Date : 2025-09-12

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25H29-PTH04
Customer Identification : Organic Citronella - Indonesia - CD0111R
Type : Essential Oil
Source : *Cymbopogon winterianus*
Customer : Plant Therapy

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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 : Jean-Christophe Fortin, M. Sc.
Date : 2025-09-11

Physicochemical data

Refractive index : 1.4695 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-08-29

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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Tricyclene	0.05	Monoterpene
α-Thujene	0.01	Monoterpene
α-Pinene	0.15	Monoterpene
Camphene	0.14	Monoterpene
Sabinene	0.02	Monoterpene
β-Pinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	0.10	Aliphatic ketone
Myrcene	0.09	Monoterpene
α-Phellandrene	0.01	Monoterpene
Octanal	0.02	Aliphatic aldehyde
α-Terpinene	0.01	Monoterpene
para-Cymene	0.01	Monoterpene
Unknown	0.03	Unknown
Limonene	3.01	Monoterpene
β-Phellandrene	0.05	Monoterpene
(*Z*)-β-Ocimene	0.29	Monoterpene
(*E*)-β-Ocimene	0.18	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.09	Aliphatic aldehyde
γ-Terpinene	0.02	Monoterpene
4-Nonanone	0.03	Aliphatic ketone
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.08	Monoterpene
Linalool	0.87	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
Unknown	0.03	Oxygenated monoterpene
cis-Rose oxide	0.01	Monoterpenic ether
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Rose oxide	0.02	Monoterpenic ether
Melonol ?	0.09	Normonoterpene
Isopulegol	2.03	Monoterpenic alcohol
Menthone	0.04	Monoterpenic ketone
iso-Isopulegol	0.53	Monoterpenic alcohol
Isomenthone	0.03	Monoterpenic ketone
Citronellal	35.00	Monoterpenic aldehyde
Borneol	0.03	Monoterpenic alcohol

neoiso-Isopulegol	0.11	Monoterpenic alcohol
Isopulegol isomer	0.03	Monoterpenic alcohol
Terpinen-4-ol	0.03	Monoterpenic alcohol
α-Terpineol	0.07	Monoterpenic alcohol
(4*Z*)-Decenal	0.04	Aliphatic aldehyde
Decanal	0.14	Aliphatic aldehyde
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
Nerol	0.20	Monoterpenic alcohol
Citronellol	9.93	Monoterpenic alcohol
Neral	0.52	Monoterpenic aldehyde
Piperitone	0.02	Monoterpenic ketone
Geraniol	22.73	Monoterpenic alcohol
Geranial	0.76	Monoterpenic aldehyde
Citronellyl formate	0.01	Monoterpenic ester
Geranyl formate	0.04	Monoterpenic ester
Unknown	0.03	Norsesquiterpene
Citronellic acid	0.18	Monoterpenic acid
8-Hydroxy-neo-menthol	0.21	Monoterpenic alcohol
α-Cubebene	0.03	Sesquiterpene
Eugenol	0.48	Phenylpropanoid
Citronellyl acetate	1.87	Monoterpenic ester
8-Hydroxy-iso-menthol	0.07	Monoterpenic alcohol
Neryl acetate	0.03	Monoterpenic ester
α-Copaene	0.04	Sesquiterpene
β-Bourbonene	0.09	Sesquiterpene
cis-β-Elemene	0.05	Sesquiterpene
β-Cubebene	0.05	Sesquiterpene
Geranyl acetate	3.20	Monoterpenic ester
β-Elemene	1.41	Sesquiterpene
Methyleugenol	0.06	Phenylpropanoid
Dodecanal	0.01	Aliphatic aldehyde
β-Caryophyllene	1.22	Sesquiterpene
β-Copaene	0.04	Sesquiterpene
trans-α-Bergamotene	0.22	Sesquiterpene
Isogermacrene D	0.05	Sesquiterpene
(*E*)-Isoeugenol	0.10	Phenylpropanoid
α-Humulene	0.21	Sesquiterpene
(*E*)-β-Farnesene	0.05	Sesquiterpene
cis-Muurola-4(15),5-diene	0.04	Sesquiterpene
trans-Cadina-1(6),4-diene	0.07	Sesquiterpene
γ-Muurolene	0.11	Sesquiterpene
Germacrene D	1.27	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
γ-Amorphene	0.07	Sesquiterpene
α-Selinene	0.06	Sesquiterpene

epi-Cubebol	0.12	Sesquiterpenic alcohol
α-Muurolene	0.25	Sesquiterpene
Germacrene A	0.44	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.19	Sesquiterpene
γ-Cadinene	0.82	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
δ-Cadinene	1.38	Sesquiterpene
Unknown	0.05	Sesquiterpene
α-Cadinene	0.08	Sesquiterpene
α-Elemol	2.11	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.03	Sesquiterpenic alcohol
Geranyl butyrate	0.19	Monoterpenic ester
Germacrene D-4-ol	0.56	Sesquiterpenic alcohol
Caryophyllene oxide	0.05	Sesquiterpenic ether
1,10-diepi-Cubenol	0.04	Sesquiterpenic alcohol
Unknown	0.07	Unknown
γ-Eudesmol	0.20	Sesquiterpenic alcohol
τ-Muurolol	0.26	Sesquiterpenic alcohol
τ-Cadinol	0.17	Sesquiterpenic alcohol
α-Muurolol	0.07	Sesquiterpenic alcohol
β-Eudesmol	0.21	Sesquiterpenic alcohol
α-Eudesmol	0.18	Sesquiterpenic alcohol
α-Cadinol	0.44	Sesquiterpenic alcohol
Unknown	0.24	Oxygenated sesquiterpene
(2*E*,6*Z*)-Farnesal	0.02	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesol	0.06	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesal	0.02	Sesquiterpenic aldehyde
Cryptomeridiol	0.02	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated diterpene
Unknown	0.09	Oxygenated diterpene
Unknown	0.02	Unknown
Unknown	0.05	Unknown
Unknown	0.23	Unknown
Unknown	0.29	Unknown
Consolidated total	**98.15**	

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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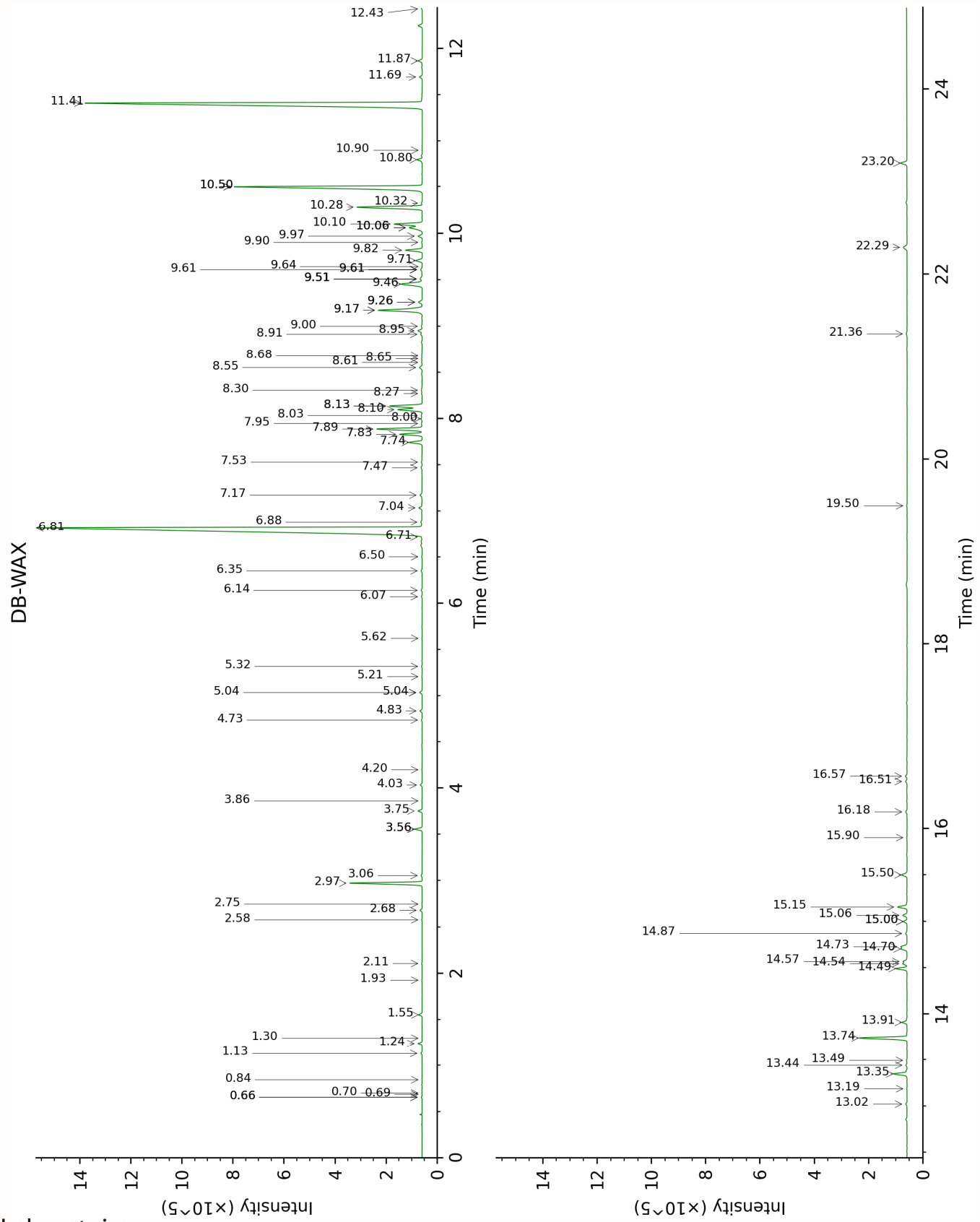
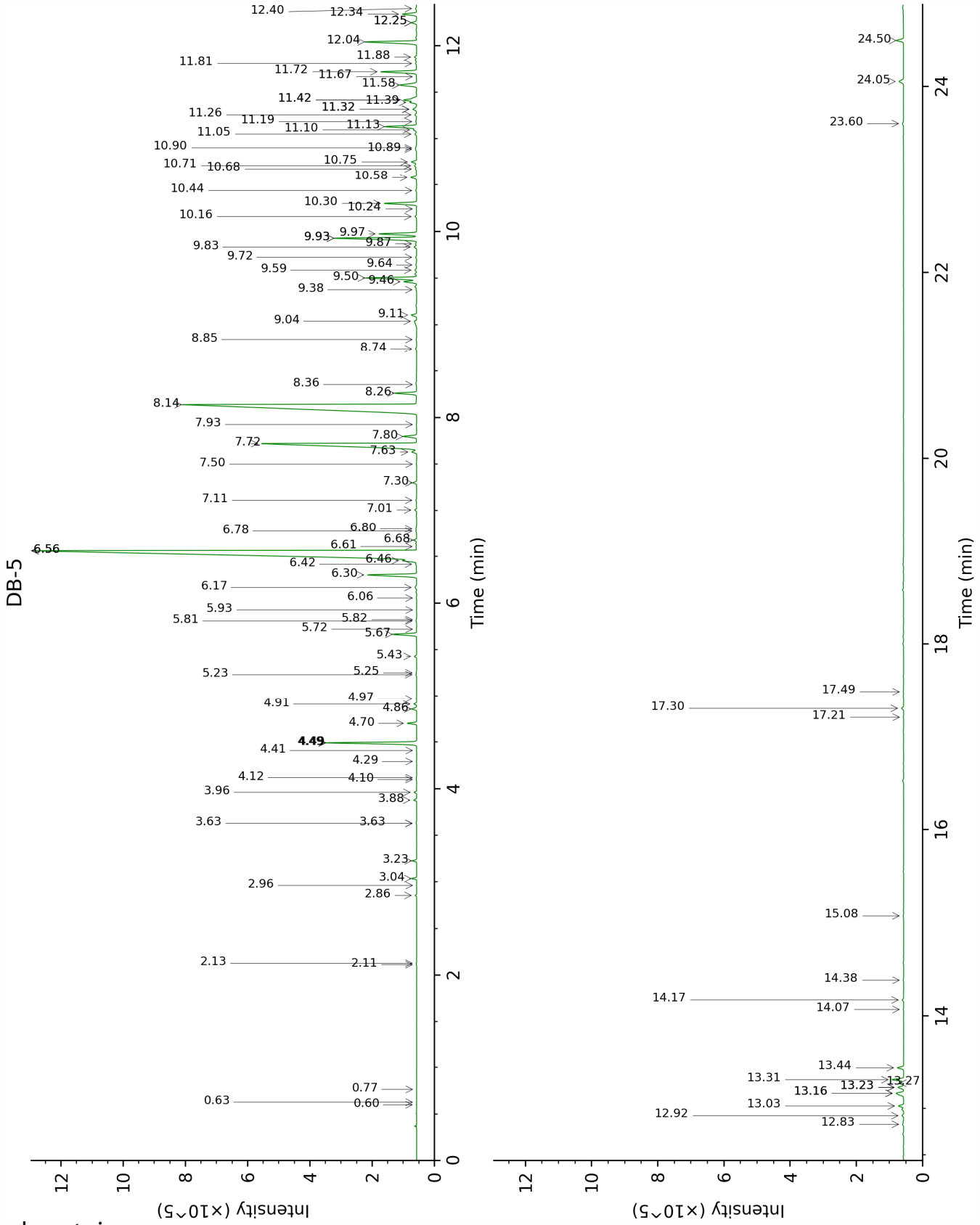

DB-WAX
Time (min)
Intensity (×10^5)
12.43
11.87
11.69
11.41
10.90
10.80
10.50
10.32
10.28
10.10
10.06
9.97
9.90
9.82
9.71
9.64
9.61
9.61
9.51
9.46
9.26
9.17
9.00
8.95
8.91
8.68
8.65
8.61
8.55
8.30
8.27
8.13
8.10
8.03
8.00
7.95
7.89
7.83
7.74
7.53
7.47
7.17
7.04
6.88
6.81
6.71
6.50
6.35
6.14
6.07
5.62
5.32
5.21
5.04
5.04
4.83
4.73
4.20
4.03
3.86
3.75
3.56
3.06
2.97
2.75
2.68
2.58
2.11
1.93
1.55
1.30
1.24
1.13
0.84
0.70
0.69
0.66
23.20
22.29
21.36
19.50
16.57
16.51
16.18
15.90
15.50
15.15
15.06
15.00
14.87
14.73
14.70
14.57
14.54
14.49
13.91
13.74
13.49
13.44
13.35
13.19
13.02


DB-5
Time (min)
Intensity (×10^5)
12.40
12.34
12.25
12.04
11.88
11.81
11.72
11.67
11.58
11.42
11.39
11.32
11.26
11.19
11.13
11.10
11.05
10.90
10.89
10.75
10.71
10.68
10.58
10.44
10.30
10.24
10.16
9.97
9.93
9.87
9.83
9.72
9.64
9.59
9.50
9.46
9.38
9.11
9.04
8.85
8.74
8.36
8.26
8.14
7.93
7.80
7.72
7.63
7.50
7.30
7.11
7.01
6.80
6.78
6.68
6.61
6.56
6.46
6.42
6.30
6.17
6.06
5.93
5.82
5.81
5.72
5.67
5.43
5.25
5.23
4.97
4.91
4.86
4.70
4.49
4.41
4.29
4.12
4.10
3.96
3.88
3.63
3.63
3.23
3.04
2.96
2.86
2.13
2.11
0.77
0.63
0.60
24.50
24.05
23.60
17.49
17.30
17.21
15.08
14.38
14.17
14.07
13.44
13.31
13.27
13.23
13.16
13.03
12.92
12.83

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Isovaleral	0.70	887.4	0.01	0.60	642.6	tr
2-Methylbutyral	0.69	881.4	tr	0.63	652.8	tr
2-Ethylfuran	0.84	919.8	tr	0.77	702.5	tr
Unknown COCI I [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	0.66*	868.7	[0.02]	2.11	859.3	0.01
Unknown COCI II [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	0.66*	868.7	[0.02]	2.13	860.6	0.01
Tricyclene	1.13	970.2	0.04	2.86	918.3	0.05
α-Thujene	1.30	999.9	tr	2.96	925.5	0.01
α-Pinene	1.24	989.8	0.15	3.04	930.4	0.15
Camphene	1.55	1026.1	0.14	3.23	943.2	0.14
Sabinene	2.11	1083.6	0.02	3.63*	970.1	[0.03]
β-Pinene	1.93	1064.8	0.01	3.63*	970.1	[0.03]
6-Methyl-5-hepten-2-one	4.83	1299.3	0.10	3.88	986.8	0.10
Myrcene	2.68	1133.5	0.08	3.96	992.4	0.09
α-Phellandrene	2.58	1125.2	0.01	4.10	1001.7	0.01
Octanal	4.20	1251.8	0.01	4.12	1003.0	0.02
α-Terpinene	2.75	1138.9	0.01	4.29	1014.1	0.01
para-Cymene	3.86	1226.7	0.01	4.41	1021.6	0.01
Unknown COCI XLIV [m/z 59, 43 (12), 109 (11), 41 (10), 127 (8)...]	6.07	1387.6	0.03	4.49*	1026.8	[3.10]
Limonene	2.97	1157.2	3.01	4.49*	1026.8	[3.10]
β-Phellandrene	3.06	1163.8	0.05	4.49*	1026.8	[3.10]
(*Z*)-β-Ocimene	3.56*	1204.0	[0.31]	4.70	1040.1	0.29
(*E*)-β-Ocimene	3.75	1218.6	0.16	4.86	1049.9	0.18
2,6-Dimethyl-5-heptenal (melonal)	5.04*	1312.6	[0.11]	4.91	1053.3	0.09
γ-Terpinene	3.56*	1204.0	[0.31]	4.97	1057.1	0.02
4-Nonanone	4.73	1291.9	0.03	5.23	1073.7	0.03
Octanol	7.95	1528.6	0.04	5.25	1075.0	0.02
Terpinolene	4.03	1239.5	0.08	5.43	1086.3	0.08

Linalool	7.83	1519.5	0.94	5.67	1101.3	0.87
Nonanal	5.62	1355.0	0.01	5.72	1104.9	0.02
Unknown COCI VII [m/z 111, 69 (70), 41 (68), 55 (53), 43 (51)... 154 (7)]	5.32	1333.0	0.03	5.81	1110.6	0.03
cis-Rose oxide	5.04*	1312.6	[0.11]	5.82	1111.5	0.01
trans-para-Mentha-2,8-dien-1-ol	8.65	1583.3	0.02	5.93	1118.3	0.01
trans-Rose oxide	5.21	1325.1	0.02	6.06	1126.6	0.02
Melonol ?				6.17	1134.0	0.09
Isopulegol	7.89	1523.9	2.06	6.30	1142.7	2.03
Menthone	6.35	1408.0	0.05	6.42	1150.2	0.04
iso-Isopulegol	7.74	1512.7	0.59	6.46	1152.7	0.53
Isomenthone	6.72	1435.3	0.03	6.56*	1159.6	[35.17]
Citronellal	6.81	1442.7	35.00	6.56*	1159.6	[35.17]
Borneol	9.51*	1652.8	[0.13]	6.61	1162.6	0.03
neoiso-Isopulegol	8.55	1575.7	0.14	6.68	1167.0	0.11
Isopulegol isomer	8.30	1556.5	0.03	6.78	1173.4	0.03
Terpinen-4-ol	8.27	1553.8	0.02	6.80	1175.0	0.03
α-Terpineol	9.51*	1652.8	[0.13]	7.01	1188.6	0.07
(4*Z*)-Decenal	7.53	1496.3	0.04	7.11	1195.4	0.04
Decanal	7.04	1459.4	0.14	7.30	1207.8	0.14
2,3-Epoxyneral?				7.50	1221.4	0.02
Nerol	10.80	1760.8	0.26	7.63	1230.3	0.20
Citronellol	10.50*	1735.3	[10.04]	7.72	1236.5	9.93
Neral	9.17*	1625.5	[2.47]	7.80	1241.7	0.52
Piperitone	9.61*	1661.0	[0.09]	7.93	1250.5	0.02
Geraniol	11.41	1813.5	22.68	8.14	1265.1	22.73
Geranial	9.82	1678.1	0.76	8.26	1273.5	0.76
Citronellyl formate	8.61	1580.0	0.02	8.36	1279.9	0.01
Geranyl formate	9.61*	1661.0	[0.09]	8.74	1306.5	0.04
Unknown CYSC II [m/z 135, 121 (81), 177 (78), 107 (60), 192 (42), 149 (35)]	6.14	1392.5	0.04	8.84	1309.8	0.03
Citronellic acid				9.04	1323.7	0.18
8-Hydroxy-neo-menthol	13.91	2044.4	0.22	9.11	1328.5	0.21

α-Cubebene	6.50	1419.4	0.02	9.38	1347.8	0.03
Eugenol	14.49	2100.7	0.49	9.46	1353.9	0.48
Citronellyl acetate	9.17*	1625.5	[2.47]	9.50	1356.7	1.87
8-Hydroxy-*iso*-menthol	14.73	2124.5	0.31	9.59	1362.6	0.07
Neryl acetate	9.90	1684.9	0.03	9.64	1366.6	0.03
α-Copaene	6.88	1447.8	0.08	9.72	1372.4	0.04
β-Bourbonene	7.17	1469.6	0.10	9.83	1380.3	0.09
cis-β-Elemene	8.00	1532.5	0.05	9.87	1382.8	0.05
β-Cubebene	7.47	1491.7	0.05	9.93*	1387.0	[3.22]
Geranyl acetate	10.28	1716.6	3.20	9.93*	1387.0	[3.22]
β-Elemene	8.14*	1543.3	[1.61]	9.98	1390.3	1.41
Methyleugenol	13.02	1959.7	0.06	10.16	1403.5	0.06
Dodecanal	9.64	1663.7	0.01	10.24	1409.5	0.01
β-Caryophyllene	8.10	1540.3	1.18	10.30	1414.0	1.22
β-Copaene	8.03	1535.3	0.04	10.44	1424.3	0.04
trans-α-Bergamotene	8.14*	1543.3	[1.61]	10.58	1434.8	0.22
Isogermacrene D	8.68	1585.7	0.02	10.68	1442.0	0.05
(*E*)-Isoeugenol	16.18	2273.7	0.07	10.71	1444.7	0.10
α-Humulene	8.95	1607.4	0.20	10.75	1447.8	0.21
(*E*)-β-Farnesene	9.26*	1632.5	[0.19]	10.89	1458.0	0.05
cis-Muurola-4(15),5-diene	9.00	1611.4	0.04	10.90	1459.2	0.04
trans-Cadina-1(6),4-diene	8.92	1604.3	0.06	11.05	1470.2	0.07
γ-Muurolene	9.26*	1632.5	[0.19]	11.10	1473.7	0.11
Germacrene D	9.46	1648.4	1.32	11.13	1476.2	1.27
β-Selinene	9.51*	1652.8	[0.13]	11.18	1480.3	0.04
γ-Amorphene	9.51*	1652.8	[0.13]	11.26	1485.7	0.07
α-Selinene	9.61*	1661.0	[0.09]	11.32*	1490.2	[0.18]
epi-Cubebol	11.69	1838.6	0.12	11.32*	1490.2	[0.18]
α-Muurolene	9.71	1669.0	0.32	11.39	1495.8	0.25
Germacrene A	10.06*	1697.8	[0.78]	11.42*	1497.7	[0.63]
(3*Z*,6*E*)-α-Farnesene	9.97	1690.4	0.19	11.42*	1497.7	[0.63]
γ-Cadinene	10.06*	1697.8	[0.78]	11.58	1509.9	0.82
trans-Calamenene	10.90	1769.5	0.02	11.67	1517.0	0.02
δ-Cadinene	10.10	1701.1	1.36	11.72	1521.2	1.38
Unknown OCSA II [m/z 119, 105 (53), 161 (33), 93	10.32	1720.3	0.04	11.81	1528.3	0.05

(28), 91 (25), 40 (20)...204]						
α-Cadinene	10.50*	1735.3	[10.04]	11.88	1533.6	0.08
α-Elemol	13.74	2028.0	2.15	12.04	1546.6	2.11
(*E*)-Nerolidol	13.49	2003.9	0.03	12.25*	1562.8	[0.20]
Geranyl butyrate	11.87	1854.1	0.19	12.25*	1562.8	[0.20]
Germacrene D-4-ol	13.35	1990.1	0.63	12.34	1570.1	0.56
Caryophyllene oxide	12.43	1905.0	0.05	12.40	1575.0	0.05
1,10-diepi-Cubenol	13.44	1998.8	0.06	12.83	1609.1	0.04
Unknown JUCO I [m/z 69, 41 (42), 109 (25), 123 (22), 64 (22), 179 (18)...]	13.19	1975.2	0.01	12.92	1616.8	0.07
γ-Eudesmol	14.54	2106.0	0.19	13.03	1625.5	0.20
τ-Muurolol	14.70	2122.0	0.26	13.16*	1636.8	[0.42]
τ-Cadinol	14.57	2108.4	0.17	13.16*	1636.8	[0.42]
α-Muurolol	14.87	2138.9	0.07	13.23*	1642.1	[0.24]
β-Eudesmol	15.06	2158.6	0.21	13.23*	1642.1	[0.24]
α-Eudesmol	15.00*	2151.9	[0.18]	13.27	1645.9	0.18
α-Cadinol	15.16	2167.7	0.44	13.31	1649.0	0.44
Unknown CYWI V [suspected m/z 59, 93 (79), 161 (61), 107 (47), 81 (44), 121 (37)...]				13.44	1659.7	0.24
(2*E*,6*Z*)-Farnesal	15.00*	2151.9	[0.18]	14.07	1712.6	0.02
(2*E*,6*E*)-Farnesol	16.51	2308.4	0.08	14.17	1721.5	0.06
(2*E*,6*E*)-Farnesal	15.50	2202.8	0.29	14.38	1740.0	0.02
Cryptomeridiol	19.50	2648.6	0.02	15.08	1800.1	0.02
Unknown COCI XXIX [m/z 81, 137 (70), 95 (46), 69 (45), 41 (39), 55 (29)...]	15.90	2244.8	0.02	17.21	1998.5	0.01
Unknown COCI XXX [m/z 41, 69 (98), 55 (55), 81 (46), 109 (46)... 290 (8)]	16.57	2314.6	0.09	17.30	2007.7	0.09
Unknown COCI				17.49	2025.9	0.02

LXIV [m/z 69, 41 (96), 55 (53), 109 (48), 95 (43), 67 (35)...]						
Unknown CYWI II [m/z 69, 81 (79), 81 (70), 137 (53), 139 (35), 95 (30)...]	21.36	2881.6	0.05	23.60	2709.7	0.05
Unknown CYWI III [m/z 69, 81 (84), 137 (53), 83 (30), 95 (27), 41 (19)...]	22.29	3005.2	0.24	24.06	2767.7	0.23
Unknown CYWI IV [m/z 69, 81 (64), 95 (29), 137 (19), 41 (19)...]	23.20	3131.7	0.32	24.50	2825.0	0.29
Total reported		97.99%			98.21%	

*: 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