

Date : September 23, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20114-PTH01

Customer identification : Nutmeg - Indonesia - N40107911R

Type : Essential oil

Source : *Myristica fragrans*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : September 16, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4830 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3215:1999 - OIL OF NUTMEG, INDONESIAN TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Myristicin	5.0	12.0	10.1	Yes
Safrole	1.0	2.5	1.7	Yes
Terpinen-4-ol	2.0	6.0	4.0	Yes
γ-Terpinene	2.0	6.0	3.7	Yes
Limonene	2.0	7.0	3.8	Yes
Δ ³ -Carene	0.5	2.0	1.2	Yes
Sabinene	14	29	19	Yes
β-Pinene	13	18	15	Yes
α-Pinene	15	28	21	Yes
Refractive index	1.4750	1.4850	1.4830	Yes

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
Toluene	tr	Simple phenolic
Tricyclene	0.02	Monoterpene
α -Thujene	1.57	Monoterpene
α -Pinene	21.49	Monoterpene
α -Fenchene	0.06	Monoterpene
Camphene	0.31	Monoterpene
meta-Cymene	0.03	Monoterpene
Sabinene	19.35	Monoterpene
β -Pinene	15.04	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	2.31	Monoterpene
α -Phellandrene	0.79	Monoterpene
Pseudolimonene	0.05	Monoterpene
Δ^3 -Carene	1.20	Monoterpene
α -Terpinene	2.53	Monoterpene
para-Cymene	0.67	Monoterpene
Limonene	3.77	Monoterpene
1,8-Cineole	2.10	Monoterpenic ether
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.04	Monoterpene
γ -Terpinene	3.74	Monoterpene
cis-Sabinene hydrate	0.27	Monoterpenic alcohol
Terpinolene	1.65	Monoterpene
para-Cymenene	0.05	Monoterpene
trans-Sabinene hydrate	0.21	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Linalool	0.24	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.14	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.02	Aliphatic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.09	Monoterpenic alcohol
Epoxyterpinolene	0.03	Monoterpenic ether
Pinocavone	0.01	Monoterpenic ketone
Borneol	0.04	Monoterpenic alcohol
δ -Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	4.04	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α -Terpineol	0.67	Monoterpenic alcohol
cis-Piperitol	0.03	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
trans-Piperitol	0.06	Monoterpenic alcohol

Citronellol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Linalyl acetate	0.04	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Bornyl acetate	0.01	Monoterpenic ester
Safrole	1.65	Phenylpropanoid
Terpinen-4-yl acetate	0.03	Monoterpenic ester
Unknown	0.25	Simple phenolic
1,4-para-Menthadien-7-ol	0.01	Monoterpenic alcohol
Unknown	0.02	Unknown
α -Terpinyl acetate	0.18	Monoterpenic ester
Eugenol	0.39	Phenylpropanoid
Citronellyl acetate	0.07	Monoterpenic ester
Neryl acetate	0.04	Monoterpenic ester
α -Copaene	0.26	Sesquiterpene
Geranyl acetate	0.16	Monoterpenic ester
β -Elemene	0.01	Sesquiterpene
Vanillin	0.01	Simple phenolic
Methyleugenol	0.25	Phenylpropanoid
β -Caryophyllene	0.08	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.09	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.79	Phenylpropanoid
(<i>E</i>)- β -Farnesene	0.02	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.01	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
Methyl (<i>E</i>)-isoeugenol	0.06	Phenylpropanoid
β -Bisabolene	0.04	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.05	Sesquiterpene
δ -Cadinene	0.04	Sesquiterpene
Myristicin	10.12	Phenylpropanoid
<i>trans</i> -Cadina-1,4-diene	0.03	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.01	Sesquiterpene
Elemicin	0.30	Phenylpropanoid
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Methoxyeugenol	0.40	Phenylpropanoid
Unknown	0.02	Phenylpropanoid
Myristic acid	0.12	Aliphatic acid
Palmitic acid	0.04	Aliphatic acid
Consolidated total	98.55%	

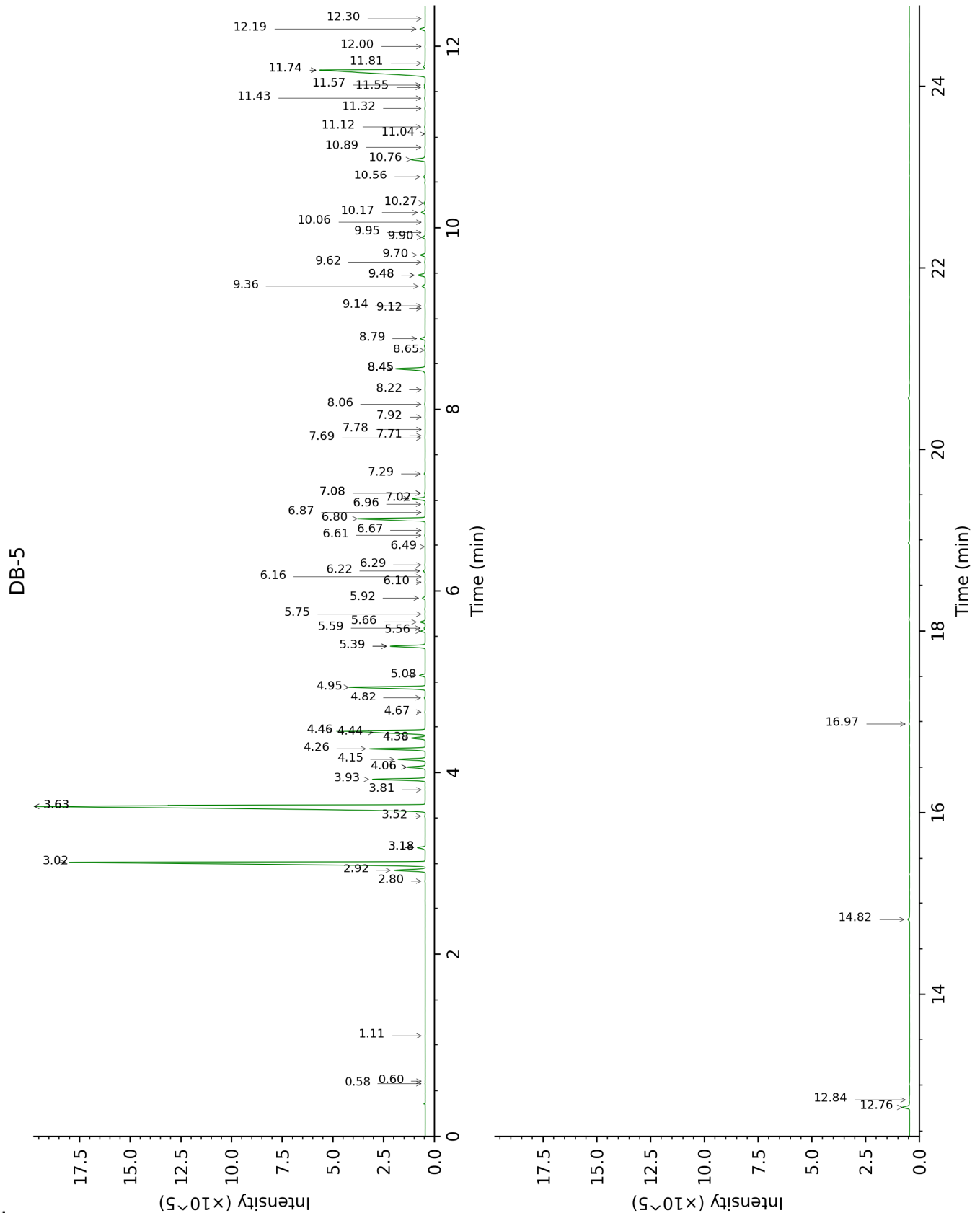
tr: The compound has been detected below 0.005% of total signal.

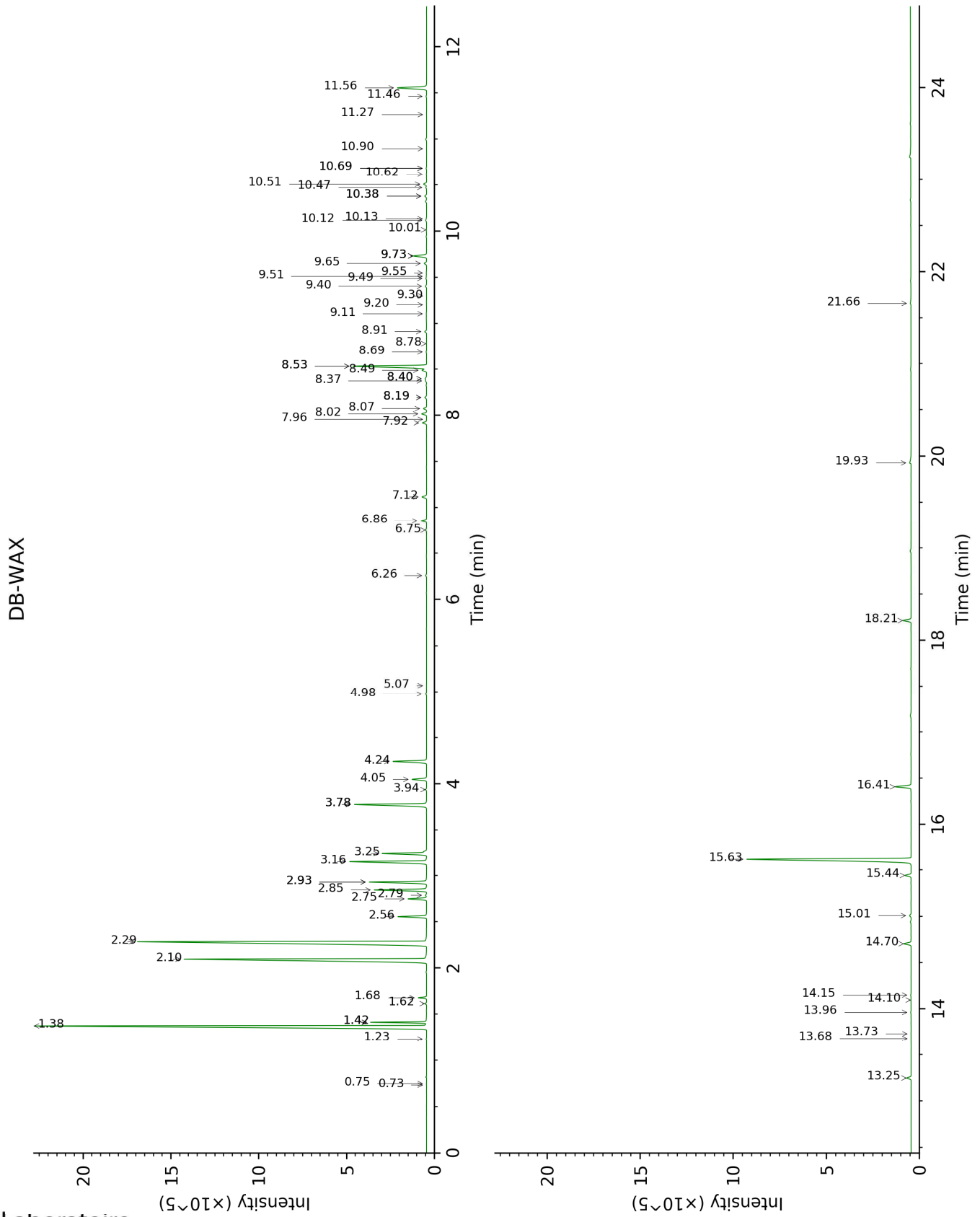
Note: no correction factor was applied

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.

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





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	639	tr	0.75	883	tr
2-Methylbutyral	0.60	650	tr	0.73	877	tr
Toluene	1.11	758	tr	1.42*	1000	1.63
Tricyclene	2.80	918	0.02	1.23	971	0.02
α -Thujene	2.92	925	1.57	1.42*	1000	[1.63]
α -Pinene	3.02	932	21.49	1.38	994	21.29
α -Fenchene	3.18*	942	0.37	1.62	1020	0.06
Camphene	3.18*	942	[0.37]	1.68	1026	0.31
meta-Cymene	3.52	966	0.03	2.93*	1139	2.54
Sabinene	3.63*	973	34.68	2.29	1086	19.35
β -Pinene	3.63*	973	[34.68]	2.10	1067	15.04
6-Methyl-5-hepten-2-one	3.81	985	0.01	5.07	1295	0.01
Myrcene	3.93	992	2.31	2.85	1132	2.30
α -Phellandrene	4.06*	1001	0.85	2.75	1125	0.79
Pseudolimonene	4.06*	1001	[0.85]	2.79	1128	0.05
Δ^3 -Carene	4.15	1007	1.20	2.56	1110	1.19
α -Terpinene	4.26	1014	2.53	2.93*	1139	[2.54]
para-Cymene	4.38	1021	0.67	4.05	1224	0.69
Limonene	4.44†	1025	5.88	3.16	1157	3.77
1,8-Cineole	4.46†	1026	[5.88]	3.25	1164	2.10
(Z)- β -Ocimene	4.67	1039	0.02	3.78*	1204	3.76
(E)- β -Ocimene	4.82	1049	0.04	3.94	1216	0.04
γ -Terpinene	4.94	1057	3.74	3.78*	1204	[3.76]
cis-Sabinene hydrate	5.08	1065	0.27	6.86	1425	0.28
Terpinolene	5.40*	1085	1.70	4.24	1238	1.65
para-Cymenene	5.40*	1085	[1.70]	6.26	1381	0.05
trans-Sabinene hydrate	5.56	1096	0.21	7.92	1505	0.22
Unknown [m/z 95, 152 (20), 67 (17), 96 (16), 41 (12)]	5.59	1098	0.05	4.98	1291	0.06
Linalool	5.66	1102	0.24	8.02	1513	0.25
Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	5.75	1107	0.01	8.49	1549	0.25
cis-para-Menth-2-en-1-ol	5.92	1118	0.14	8.07	1517	0.17
4-Hydroxy-4-methylcyclohex-2-enone	6.10	1130	0.02	14.10	2032	0.01
trans-Pinocarveol	6.16	1133	0.01	9.20	1605	0.01
trans-para-Menth-2-en-1-ol	6.22	1137	0.09	8.91	1582	0.10

Epoxyterpinolene	6.29	1142	0.03	6.75	1418	0.06
Pinocarvone	6.49	1154	0.01	7.96	1508	0.01
Borneol	6.61	1162	0.04	9.73*	1648	0.72
δ-Terpineol	6.66	1166	0.01	9.49	1628	0.04
Terpinen-4-ol	6.80	1174	4.04	8.53*	1553	4.07
Cryptone	6.87	1179	0.02	9.11	1597	0.04
para-Cymen-8-ol	6.96	1184	0.04	11.46	1793	0.03
α-Terpineol	7.02	1188	0.67	9.73*	1648	[0.72]
cis-Piperitol	7.08*	1192	0.06	9.55	1633	0.03
Myrtenol	7.08*	1192	[0.06]	10.90	1745	0.01
trans-Piperitol	7.29	1206	0.06	10.38*	1701	0.10
Citronellol	7.69	1232	0.02	10.69*	1727	0.02
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.71	1234	0.01	11.27	1776	0.01
Unknown [m/z 123, 165 (21), 180 (18), 79 (9), 124 (9)]	7.78	1238	0.01			
Unknown [m/z 43, 109 (63), 71 (50), 81 (31), 55 (29), 85 (26)...]	7.92	1247	0.01			
Linalyl acetate	8.06	1257	0.04	8.19*	1526	0.10
trans-Ascaridole glycol	8.22	1267	0.01	14.15	2038	0.03
Bornyl acetate	8.45*	1283	1.66	8.19*	1526	[0.10]
Safrole	8.45*	1283	[1.66]	11.56	1801	1.65
Terpinen-4-yl acetate	8.65	1296	0.03	8.69	1565	0.03
Unknown [m/z 121, 178 (20), 77 (13), 122 (10)]	8.79	1305	0.25	8.53*	1553	[4.07]
1,4-para- Menthadien-7-ol	9.12	1328	0.01	13.73	1997	0.01
Unknown [m/z 149, 178 (41), 121 (36), 91 (30), 55 (21)]	9.14	1330	0.02	8.78	1572	0.01
α-Terpinyl acetate	9.36	1345	0.18	9.65	1642	0.14
Eugenol	9.48*	1354	0.43	14.70	2091	0.39
Citronellyl acetate	9.48*	1354	[0.43]	9.40	1622	0.07
Neryl acetate	9.62	1364	0.04	10.13	1681	0.01
α-Copaene	9.70	1369	0.26	7.12	1445	0.26
Geranyl acetate	9.90	1383	0.16	10.51	1712	0.16
β-Elemene	9.95	1386	0.01	8.40*	1542	0.10
Vanillin	10.06	1394	0.01			
Methyleugenol	10.17	1402	0.25	13.25	1953	0.22
β-Caryophyllene	10.27	1410	0.08	8.40*	1542	[0.10]
trans-α- Bergamotene	10.56	1431	0.09	8.37	1540	0.06
(E)-Isoeugenol	10.76	1446	0.79	16.41	2263	0.85

(E)-β-Farnesene	10.89	1456	0.02	9.51	1630	0.02
<i>trans</i> -Cadina-1(6),4-diene	11.04	1467	0.01	9.30	1613	0.01
Germacrene D	11.12	1473	0.03	9.73*	1648	[0.72]
Bicyclogermacrene	11.32	1488	0.02	10.01	1671	0.03
Methyl (E)-isoeugenol	11.43	1496	0.06	15.01	2121	0.09
β-Bisabolene	11.55	1505	0.04	10.12	1679	0.06
(3E,6E)-α-Farnesene	11.57	1507	0.05	10.47	1709	0.05
δ-Cadinene	11.74*	1520	10.04	10.38*	1701	[0.10]
Myristicin	11.74*	1520	[10.04]	15.63	2183	10.12
<i>trans</i> -Cadina-1,4-diene	11.81	1526	0.03	10.62	1721	0.01
(E)-α-Bisabolene	12.00	1540	0.01	10.69*	1727	[0.02]
Elemicin	12.19	1555	0.30	15.44	2164	0.31
Germacrene D-4-ol	12.30	1564	0.01	13.68	1992	0.01
Methoxyeugenol	12.76	1600	0.40	18.21	2458	0.43
Unknown [m/z 165, 121 (81), 181 (25), 238 (25)]	12.84	1607	0.02	13.96	2020	0.02
Myristic acid	14.82	1775	0.12	19.93	2656	0.14
Palmitic acid	16.97	1973	0.04	21.66	2870	0.05
Total identified		98.33%			98.22%	
Total reported		98.73%			98.58%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not 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