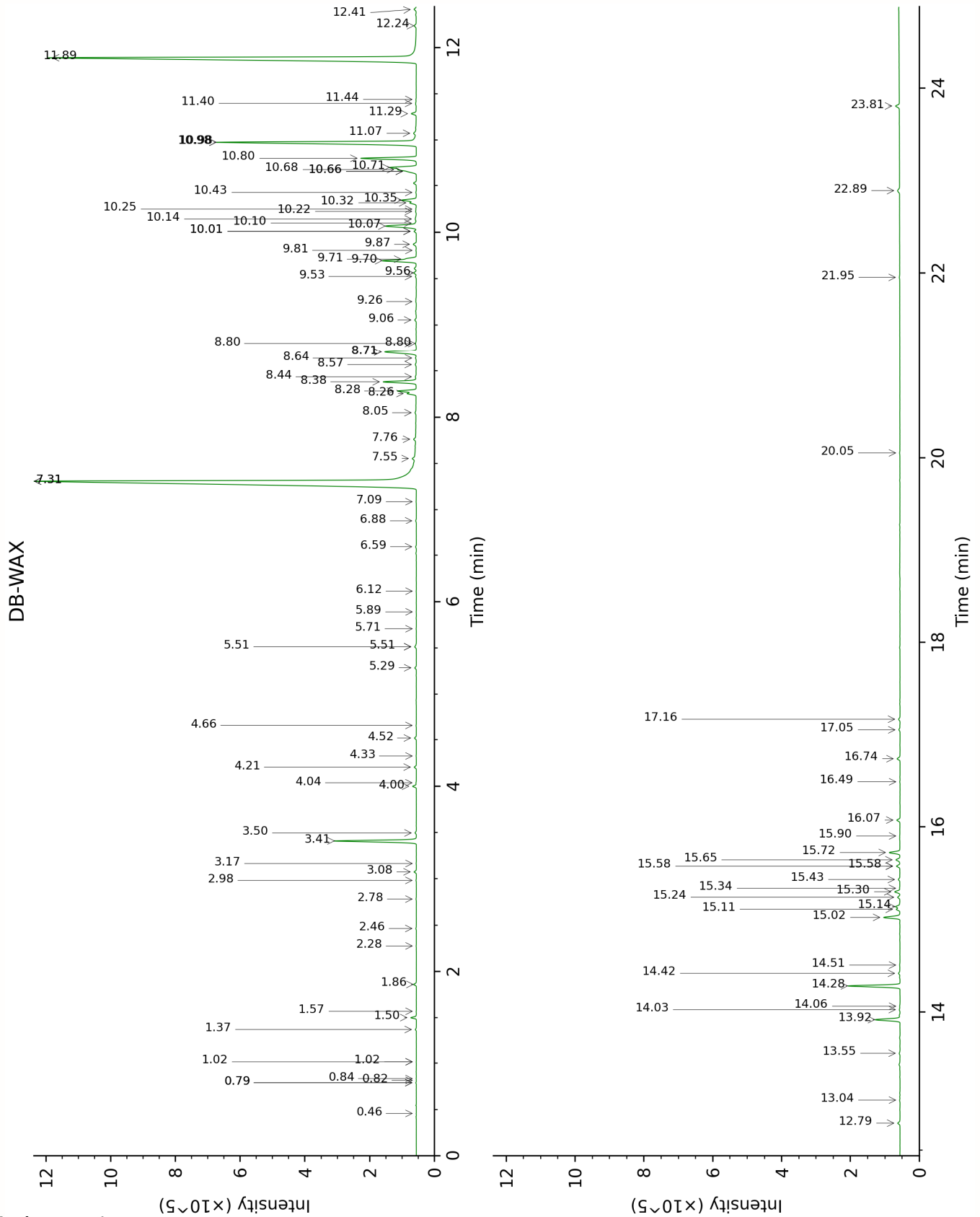
Note: no correction factor was applied

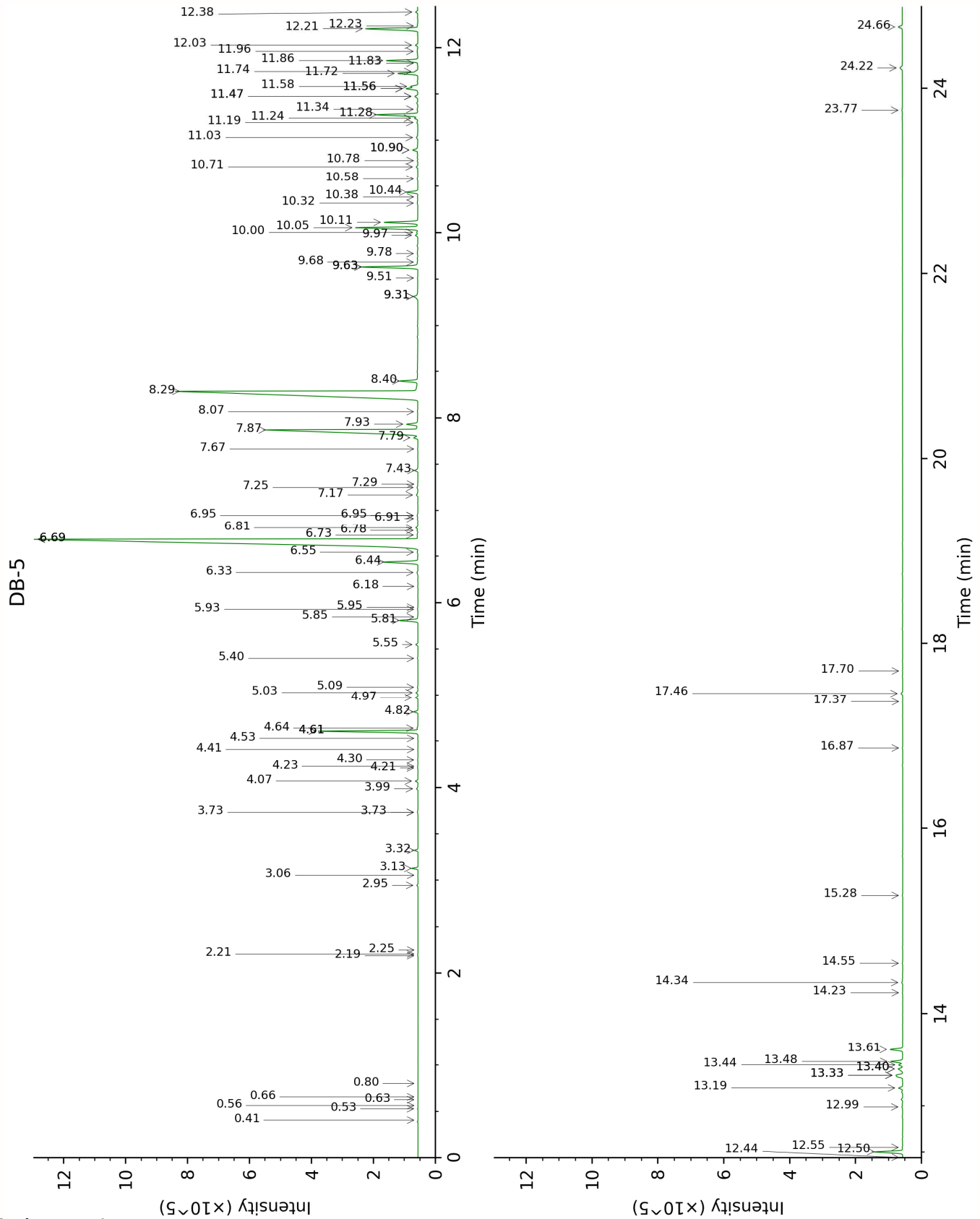
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Dimethylsulfide	Column DB-WAX			Column DB-5		
	0.46	708.0	tr	0.41	500.0	tr
2-Methyl-3-buten-2-ol				0.53	606.2	0.01
Methylcyclopentane ?				0.56	618.3	tr
Isovaleral	0.84	884.2	tr	0.63	640.2	tr
2-Methylbutyral	0.82	877.8	tr	0.66	650.6	tr
2-Ethylfuran	1.02*	917.9	[tr]	0.80	700.7	tr
Unknown COCI I [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	0.79*	869.3	[0.01]	2.19	858.8	0.01
Unknown COCI II [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	0.79*	869.3	[0.01]	2.21	860.3	0.01
Unknown ROOF III [m/z 67, 81 (70), 66 (53), 68 (41), 82 (38), 109 (38)...]	1.02*	917.9	[tr]	2.25	863.8	tr
Tricyclene	1.37	972.5	0.04	2.95	917.9	0.04
α -Thujene	1.57	999.6	0.01	3.06	925.1	0.01
α -Pinene	1.50	992.1	0.20	3.13	930.0	0.20
Camphene	1.86	1027.3	0.11	3.32	942.8	0.11
β -Pinene	2.28	1066.9	0.01	3.73*	969.8	[0.02]
Sabinene	2.46	1084.8	0.02	3.73*	969.8	[0.02]
6-Methyl-5-hepten-2-one	5.29	1295.4	0.07	3.99	986.6	0.06
Myrcene	3.08	1133.5	0.09	4.07	992.1	0.09
α -Phellandrene	2.98	1126.4	0.01	4.21	1001.3	0.01
Octanal	4.66	1250.4	0.01	4.23	1002.6	0.01
Δ^3 -Carene	2.78	1111.0	0.01	4.30	1006.9	0.02
α -Terpinene	3.17	1140.3	0.01	4.41	1013.9	0.01
<i>para</i> -Cymene	4.33	1226.8	0.01	4.53	1021.4	0.01
β -Phellandrene	3.50	1165.5	0.05	4.61*†	1026.3	[3.52]
Limonene	3.41	1159.0	3.52	4.61*†	1026.3	[3.52]
Unknown COCI XLIV [m/z 59, 43 (12), 109 (11), 41 (10), 127 (8)...]	6.60	1388.6	0.03	4.64*†	1028.3	[0.05]
(Z)- β -Ocimene	4.00	1203.4	0.15	4.82	1039.3	0.15

(E)-β-Ocimene	4.21	1218.2	0.09	4.97	1049.1	0.09
2,6-Dimethyl-5-heptenal (melonal)	5.52*	1311.7	[0.09]	5.03	1052.6	0.07
γ-Terpinene	4.04	1206.1	0.02	5.09	1056.3	0.02
Octanol	8.44	1525.6	0.04	5.40	1075.8	0.03
Terpinolene	4.52	1240.6	0.08	5.55	1085.1	0.08
Linalool	8.28	1513.7	0.78	5.81	1101.4	0.74
Nonanal	6.12	1354.4	0.01	5.85	1103.7	0.01
Unknown COCI VII [m/z 111, 69 (70), 41 (68), 55 (53), 43 (51)... 154 (7)]	5.89	1338.5	0.01	5.93	1109.0	0.02
cis-Rose oxide	5.52*	1311.7	[0.09]	5.95	1110.5	tr
trans-Rose oxide	5.71	1325.5	0.01	6.18	1124.8	0.01
Melonol ?				6.33	1134.3	0.06
Isopulegol	8.38	1521.3	1.50	6.44	1141.5	1.47
Menthone	6.88	1409.6	0.03	6.55	1148.3	0.04
iso-Isopulegol	8.26	1511.6	0.37	6.69*	1157.2	[37.20]
Citronellal	7.31*†	1441.1	[36.29]	6.69*	1157.2	[37.20]
Isomenthone	7.31*†	1441.1	[36.29]	6.73	1160.1	0.06
Borneol	10.01*	1649.0	[0.10]	6.78	1163.4	0.03
neoiso-Isopulegol	9.06	1573.2	0.07	6.81	1165.2	0.08
Rosefuran oxide	8.80*	1553.7	[0.05]	6.91	1171.7	0.02
Terpinen-4-ol	8.80*	1553.7	[0.05]	6.95*	1173.9	[0.04]
Unknown CYFL V [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	9.81	1632.5	0.02	6.95*	1173.9	[0.04]
α-Terpineol	10.01*	1649.0	[0.10]	7.17	1188.1	0.08
(4Z)-Decenal	8.05	1495.7	0.05	7.25	1193.2	0.04
trans-Isopiperitenol	10.66*	1702.1	[0.28]	7.29	1195.5	0.01
Decanal	7.56*†	1459.1	[0.41]	7.44	1205.1	0.14
2,3-Epoxyneral?				7.67	1220.5	0.02
Nerol	11.29	1754.5	0.21	7.79	1228.6	0.18
Citronellol	10.98*	1728.5	[10.44]	7.87	1234.3	10.27
Neral	9.71	1624.9	0.34	7.93	1238.4	0.50
Piperitone	10.14	1659.7	0.08	8.07	1247.4	0.02
Geraniol	11.89	1806.0	24.63	8.29	1262.1	24.08
Geranial	10.35	1676.0	0.68	8.40	1269.5	0.62
8-Hydroxy-neo-menthol	14.51	2045.2	0.02	9.32*	1332.2	[0.25]
Citronellic acid				9.32*	1332.2	[0.25]
α-Cubebene	7.09	1424.8	0.02	9.51	1346.1	0.02
Citronellyl acetate	9.70	1623.6	1.59	9.63*	1354.5	[2.22]
Eugenol	15.02	2094.8	0.76	9.63*	1354.5	[2.22]

8-Hydroxy-iso-menthol	15.34	2126.0	0.02	9.68	1358.2	0.03
Neryl acetate	10.43	1682.6	0.02	9.78	1364.6	0.02
β -Bourbonene	7.76	1474.4	0.09	9.97	1378.5	0.10
<i>cis</i> - β -Elemene	8.57	1535.7	0.04	10.00	1380.6	0.05
Geranyl acetate	10.80	1713.9	2.49	10.05	1384.2	2.45
β -Elemene	8.71*	1546.3	[1.77]	10.11	1388.3	1.32
Methyleugenol	13.55	1954.7	0.04	10.32	1402.8	0.03
Dodecanal	10.25	1668.2	0.02	10.38	1407.8	0.02
β -Caryophyllene	8.71*	1546.3	[1.77]	10.44	1411.7	0.45
β -Copaene	8.64	1541.1	0.03	10.58	1422.3	0.03
<i>trans</i> - α -Bergamotene	8.71*	1546.3	[1.77]	10.71	1432.3	0.06
Isogermacrene D	9.26	1588.4	0.02	10.78	1437.3	0.02
α -Humulene	9.56	1613.1	0.12	10.90*	1445.8	[0.23]
(<i>E</i>)-Isoeugenol	16.74	2268.4	0.14	10.90*	1445.8	[0.23]
Methyl (<i>Z</i>)-isoeugenol	14.42	2036.6	0.08	11.03	1455.8	0.07
<i>trans</i> -Cadina-1(6),4-diene	9.52	1609.9	0.04	11.19	1467.9	0.04
γ -Murolene	9.87	1637.8	0.16	11.24	1471.3	0.12
Germacrene D	10.07	1653.6	1.73	11.28	1474.1	1.72
β -Selinene	10.10	1656.1	0.03	11.34	1478.4	0.04
α -Selinene	10.22	1666.2	0.04	11.48*	1488.8	[0.14]
epi-Cubebol	12.24	1836.4	0.09	11.48*	1488.8	[0.14]
Methyl (<i>E</i>)-isoeugenol	15.24	2116.4	0.12	11.56*	1495.0	[0.51]
α -Murolene	10.32	1673.7	0.28	11.56*	1495.0	[0.51]
Germacrene A	10.66*	1702.1	[0.28]	11.58	1496.7	0.28
γ -Cadinene	10.68	1703.6	0.76	11.72*†	1507.5	[0.82]
Cubebol	12.79	1885.4	0.12	11.74*†	1509.0	[0.07]
<i>trans</i> -Calamenene	11.44	1767.4	0.01	11.83	1516.2	0.02
δ -Cadinene	10.70	1705.5	1.28	11.86	1518.3	1.23
Unknown OCSA II [m/z 119, 105 (53), 161 (33), 93 (28), 91 (25), 40 (20)...204]	10.98*	1728.5	[10.44]	11.96	1526.1	0.03
α -Cadinene	11.08	1736.7	0.08	12.03	1531.3	0.10
α -Elemol	14.28	2023.6	2.24	12.20	1545.3	2.21
Germacrene B	11.40	1763.8	0.04	12.23	1547.6	0.03
Geranyl butyrate	12.41	1852.1	0.10	12.38	1559.3	0.09
(<i>E</i>)-Nerolidol	14.06	2002.6	0.02	12.44	1563.7	0.02
Germacrene D-4-ol	13.92	1988.8	1.12	12.50	1568.6	1.07
Caryophyllene oxide	13.04	1908.2	0.02	12.55	1572.4	0.03

1,10-diepi-Cubenol	14.03	1999.1	0.04	12.99	1606.9	0.05
γ-Eudesmol	15.14	2106.4	0.22	13.19	1623.8	0.17
τ-Cadinol	15.11	2103.5	0.16	13.33*	1635.1	[0.44]
τ-Muurolol	15.30	2122.3	0.25	13.33*	1635.1	[0.44]
α-Muurolol	15.43	2135.5	0.08	13.40*	1640.8	[0.25]
β-Eudesmol	15.65	2156.6	0.22	13.40*	1640.8	[0.25]
α-Eudesmol	15.58*	2149.8	[0.17]	13.44	1644.4	0.16
α-Cadinol	15.72	2164.4	0.51	13.48	1647.4	0.49
Unknown CYWI V [suspected m/z 59, 93 (79), 161 (61), 107 (47), 81 (44), 121 (37)...]				13.61	1658.1	0.50
(2E,6Z)-Farnesal	15.58*	2149.8	[0.17]	14.23	1709.5	0.02
(2E,6E)-Farnesol	17.05	2301.2	0.06	14.34	1719.0	0.05
(2E,6E)-Farnesal	16.08	2199.8	0.15	14.55	1737.0	0.02
Cryptomeridiol	20.06	2640.0	0.03	15.28	1800.2	0.03
Geranyl caprylate	15.90	2182.2	0.02	16.87	1946.4	0.01
Unknown COCI XXIX [m/z 81, 137 (70), 95 (46), 69 (45), 41 (39), 55 (29)...]	16.49	2242.6	0.01	17.37	1994.0	0.01
Unknown COCI XXX [m/z 41, 69 (98), 55 (55), 81 (46), 109 (46)... 290 (8)]	17.16	2313.6	0.07	17.46	2002.8	0.07
Unknown COCI LXIV [m/z 69, 41 (96), 55 (53), 109 (48), 95 (43), 67 (35)...]				17.70	2027.0	0.01
Unknown CYWI II [m/z 69, 81 (79), 81 (70), 137 (53), 139 (35), 95 (30)...]	21.96	2875.7	0.03	23.76	2706.0	0.04
Unknown CYWI III [m/z 69, 81 (84), 137 (53), 83 (30), 95 (27), 41 (19)...]	22.89	2998.5	0.13	24.22	2765.0	0.13
Unknown CYWI IV [m/z 69, 81 (64), 95 (29), 137 (19), 41 (19)...]	23.81	3124.3	0.19	24.66	2822.9	0.18
Total reported		98.93%			98.96%	

*: 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