Date : January 18, 2021

Certificate of Analysis – GC Profiling

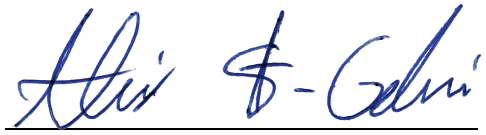
Sample identification

Internal code : 21A15-PTH01
Customer identification : Sweet Fennel - Hungary - F10110202R
Type : Essential oil
Source : *Foeniculum vulgare*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Alexis St-Gelais, M. Sc., chimiste
Analysis date : January 17, 2021

Checked and approved by :



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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Physical aspect: Clear liquid
Refractive index: 1.5451 ± 0.0003 (20 °C; method PC-MAT-016)

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
Tricyclene	0.02	Monoterpene
α-Pinene	5.42	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.04	Monoterpene
β-Pinene	0.02	Monoterpene
Sabinene	0.02	Monoterpene
Myrcene	0.11	Monoterpene
trans-Dehydroxylinalool oxide	0.01	Monoterpenic ether
α-Phellandrene	0.05	Monoterpene
cis-Dehydroxylinalool oxide	tr	Monoterpenic ether
Δ3-Carene	0.01	Monoterpene
α-Terpinene	tr	Monoterpene
para-Cymene	0.04	Monoterpene
Limonene	5.77	Monoterpene
β-Phellandrene	0.12*	Monoterpene
1,8-Cineole	[0.12]*	Monoterpenic ether
(*Z*)-β-Ocimene	tr	Monoterpene
γ-Terpinene	0.06	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Fenchone	1.87	Monoterpenic ketone
Terpinolene	0.03	Monoterpene
α-Pinene oxide	0.01	Monoterpenic ether
Linalool	0.02	Monoterpenic alcohol
trans-Pinene hydrate	tr	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	tr	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.05	Monoterpenic ketone
Unknown	tr	Oxygenated monoterpene
Terpinen-4-ol	tr	Monoterpenic alcohol
α-Terpineol	0.01	Monoterpenic alcohol
Methylchavicol	3.06	Phenylpropanoid
Dihydroanethole	0.01	Phenylpropanoid
trans-Carveol	0.01	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
(*Z*)-Anethole	0.06	Phenylpropanoid
para-Anisaldehyde	0.16	Simple phenolic
(*E*)-Anethole	82.00	Phenylpropanoid
(*Z*)-Anethole epoxide?	0.02	Phenylpropanoid
Unknown	0.15	Phenylpropanoid
para-Acetonylanisole	0.03	Phenylpropanoid

1-(4-Methoxyphenyl)-1-propanol	0.01	Phenylpropanoid
β-Caryophyllene	0.04	Sesquiterpene
trans-α-Bergamotene	0.01	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
Unknown	tr	Phenylpropanoid
Unknown	0.01	Phenylpropanoid
Unknown	tr	Phenylpropanoid
Verimol C, isomer I	0.01	Lignan
Verimol C, isomer II	tr	Lignan
Consolidated total	**99.36%**	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
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.

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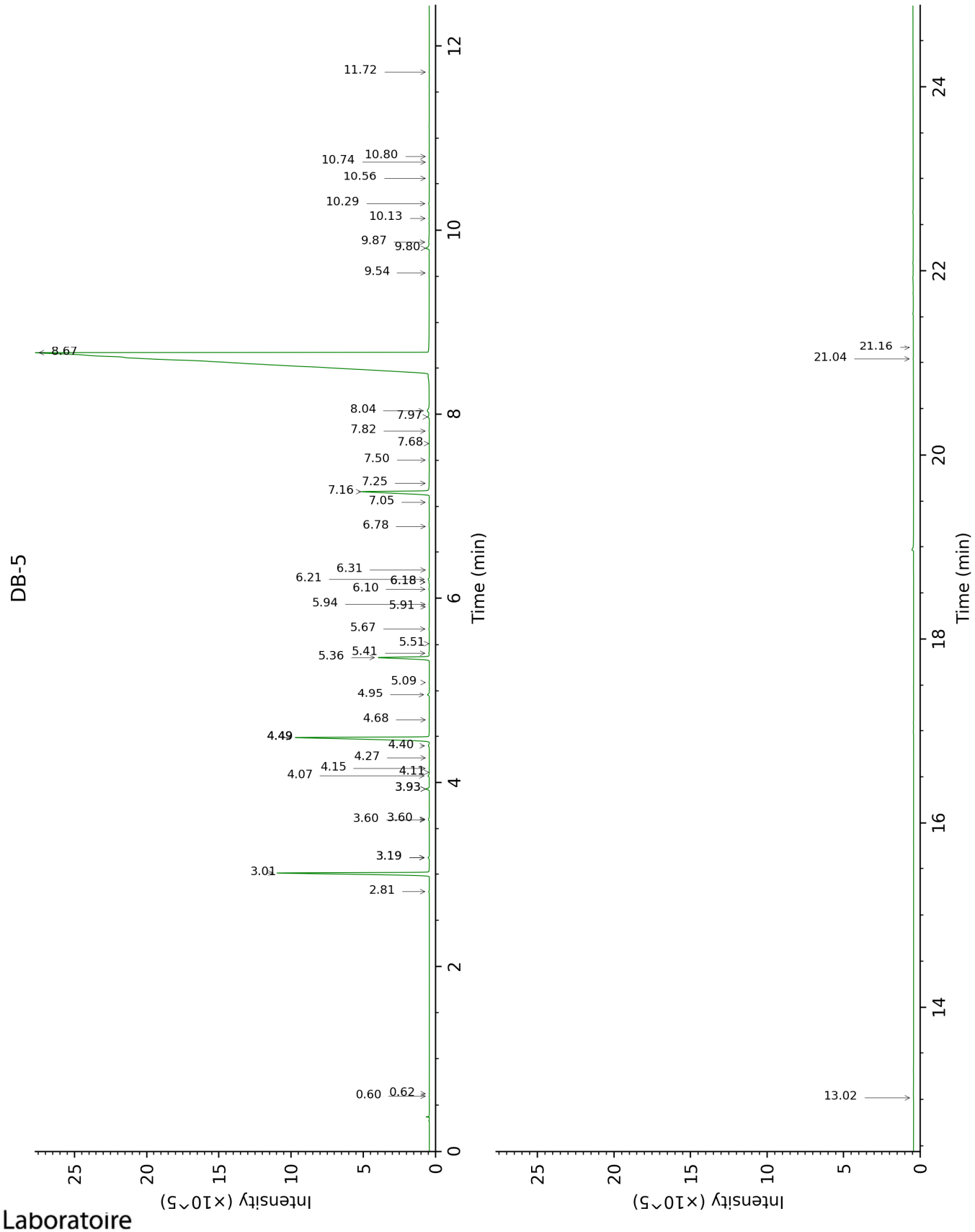

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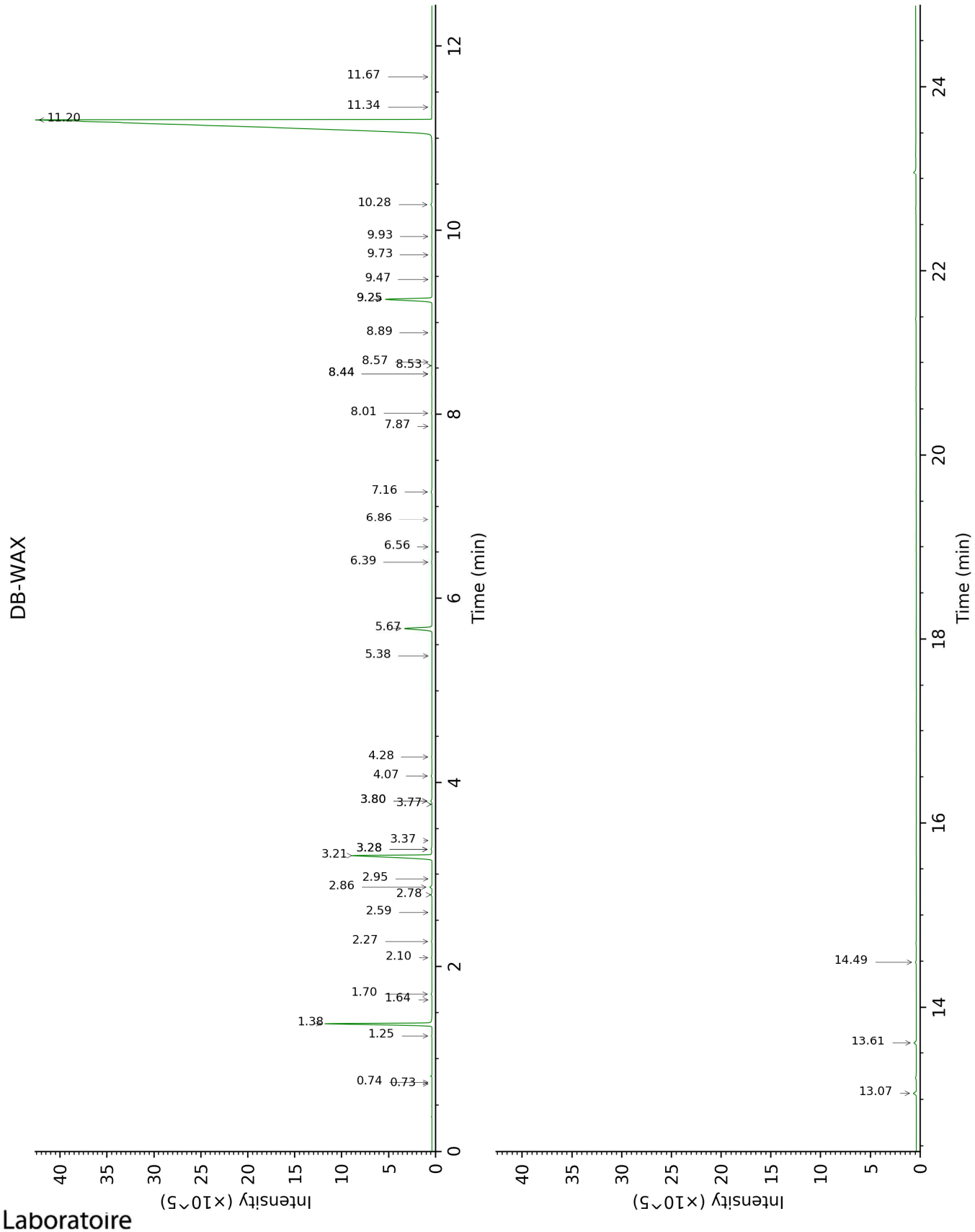
DB-WAX
11.67
11.34
11.20
10.28
9.93
9.73
9.47
9.25
8.89
8.57
8.53
8.44
8.01
7.87
7.16
6.86
6.56
6.39
5.67
5.38
4.28
4.07
3.80
3.77
3.37
3.28
3.21
2.95
2.86
2.78
2.59
2.27
2.10
1.70
1.64
1.38
1.25
0.74
0.73
14.49
13.61
13.07
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.60	638	tr	0.74	888	tr
2-Methylbutyral	0.62	650	tr	0.73	882	tr
Tricyclene	2.81	918	0.02	1.25	978	0.02
α-Pinene	3.01	931	5.42	1.38	1000	5.35
α-Fenchene	3.19*	943	0.04	1.64	1026	0.01
Camphene	3.19*	943	[0.04]	1.70	1032	0.04
β-Pinene	3.60	970	0.02	2.10	1071	0.02
Sabinene	3.60	970	0.02	2.27	1088	0.03
Myrcene	3.93*	992	0.11	2.86	1136	0.11
trans-Dehydroxylinalool oxide	3.93*	992	[0.11]	3.37	1175	0.01
α-Phellandrene	4.07	1001	0.05	2.78	1129	0.05
cis-Dehydroxylinalool oxide	4.11	1004	tr	3.76	1205	tr
Δ3-Carene	4.15	1006	0.01	2.59	1115	0.01
α-Terpinene	4.27	1013	tr	2.95	1143	tr
para-Cymene	4.40	1022	0.04	4.07	1227	0.04
Limonene	4.49*	1027	5.89	3.21	1163	5.77
β-Phellandrene	4.49*	1027	[5.89]	3.28*	1168	0.08
1,8-Cineole	4.49*	1027	[5.89]	3.28*	1168	[0.08]
(*Z*)-β-Ocimene	4.68	1039	tr	3.80*	1208	0.07
γ-Terpinene	4.95	1056	0.06	3.80*	1208	[0.07]
cis-Sabinene hydrate	5.09	1065	0.01	6.86	1428	0.01
Fenchone	5.36	1082	1.87	5.68	1342	1.83
Terpinolene	5.41	1084	0.03	4.28	1242	0.02
α-Pinene oxide	5.51	1091	0.01	5.38	1321	tr
Linalool	5.67	1101	0.02	8.01	1515	0.03
trans-Pinene hydrate	5.91	1116	tr	7.87	1504	0.01
trans-para-Mentha-2,8-dien-1-ol	5.94	1118	0.01	8.89	1583	0.01
cis-Limonene oxide	6.10	1128	0.02	6.39	1394	0.02
cis-para-Mentha-2,8-dien-1-ol	6.18*	1133	0.02	9.47	1629	tr
trans-Limonene oxide	6.18*	1133	[0.02]	6.56	1406	0.01
Camphor	6.21	1135	0.05	7.16	1451	0.05
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.31	1142	tr			
Terpinen-4-ol	6.78	1172	tr	8.57	1558	0.01
α-Terpineol	7.05	1189	0.01	9.73	1651	0.02

Methylchavicol	7.16	1196	3.06	9.25*	1612	3.08
Dihydroanethole	7.25	1202	0.01	8.53	1555	0.01
trans-Carveol	7.50	1219	0.01	11.34	1785	0.01
cis-Carveol	7.68	1231	0.01	11.67	1814	0.01
Carvone	7.82	1240	0.01	9.93	1667	0.02
(*Z*)-Anethole	7.97	1251	0.06	10.28	1695	0.06
para-Anisaldehyde	8.04	1255	0.16	13.07	1941	0.19
(*E*)-Anethole	8.67	1298	82.00	11.20	1774	81.86
(*Z*)-Anethole epoxide?	9.54	1356	0.02			
Unknown [121, 91 (60), 120 (39), 164 (37), 77 (34), 135 (26)]	9.80	1375	0.15	13.61	1991	0.15
para-Acetonylanisole	9.87	1380	0.03	14.49	2077	0.05
1-(4-Methoxyphenyl)-1-propanol	10.13	1398	0.01			
β-Caryophyllene	10.29	1410	0.04	8.44*	1548	0.02
trans-α-Bergamotene	10.56	1430	0.01	8.44*	1548	[0.02]
α-Humulene	10.74	1444	0.01	9.25*	1612	[3.08]
Unknown [m/z 121, 164 (34), 91 (13), 135 (11), 77 (11), 122 (9), 65 (6), 78 (6)]	10.80	1448	tr			
Unknown [m/z 137, 148 (14), 121 (14), 208 (13)]	11.72	1517	0.01			
Unknown [m/z 137, 131 (46), 166 (44), 109 (26), 77 (21)...]	13.02	1620	tr			
Verimol C, isomer I	21.04	2406	0.01			
Verimol C, isomer II	21.16	2421	tr			
Total identified		**99.19%**			**98.94%**	
Total reported		**99.36%**			**99.09%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
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