CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23L14-PTH01
Customer Identification : Nutmeg - India - N40112R
Type : Essential Oil
Source : *Myristica fragrans*
Customer : Plant Therapy

Checked an approved by:

_____

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

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MÉTHODE CERTIFIÉE
ISO 17025:2017
CERTIFIED METHOD

Laboratoire
PhytoChemia

628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

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 : 2023-12-19

PHYSICOCHEMICAL DATA

Refractive index : 1.477 ± 0.0003 (20 ℃)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2023-12-19

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	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Tricyclene	0.02	Monoterpene
α-Thujene	2.70	Monoterpene
α-Pinene	15.68	Monoterpene
α-Fenchene	0.06	Monoterpene
Camphene	0.23	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.02	Monoterpene
Sabinene	30.38	Monoterpene
β-Pinene	11.13	Monoterpene
Myrcene	2.66	Monoterpene
2-Carene	0.01	Monoterpene
α-Phellandrene	0.90	Monoterpene
Pseudolimonene	0.06	Monoterpene
Δ3-Carene	1.76	Monoterpene
α-Terpinene	2.76	Monoterpene
meta-Cymene	0.01	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	1.47	Monoterpene
Limonene	3.80	Monoterpene
1,8-Cineole	2.68	Monoterpenic ether
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	4.38	Monoterpene
cis-Sabinene hydrate	0.23	Monoterpenic alcohol
Terpinolene	1.66	Monoterpene
para-Cymenene	0.11	Monoterpene
α-Pinene oxide	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.15	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Linalool	0.17	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
para-Mentha-1,3,8-triene	0.01	Monoterpene
end*o*-Fenchol	0.02	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.13	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.01	Aliphatic alcohol
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Pinocarveol	0.02	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.09	Monoterpenic alcohol

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Unknown	0.01	Unknown
Epoxyterpinolene	0.03	Monoterpenic ether
Sabinaketone	0.01	Normonoterpenic ketone
Borneol	0.02	Monoterpenic alcohol
δ-Terpineol	0.02	Monoterpenic alcohol
Terpinen-4-ol	5.06	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
meta-Cymen-8-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
α-Terpineol	0.46	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
cis-Piperitol	0.04	Monoterpenic alcohol
cis-α-Phellandrene epoxide (iPr vs Me)	0.01	Monoterpenic ether
trans-Piperitol	0.04	Monoterpenic alcohol
endo-Fenchyl acetate	0.01	Monoterpenic ester
Citronellol	0.04	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Unknown	0.01	Unknown
Unknown	0.04	Unknown
Geraniol	0.06	Monoterpenic alcohol
Linalyl acetate	0.01	Monoterpenic ester
trans-Ascaridole glycol	0.07	Monoterpenic alcohol
Bornyl acetate	0.09	Monoterpenic ester
Safrole	1.15	Phenylpropanoid
Cuminol	0.03	Monoterpenic alcohol
Terpinen-4-yl acetate	0.03	Monoterpenic ester
Unknown	0.02	Unknown
Thymol	0.01	Monoterpenic alcohol
Unknown	0.25	Simple phenolic
4-Vinylguaiacol	0.02	Simple phenolic
Unknown	0.05	Monoterpenic alcohol
Unknown	0.02	Unknown
α-Cubebene	0.09	Sesquiterpene
α-Terpinyl acetate	0.08	Monoterpenic ester
Citronellyl acetate	0.11	Monoterpenic ester
Eugenol	0.11	Phenylpropanoid
Neryl acetate	0.02	Monoterpenic ester
α-Copaene	0.31	Sesquiterpene
β-Cubebene	0.01	Sesquiterpene
Geranyl acetate	0.17	Monoterpenic ester
β-Elemene	0.03	Sesquiterpene
Methyleugenol	0.79	Phenylpropanoid
β-Caryophyllene	0.37	Sesquiterpene
trans-α-Bergamotene	0.13	Sesquiterpene
α-Humulene	0.06	Sesquiterpene

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(*E*)-Isoeugenol	0.05	Phenylpropanoid
(*E*)-β-Farnesene	0.05	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Muurolene	0.03	Sesquiterpene
Germacrene D	0.05	Sesquiterpene
trans-Muurola-4(15),5-diene	0.01	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
Methyl (*E*)-isoeugenol	0.21	Phenylpropanoid
β-Bisabolene	0.08	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.05	Sesquiterpene
γ-Cadinene	tr	Sesquiterpene
Myristicin	2.12	Phenylpropanoid
trans-Cadina-1,4-diene	0.02	Sesquiterpene
(*E*)-α-Bisabolene	0.01	Sesquiterpene
Elemicin	2.34	Phenylpropanoid
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
Unknown	0.01	Phenylpropanoid
(*E*)-Isoelemicin	0.15	Phenylpropanoid
Myristic acid	0.42	Aliphatic acid
Consolidated total	**99.16**	

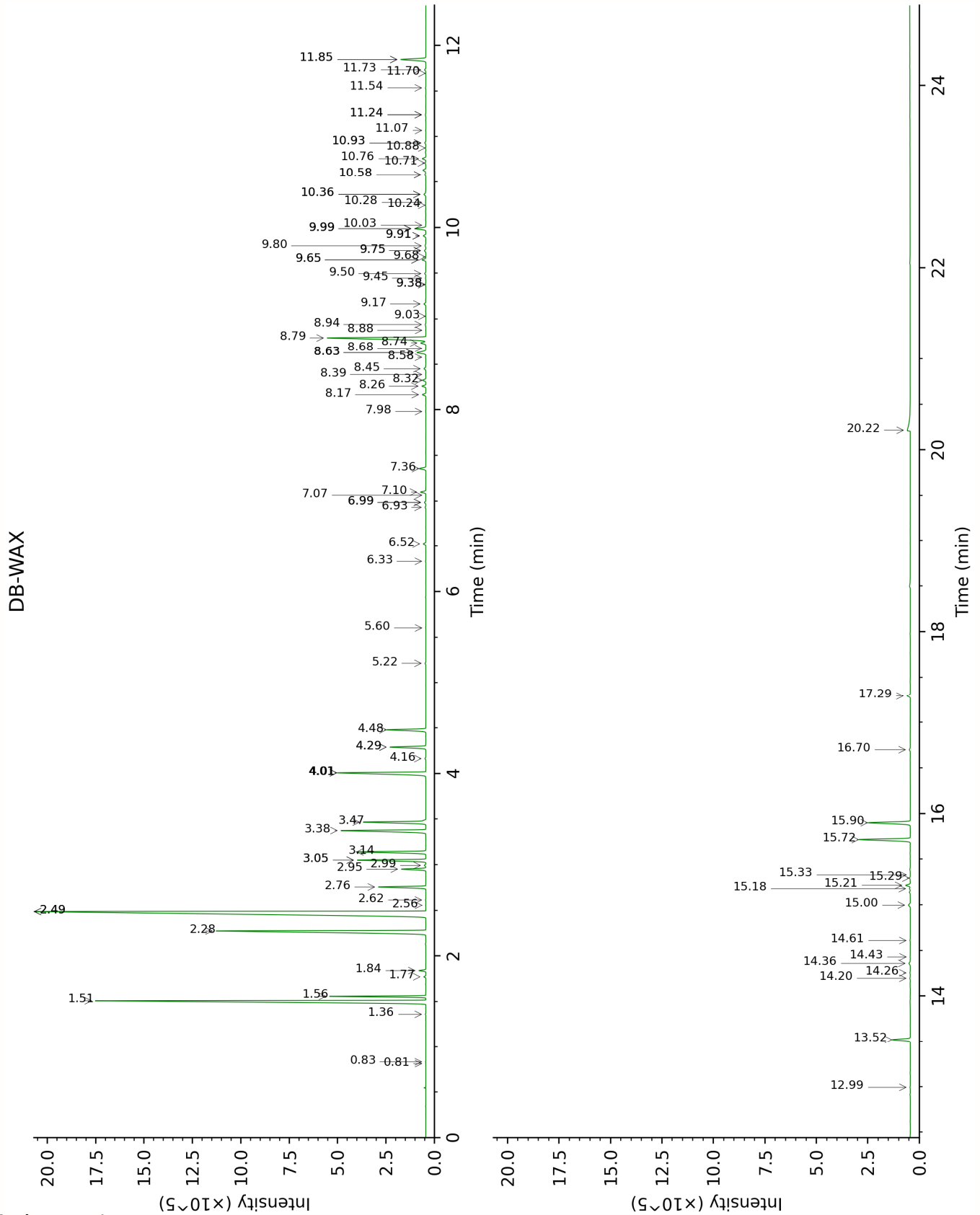tr: The compound has been detected below 0.005% of the total signal

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.
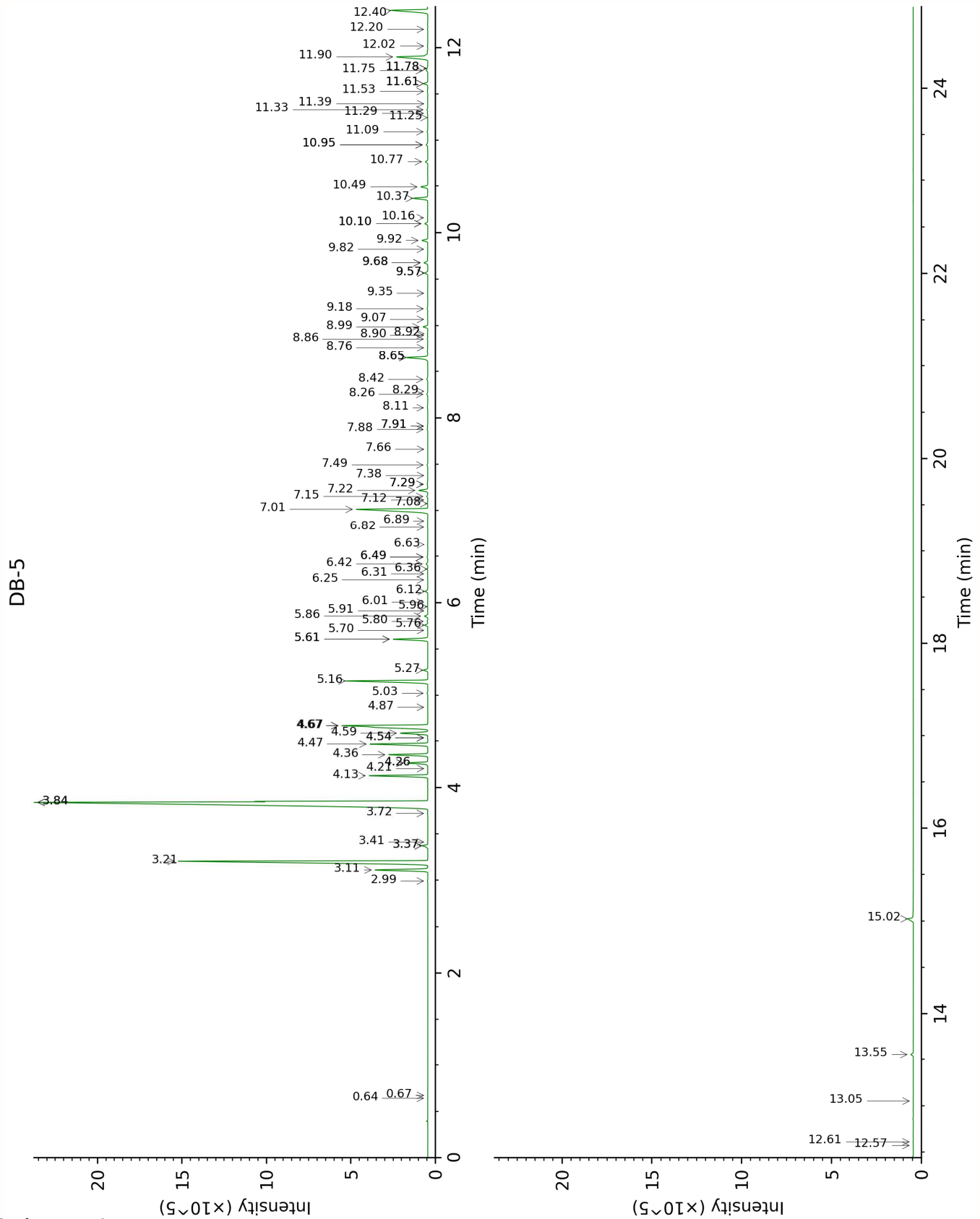
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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

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DB-5

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.84	886.3	0.01	0.64	641.0	0.01
2-Methylbutyral	0.82	879.6	tr	0.67	651.4	tr
Tricyclene	1.36	973.7	0.02	2.99	919.1	0.02
α-Thujene	1.56	1002.1	2.68	3.11	926.9	2.70
α-Pinene	1.51	996.0	15.58	3.21	933.1	15.68
α-Fenchene	1.77	1022.2	0.06	3.37*	944.1	[0.31]
Camphene	1.84	1028.6	0.23	3.37*	944.1	[0.31]
Thuja-2,4(10)-diene	2.49*	1089.7	[30.19]	3.41	946.8	0.01
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.05*	1134.2	[2.67]	3.72	967.0	0.02
Sabinene	2.49*	1089.7	[30.19]	3.84*	974.9	[41.51]
β-Pinene	2.28	1069.6	11.13	3.84*	974.9	[41.51]
Myrcene	3.05*	1134.2	[2.67]	4.13	993.8	2.66
2-Carene	2.56	1096.2	0.01	4.20	998.8	0.01
α-Phellandrene	2.95	1126.8	0.90	4.26*	1002.8	[0.95]
Pseudolimonene	2.99	1129.9	0.06	4.26*	1002.8	[0.95]
Δ3-Carene	2.76	1111.9	1.75	4.36	1008.5	1.76
α-Terpinene	3.14	1141.0	2.76	4.47	1015.7	2.76
meta-Cymene	4.29*	1226.3	[1.48]	4.54*	1019.9	[0.02]
Carvomenthene	2.62	1101.1	0.01	4.54*	1019.9	[0.02]
para-Cymene	4.29*	1226.3	[1.48]	4.59	1023.0	1.47
Limonene	3.38	1158.8	3.80	4.67*	1028.1	[6.49]
1,8-Cineole	3.47	1165.8	2.68	4.67*	1028.1	[6.49]
(*Z*)-β-Ocimene	4.01*	1206.3	[4.39]	4.87	1040.4	0.01
(*E*)-β-Ocimene	4.16	1217.4	0.04	5.02	1050.4	0.04
γ-Terpinene	4.01*	1206.3	[4.39]	5.16	1058.7	4.38
cis-Sabinene hydrate	7.10	1429.3	0.23	5.27	1065.9	0.23
Terpinolene	4.48	1239.8	1.66	5.61*	1086.8	[1.77]
para-Cymenene	6.52	1387.1	0.11	5.61*	1086.8	[1.77]
α-Pinene oxide	5.60	1321.3	0.01	5.70	1092.7	0.01
trans-Sabinene hydrate	8.17	1508.6	0.16	5.76	1096.3	0.15
Unknown MYFR I [m/z 95, 152 (20), 67 (17), 96 (16), 41 (12)]	5.22	1292.2	0.03	5.80	1098.8	0.04
Linalool	8.26	1515.8	0.17	5.86	1102.3	0.17
Unknown ORMA I [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	8.68	1547.9	0.01	5.91	1105.9	0.01
para-Mentha-1,3,8-	6.33	1373.5	0.02	5.96	1108.8	0.01

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triene						
end*o*-Fenchol	8.58	1540.2	0.02	6.01	1111.9	0.02
cis-para-Menth-2-en-1-ol	8.32	1520.7	0.15	6.12	1119.3	0.13
4-Hydroxy-4-methylcyclohex-2-enone	14.26	2025.6	0.02	6.25	1127.2	0.01
cis-para-Mentha-2,8-dien-1-ol	9.68	1626.5	0.01	6.31	1131.4	0.01
trans-Pinocarveol	9.38*	1602.1	[0.03]	6.36	1134.6	0.02
trans-para-Menth-2-en-1-ol	9.17	1585.6	0.09	6.42	1138.2	0.09
Unknown MEAL II [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	7.07	1426.7	0.01	6.49*	1142.9	[0.04]
Epoxyterpinolene	6.93	1416.9	0.03	6.49*	1142.9	[0.04]
Sabinaketone	8.88	1563.4	0.01	6.63	1151.5	0.01
Borneol	9.99*	1651.4	[0.54]	6.82	1163.5	0.02
δ-Terpineol	9.65*	1623.8	[0.18]	6.89	1168.1	0.02
Terpinen-4-ol	8.80	1556.9	5.05	7.02	1176.2	5.06
Cryptone	9.38*	1602.1	[0.03]	7.08	1180.1	0.02
meta-Cymen-8-ol	11.70	1793.4	0.01	7.12	1182.6	0.01
para-Cymen-8-ol	11.73	1796.6	0.06	7.15	1185.1	0.06
α-Terpineol	9.99*	1651.4	[0.54]	7.22	1189.2	0.46
Myrtenol	11.07	1740.6	0.01	7.28*	1193.4	[0.05]
cis-Piperitol	9.75*	1632.0	[0.07]	7.28*	1193.4	[0.05]
cis-α-Phellandrene epoxide (iPr vs Me)	11.24*	1755.1	[0.03]	7.38	1199.5	0.01
trans-Piperitol	10.58*	1699.2	[0.06]	7.49	1206.8	0.04
end*o*-Fenchyl acetate	6.99*	1420.9	[0.07]	7.66	1218.1	0.01
Citronellol	10.93*	1729.0	[0.06]	7.88	1232.4	0.04
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.54	1779.9	0.02	7.91*	1234.8	[0.03]
Unknown MYFR II [m/z 123, 165 (21), 180 (18), 79 (9), 124 (9)]				7.91*	1234.8	[0.03]
Unknown MISC CV [m/z 43, 109 (63), 71 (50), 81 (31), 55 (29), 85 (26)...]	9.91*	1645.0	[0.13]	8.11	1248.0	0.04

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Compound						
Geraniol	11.85*	1806.5	[1.23]	8.26	1257.7	0.06
Linalyl acetate	8.39	1525.6	0.01	8.29	1259.8	0.01
trans-Ascaridole glycol	14.36	2035.6	0.08	8.42	1268.4	0.07
Bornyl acetate	8.45	1530.5	0.09	8.65*	1284.2	[1.24]
Safrole	11.85*	1806.5	[1.23]	8.65*	1284.2	[1.24]
Cuminol	14.43	2042.4	0.01	8.76	1291.7	0.03
Terpinen-4-yl acetate	8.94	1568.3	0.04	8.86	1297.9	0.03
Unknown MYFR III [m/z 81, 55 (82), 41 (58), 69 (51), 67 (49)...]	11.24*	1755.1	[0.03]	8.90	1300.6	0.02
Thymol	15.33	2130.0	0.01	8.92	1301.9	0.01
Unknown MYFR IV [m/z 121, 178 (20), 77 (13), 122 (10)]	8.74	1552.7	0.25	8.99	1306.8	0.25
4-Vinylguaiacol	15.29	2126.4	0.04	9.07	1312.5	0.02
Unknown MEAL I [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	15.18	2114.8	0.04	9.18	1320.5	0.05
Unknown MYFR V [m/z 149, 178 (41), 121 (36), 91 (30), 55 (21)]	9.03	1575.3	0.01	9.35	1332.2	0.02
α-Cubebene	6.99*	1420.9	[0.07]	9.57*	1347.5	[0.17]
α-Terpinyl acetate	9.91*	1645.0	[0.13]	9.57*	1347.5	[0.17]
Citronellyl acetate	9.65*	1623.8	[0.18]	9.68*	1355.3	[0.22]
Eugenol	15.00	2096.9	0.11	9.68*	1355.3	[0.22]
Neryl acetate	10.36*	1681.6	[0.12]	9.82	1365.5	0.02
α-Copaene	7.36	1448.3	0.30	9.92	1372.2	0.31
β-Cubebene	7.98	1494.5	0.01	10.10*	1384.9	[0.17]
Geranyl acetate	10.76	1714.4	0.17	10.10*	1384.9	[0.17]
β-Elemene	8.63*	1544.2	[0.50]	10.16	1389.3	0.03
Methyleugenol	13.52	1956.8	0.79	10.37	1404.1	0.79
β-Caryophyllene	8.63*	1544.2	[0.50]	10.49	1413.1	0.37
trans-α-Bergamotene	8.63*	1544.2	[0.50]	10.77	1433.8	0.13
α-Humulene	9.50	1611.8	0.06	10.95*	1447.3	[0.10]
(*E*)-Isoeugenol	16.70	2269.7	0.05	10.95*	1447.3	[0.10]
(*E*)-β-Farnesene	9.75*	1632.0	[0.07]	11.09	1457.9	0.05
trans-Cadina-1(6),4-diene	9.45	1607.8	0.02	11.25	1469.2	0.01
γ-Muurolene	9.80	1636.2	0.05	11.29	1472.6	0.03
Germacrene D	9.99*	1651.4	[0.54]	11.33	1475.5	0.05

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	R.T.	R.I.	%	R.T.	R.I.	%
trans-Muurola-4(15),5-diene	10.03	1654.4	0.01	11.40	1480.3	0.01
Bicyclogermacrene	10.24	1672.0	0.03	11.53	1490.2	0.03
α-Muurolene	10.28	1674.5	0.02	11.61*	1496.5	[0.21]
Methyl (*E*)-isoeugenol	15.22	2118.5	0.21	11.61*	1496.5	[0.21]
β-Bisabolene	10.36*	1681.6	[0.12]	11.75	1507.1	0.08
(3*E*,6*E*)-α-Farnesene	10.71	1710.4	0.05	11.78*	1508.8	[0.05]
γ-Cadinene	10.58*	1699.2	[0.06]	11.78*	1508.8	[0.05]
Myristicin	15.90	2187.0	1.99	11.90	1518.6	2.12
trans-Cadina-1,4-diene	10.88	1724.3	0.02	12.02	1527.7	0.02
(*E*)-α-Bisabolene	10.93*	1729.0	[0.06]	12.20	1541.8	0.01
Elemicin	15.72	2168.5	2.35	12.40	1558.0	2.34
Spathulenol	14.61	2059.5	0.02	12.57	1571.3	0.01
Caryophyllene oxide	12.99	1908.2	0.02	12.61	1574.4	0.02
Unknown MYFR VII [m/z 165, 121 (81), 181 (25), 238 (25)]	14.20	2019.9	0.03	13.05	1609.1	0.01
(*E*)-Isoelemicin	17.29	2332.7	0.15	13.55	1650.5	0.15
Myristic acid	20.22	2665.2	0.57	15.02	1775.2	0.42
Total reported		98.94%			99.15%	

*: 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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