CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22J28-NSO02
Customer identification : Organic EO: Bergamot, FCF Lot# B123010 - Botanical Species: Citrus bergamia
Type : Essential oil
Source : *Citrus bergamia*
Customer : Natural Sourcing LLC

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 : Amélie Simard, Analyste
Analysis date : November 09, 2022

Checked and approved by :

_____
Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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Essential oil, *Citrus bergamia*
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Report prepared for
Natural Sourcing LLC

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4640 ± 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
Tricyclene	0.01	Monoterpene
α-Thujene	0.28	Monoterpene
α-Pinene	1.15	Monoterpene
Camphene	0.04	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β-Pinene	6.27	Monoterpene
Sabinene	1.03	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.97	Monoterpene
α-Phellandrene	0.03	Monoterpene
Δ3-Carene	tr	Monoterpene
Octanal	0.03	Aliphatic aldehyde
α-Terpinene	0.12	Monoterpene
para-Cymene	1.01	Monoterpene
1,8-Cineole	0.23	Monoterpenic ether
Limonene	40.03	Monoterpene
(Z)-β-Ocimene	0.04	Monoterpene
(E)-β-Ocimene	0.16	Monoterpene
γ-Terpinene	5.74	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.04	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.24	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	14.83	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.02	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
Epoxyterpinolene	0.01	Monoterpenic ether
Terpinen-4-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.03	Monoterpenic alcohol
Hodiendiol	0.01	Monoterpenic alcohol
Decanal	0.01	Aliphatic aldehyde
Octyl acetate	0.03	Aliphatic ester
Nerol	0.02	Monoterpenic alcohol
Neral	0.05	Monoterpenic aldehyde
Linalyl acetate	24.98	Monoterpenic ester
Geraniol	0.03	Monoterpenic alcohol
(trans?)-Linalool oxide acetate (fur.)?	0.05	Monoterpenic ester
Geranial	0.05	Monoterpenic aldehyde
Bornyl acetate	0.01	Monoterpenic ester
Hodiendiol derivative	0.02	Oxygenated monoterpene

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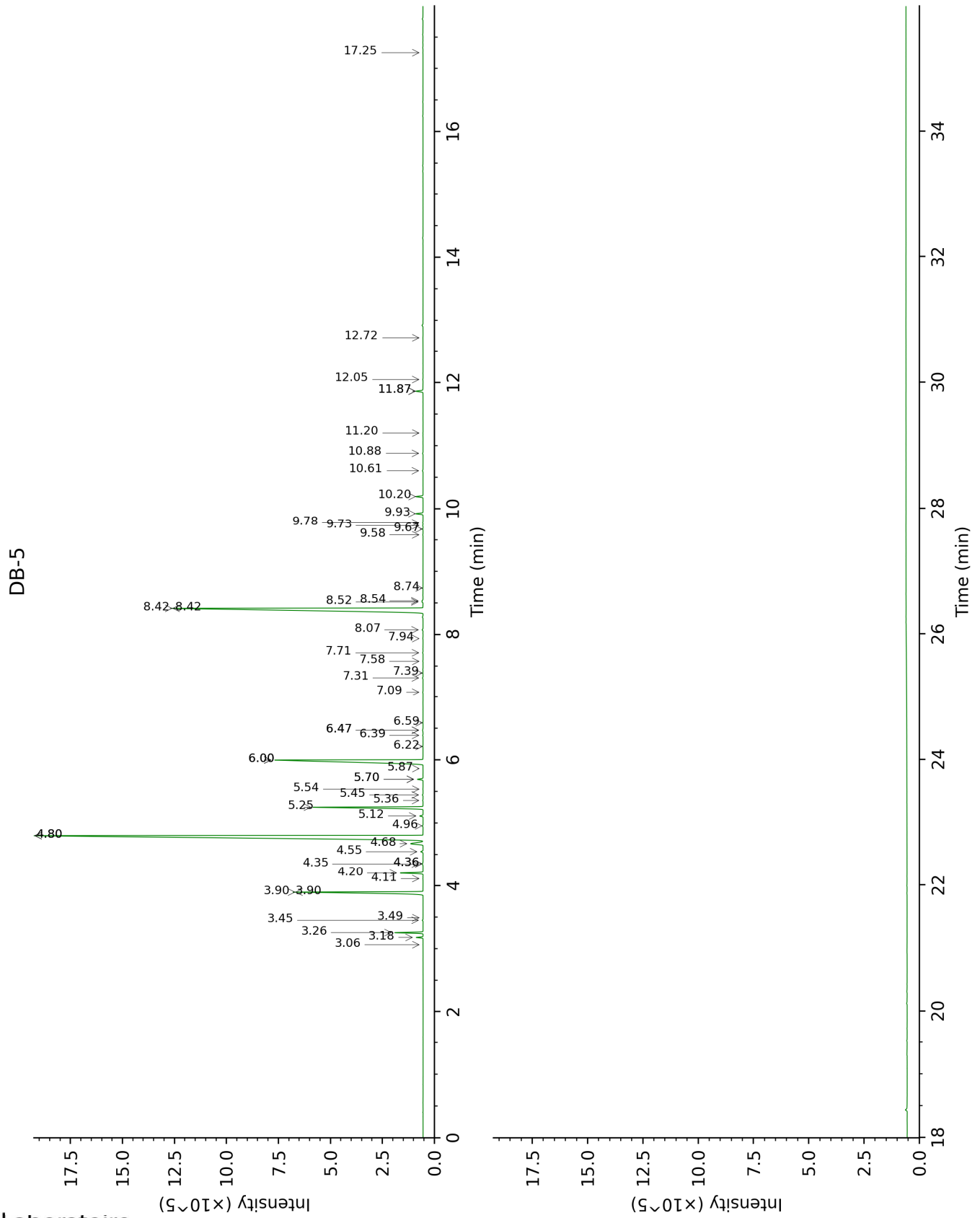|		
α-Terpinyl acetate	0.02	Monoterpenic ester
Unknown	0.02	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.35	Monoterpenic ester
Geranyl acetate	0.35	Monoterpenic ester
β-Caryophyllene	0.03	Sesquiterpene
trans-α-Bergamotene	0.03	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
β-Bisabolene	0.37	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
β-Sesquiphellandrene	0.02	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
Unknown	0.01	Unknown
Consolidated total	**99.02%**	

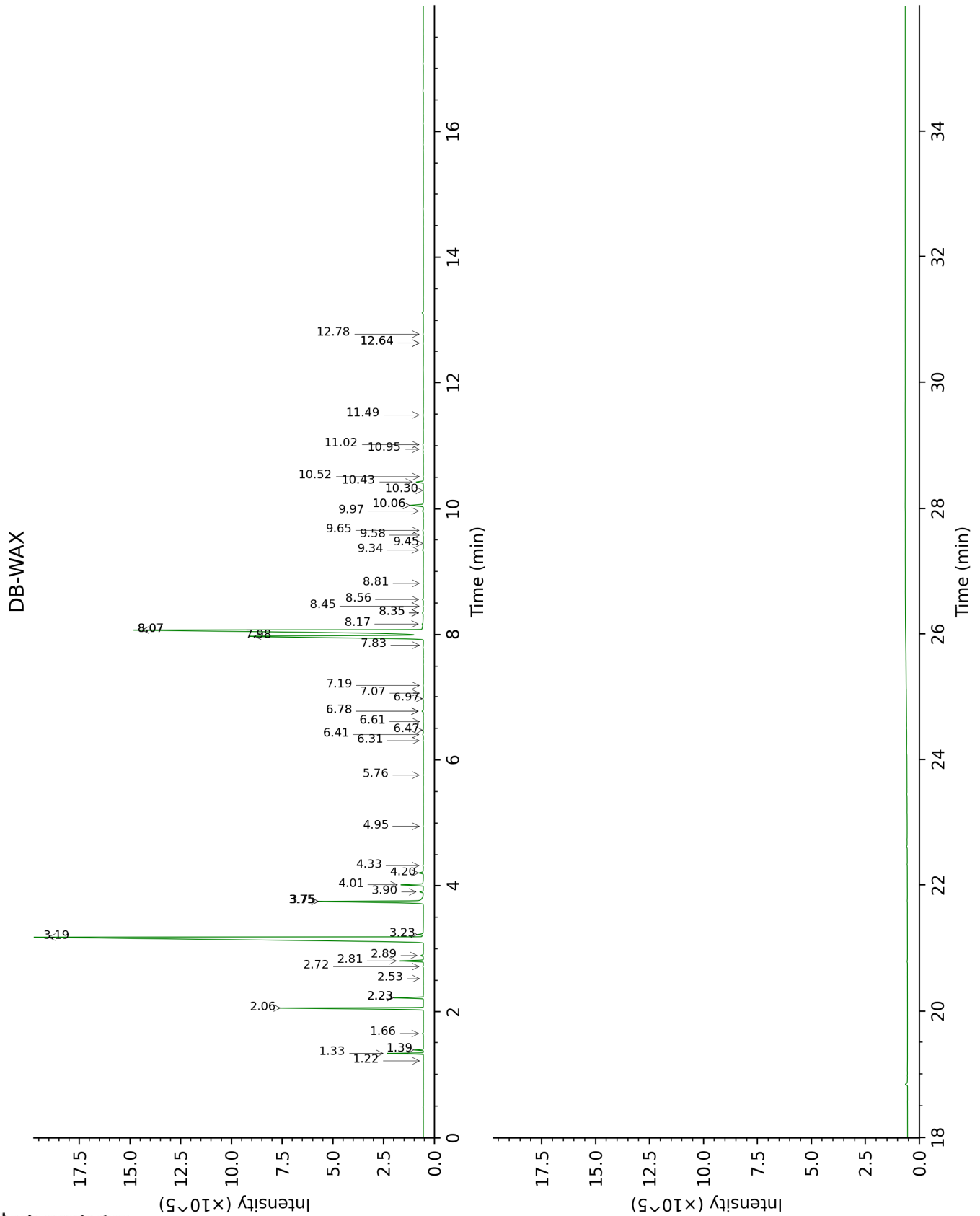tr: The compound has been detected below 0.005% of total signal.

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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DB-5

DB-WAX

Time (min)

Time (min)

Intensity (×10^5)

Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Tricyclene	3.06	919	0.01	1.22	974	tr
α-Thujene	3.18	926	0.28	1.39	1001	0.27
α-Pinene	3.26	932	1.15	1.33	994	1.14
Camphene	3.45	944	0.04	1.66	1028	0.04
Thuja-2,4(10)-diene	3.49	947	0.01	2.23*	1086	1.07
β-Pinene	3.90*	974	7.30	2.06	1069	6.27
Sabinene	3.90*	974	[7.30]	2.23*	1086	[1.07]
6-Methyl-5-hepten-2-one	4.11	988	0.01	4.95	1302	0.02
Myrcene	4.20	994	0.97	2.81	1135	0.97
α-Phellandrene	4.35	1003	0.03	2.72	1128	0.03
Δ3-Carene	4.36*	1004	0.04	2.53	1112	tr
Octanal	4.36*	1004	[0.04]	4.33	1254	0.03
α-Terpinene	4.55	1016	0.12	2.89	1142	0.12
para-Cymene	4.68	1024	1.01	4.02	1230	1.03
1,8-Cineole	4.80*	1032	40.15	3.23	1169	0.23
Limonene	4.80*	1032	[40.15]	3.19	1165	40.03
(Z)-β-Ocimene	4.96	1041	0.04	3.75*	1211	5.65
(E)-β-Ocimene	5.12	1051	0.16	3.90	1222	0.17
γ-Terpinene	5.25	1060	5.74	3.75*	1211	[5.65]
cis-Sabinene hydrate	5.36	1066	0.02	6.78*	1428	0.07
cis-Linalool oxide (fur.)	5.45	1072	0.04	6.40	1401	0.04
Octanol	5.54	1078	0.02	8.07*	1527	25.00
Terpinolene	5.70*	1087	0.27	4.20	1245	0.24
trans-Linalool oxide (fur.)	5.70*	1087	[0.27]	6.78*	1428	[0.07]
trans-Sabinene hydrate	5.87	1098	0.01	7.83	1508	0.01
Linalool	6.00*	1106	14.72	7.98	1519	14.83
Nonanal	6.00*	1106	[14.72]	5.76	1354	0.02
trans-para-Mentha-2,8-dien-1-ol	6.22	1120	0.01	8.81	1584	0.01
cis-Limonene oxide	6.39	1131	0.02	6.31	1394	0.02
trans-Limonene oxide	6.47*	1136	0.05	6.48	1406	0.02
Camphor	6.47*	1136	[0.05]	7.07	1451	0.01
Epoxyterpinolene	6.59	1144	0.01	6.61	1416	0.01
Terpinen-4-ol	7.09	1176	0.02	8.45	1556	0.01
α-Terpineol	7.31	1190	0.03	9.65	1652	0.04
Hodiendiol	7.39	1195	0.01	12.64*	1909	0.02
Decanal	7.58	1207	0.01	7.19	1460	0.02
Octyl acetate	7.71	1216	0.03	6.97	1443	0.03
Nerol	7.94	1231	0.02	10.95	1760	0.03
Neral	8.08	1240	0.05	9.34	1626	0.05
Linalyl acetate	8.42*	1263	25.17	8.07*	1527	[25.00]
Geraniol	8.42*	1263	[25.17]	11.49	1807	0.03

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Compound	R.T.	R.I.	%	R.T.	R.I.	%
(*trans*?)-Linalool oxide acetate (fur.)?	8.52	1270	0.05	8.56	1564	0.05
Geranial	8.54	1271	0.05	9.97	1678	0.05
Bornyl acetate	8.74	1284	0.01	8.17	1534	0.06
Hodiendiol derivative	9.58	1343	0.02	12.78	1922	0.02
α-Terpinyl acetate	9.67	1349	0.02	9.58	1646	0.02
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.73	1353	0.02			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.78	1357	0.02	11.02	1766	0.03
Neryl acetate	9.93	1367	0.35	10.06*	1685	0.72
Geranyl acetate	10.20	1386	0.35	10.43	1716	0.36
β-Caryophyllene	10.61	1415	0.03	8.34*	1548	0.04
trans-α-Bergamotene	10.88	1436	0.03	8.34*	1548	[0.04]
(*E*)-β-Farnesene	11.20	1460	0.01	9.45	1635	0.01
β-Bisabolene	11.87*	1509	0.39	10.06*	1685	[0.72]
γ-Cadinene	11.87*	1509	[0.39]	10.30	1705	0.02
β-Sesquiphellandrene	12.05	1524	0.02	10.52	1723	0.02
Caryophyllene oxide	12.72	1576	0.01	12.64*	1909	[0.02]
Unknown [m/z 266, 43 (89), 44 (67), 176 (49), 207 (44), 55 (38)...]	17.25	1969	0.01			
Total identified		**98.93%**			**98.90%**	
Total reported		**98.98%**			**98.93%**	

*: 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

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