Date : August 26, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21H12-PTH05
Customer identification : Rosalina - Australia - R201072010R
Type : Essential oil
Source : *Melaleuca ericifolia* ct. Linalool
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 : Seydou Ka, Ph. D.
Analysis date : August 23, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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: Faintly yellow liquid
Refractive index: 1.4668 ± 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
Isobutyral	0.04	Aliphatic aldehyde
Isobutanol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
3-Methyl-2-butanone	0.04	Aliphatic ketone
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Methylbutanol	tr	Aliphatic alcohol
3-Methyl-2-pentanone	0.02	Aliphatic ketone
Isobutyric acid	0.03	Aliphatic acid
Octane	0.01	Alkane
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Isoamyl acetate	tr	Aliphatic ester
Tricyclene	0.03	Monoterpene
α-Thujene	0.23	Monoterpene
α-Pinene	12.28	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.02	Monoterpene
β-Pinene	1.32	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
trans-Dehydroxylinalool oxide	0.04	Monoterpenic ether
Myrcene	0.31	Monoterpene
α-Phellandrene	0.07	Monoterpene
Pseudolimonene	0.05	Monoterpene
Δ3-Carene	0.01	Monoterpene
cis-Dehydroxylinalool oxide	0.03	Monoterpenic ether
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.32	Monoterpene
para-Cymene	2.11	Monoterpene
Limonene	3.54	Monoterpene
1,8-Cineole	25.84	Monoterpenic ether
(*Z*)-β-Ocimene	0.03	Monoterpene
(*E*)-β-Ocimene	0.32	Monoterpene
γ-Terpinene	1.84	Monoterpene
cis-Linalool oxide (fur.)	0.74	Monoterpenic alcohol
Terpinolene	0.72	Monoterpene
para-Cymenene	0.03	Monoterpene
trans-Linalool oxide (fur.)	0.56	Monoterpenic alcohol
Linalool	31.86	Monoterpenic alcohol
Hotrienol	0.18	Monoterpenic alcohol
endo-Fenchol	0.13	Monoterpenic alcohol
cis-Rose oxide	tr	Monoterpenic ether
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α-Campholenal	0.03	Monoterpenic aldehyde
trans-Pinocarveol	0.07	Monoterpenic alcohol

trans-para-Menth-2-en-1-ol	tr	Monoterpenic alcohol
Unknown	0.09	Oxygenated monoterpene
cis-α-Dihydroterpineol	0.07	Monoterpenic alcohol
Unknown	0.03	Unknown
Borneol	0.05	Monoterpenic alcohol
δ-Terpineol	0.10	Monoterpenic alcohol
Terpinen-4-ol	1.83	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
α-Terpineol	3.52	Monoterpenic alcohol
cis-Piperitol	0.04	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
trans-Carveol	0.03	Monoterpenic alcohol
Nerol	0.10	Monoterpenic alcohol
Citronellol	0.15	Monoterpenic alcohol
Neral	0.08	Monoterpenic aldehyde
Unknown	0.05	Unknown
Geraniol	0.30	Monoterpenic alcohol
Chavicol	0.01	Phenylpropanoid
Geranial	0.11	Monoterpenic aldehyde
cis-Ascaridole glycol	0.01	Monoterpenic alcohol
Geranyl formate	0.02	Monoterpenic ester
Methyl geranate	0.09	Monoterpenic ester
α-Cubebene	0.01	Sesquiterpene
Eugenol	0.01	Phenylpropanoid
Isoledene	0.10	Sesquiterpene
α-Copaene	0.03	Sesquiterpene
7-Cubebene	0.07	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Elemene	0.03	Sesquiterpene
Phenylethyl isobutyrate	0.42	Phenolic ester
α-Gurjunene	0.25	Sesquiterpene
β-Caryophyllene	0.54	Sesquiterpene
γ-Maaliene	0.07	Sesquiterpene
β-Gurjunene	0.10	Sesquiterpene
α-Maaliene	0.04	Sesquiterpene
Aromadendrene	1.84	Sesquiterpene
Selina-5,11-diene	0.14	Sesquiterpene
Unknown	0.01	Sesquiterpene
trans-Muurola-3,5-diene	0.03	Sesquiterpene
α-Humulene	0.09	Sesquiterpene
Valerena-4,7(11)-diene	0.02	Sesquiterpene
allo-Aromadendrene	0.77	Sesquiterpene
cis-Cadina-1(6),4-diene	0.05	Sesquiterpene
trans-Cadina-1(6),4-diene	0.03	Sesquiterpene
γ-Gurjunene	0.01	Sesquiterpene
Selina-4,11-diene	0.03	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
β-Selinene	0.20	Sesquiterpene
allo-Aromadendr-9-ene	0.14	Sesquiterpene
δ-Selinene	0.07	Sesquiterpene
α-Selinene	0.15	Sesquiterpene
Viridiflorene	0.61	Sesquiterpene

Bicyclogermacrene	0.51	Sesquiterpene
α-Muurolene	0.04	Sesquiterpene
δ-Guaiene	0.01	Sesquiterpene
γ-Cadinene	0.06	Sesquiterpene
Unknown	0.05	Sesquiterpene
δ-Cadinene	0.16	Sesquiterpene
trans-Calamenene	0.06	Sesquiterpene
Zonarene	0.07	Sesquiterpene
trans-Cadina-1,4-diene	0.05	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
α-Elemol	0.02	Sesquiterpenic alcohol
Epiglobulol	0.09	Sesquiterpenic alcohol
Palustrol	0.10	Sesquiterpenic alcohol
Maaliol	0.01	Sesquiterpenic alcohol
Spathulenol	0.27	Sesquiterpenic alcohol
Caryophyllene oxide	0.20	Sesquiterpenic ether
Globulol	0.40	Sesquiterpenic alcohol
Viridiflorol	0.47	Sesquiterpenic alcohol
Cubeban-11-ol	0.09	Sesquiterpenic alcohol
Ledol	0.29	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Rosifoliol	0.12	Sesquiterpenic alcohol
1-epi-Cubenol	0.06	Sesquiterpenic alcohol
γ-Eudesmol	0.02	Sesquiterpenic alcohol
Isospathulenol	0.11	Sesquiterpenic alcohol
Cubenol	0.04	Sesquiterpenic alcohol
α-Muurolol	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.05	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Methyl eudesmate	0.01	Phenolic ester
Consolidated total	**99.09%**	

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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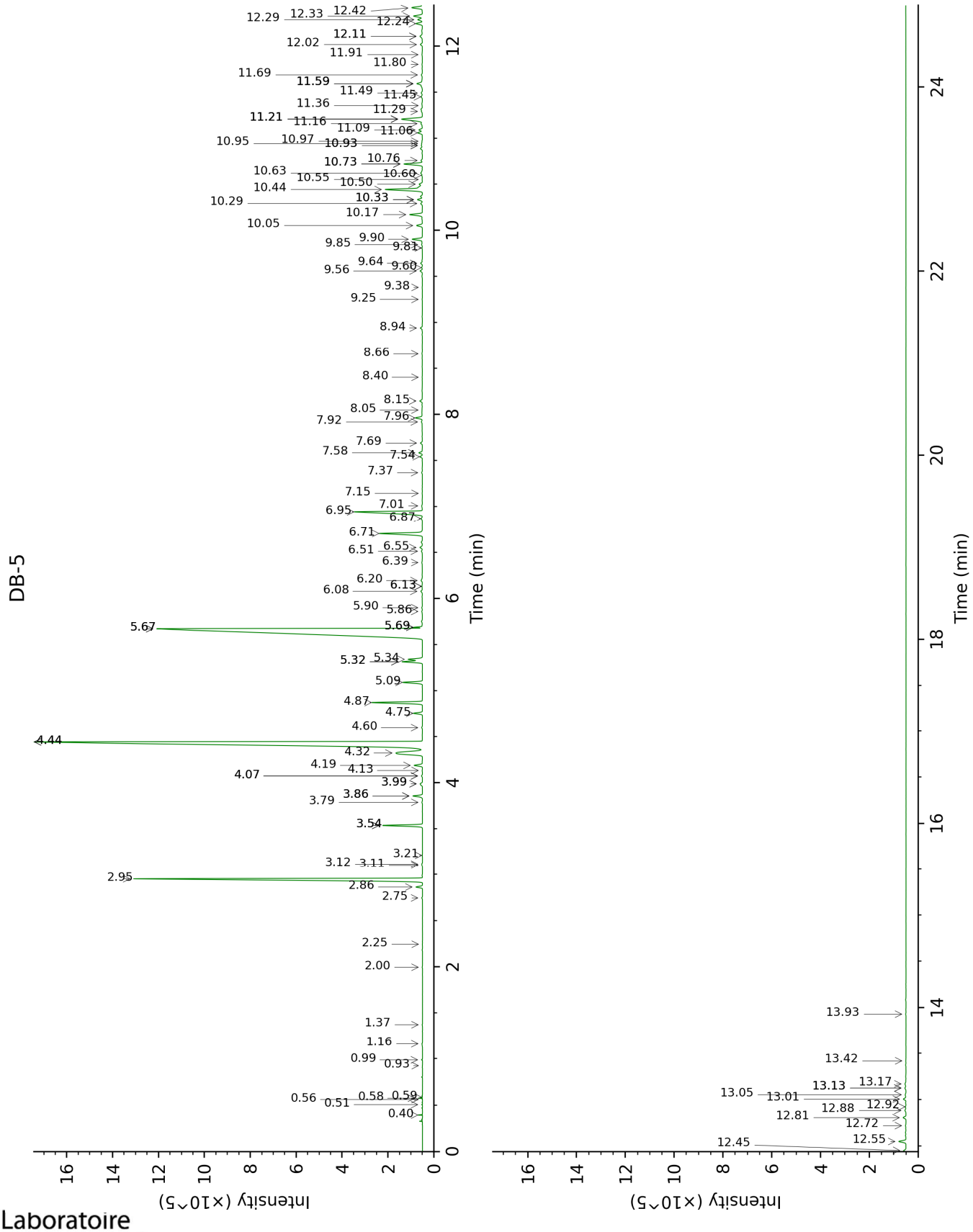

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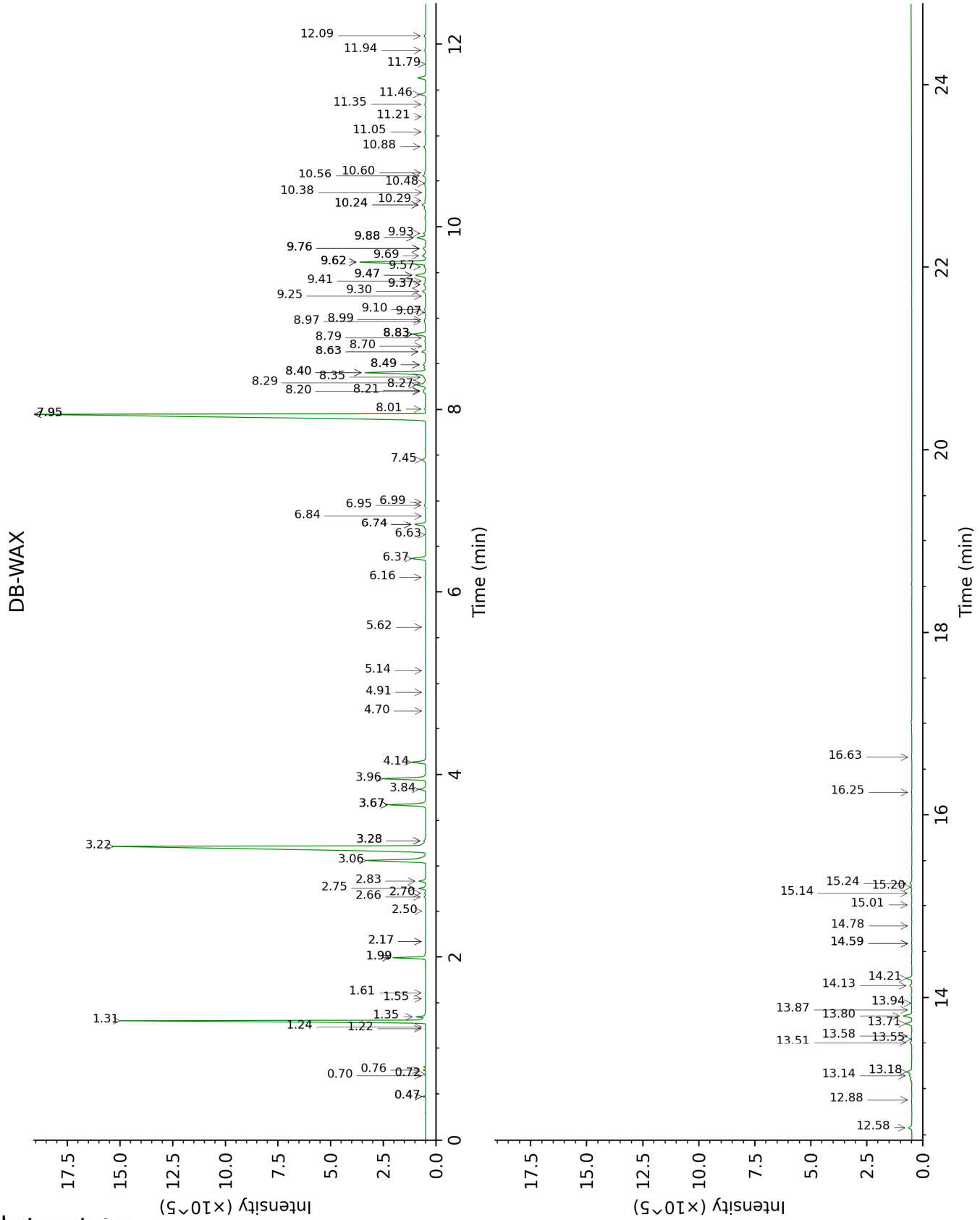

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutyral	0.40	534	0.04	0.48*	781	0.05
Isobutanol	0.51	620	0.01	1.99*	1065	1.33
Isovaleral	0.56	641	tr	0.72	886	tr
3-Methyl-2-butanone	0.58	646	0.04	0.76	901	0.04
2-Methylbutyral	0.59	651	0.01	0.70	880	0.01
2-Methylbutanol	0.93	734	tr	3.28*	1176	0.11
3-Methyl-2-pentanone	0.99	744	0.02	1.24	982	tr
Isobutyric acid	1.16	770	0.03	7.95*	1519	31.92
Octane	1.37	802	0.01	0.48*	781	[0.05]
(3*Z*)-Hexenol	2.00	857	0.01	5.62	1346	0.01
Isoamyl acetate	2.24	878	tr			
Tricyclene	2.75	918	0.03	1.22	979	0.02
α-Thujene	2.86	926	0.23	1.35	1000	0.38
α-Pinene	2.95	932	12.28	1.31	994	12.10
α-Fenchene	3.11†	942	0.04	1.55	1020	0.01
Camphene	3.12†	943	[0.04]	1.61	1026	0.02
Thuja-2,4(10)-diene	3.21	949	0.01	2.17*	1083	0.03
Sabinene	3.54*	971	1.34	2.17*	1083	[0.03]
β-Pinene	3.54*	971	[1.34]	1.99*	1065	[1.33]
6-Methyl-5-hepten-2-one	3.79	988	0.02	4.91	1300	0.01
trans-Dehydroxylinalool oxide	3.86*	993	0.36	3.28*	1176	[0.11]
Myrcene	3.86*	993	[0.36]	2.75	1133	0.31
α-Phellandrene	3.99*	1002	0.13	2.66	1125	0.07
Pseudolimonene	3.99*	1002	[0.13]	2.70	1129	0.05
Δ3-Carene	4.07*	1007	0.04	2.50	1113	0.01
cis-Dehydroxylinalool oxide	4.07*	1007	[0.04]	3.67*	1207	1.90
(3*Z*)-Hexenyl acetate	4.13	1011	0.01	4.70	1284	tr
α-Terpinene	4.19	1014	0.32	2.83	1139	0.32
para-Cymene	4.32	1023	2.11	3.96	1228	2.11
Limonene	4.44*	1031	29.30	3.06	1158	3.54
1,8-Cineole	4.44*	1031	[29.30]	3.22	1171	25.84
(*Z*)-β-Ocimene	4.60	1040	0.03	3.67*	1207	[1.90]
(*E*)-β-Ocimene	4.75	1050	0.32	3.84	1220	0.33
γ-Terpinene	4.87	1058	1.84	3.67*	1207	[1.90]
cis-Linalool oxide (fur.)	5.09	1072	0.74	6.37	1400	0.74
Terpinolene	5.32*	1086	0.76	4.14	1242	0.72
para-Cymenene	5.32*	1086	[0.76]	6.16	1385	0.03

trans-Linalool oxide (fur.)	5.34	1088	0.56	6.74*	1428	0.61
Linalool	5.67*†	1108	32.07	7.95*	1519	[31.92]
Hotrienol	5.67*†	1108	[32.07]	8.63*	1572	0.19
endo-Fenchol	5.69*†	1110	[32.07]	8.20	1538	0.13
cis-Rose oxide	5.69*†	1110	[32.07]	5.14	1311	tr
cis-para-Menth-2-en-1-ol	5.86	1121	0.03	7.95*	1519	[31.92]
α-Campholenal	5.90	1123	0.03	6.84	1435	0.03
trans-Pinocarveol	6.08	1135	0.07	8.97†	1598	0.14
trans-para-Menth-2-en-1-ol	6.13*	1138	0.02	8.83*	1588	0.76
Unknown [m/z 83, 55 (69), 41 (60), 71 (59), 81 (57), 95 (56), 69 (56)...154 (3)]	6.13*	1138	[0.02]			
cis-α-Dihydroterpineol	6.20	1142	0.07	8.00	1524	0.07
Unknown [m/z 97, 114 (60), 41 (41), 115 (30), 56 (20), 69 (19)...]	6.39	1155	0.03			
Borneol	6.51	1162	0.05	9.62*	1651	3.59
δ-Terpineol	6.55	1165	0.10	9.30	1625	0.19
Terpinen-4-ol	6.70	1175	1.83	8.40*	1554	3.40
para-Cymen-8-ol	6.87	1186	0.06	11.35	1796	0.06
α-Terpineol	6.95	1190	3.52	9.62*	1651	[3.59]
cis-Piperitol	7.01	1194	0.04	9.41	1634	0.04
Unknown [m/z 84, 41 (83), 83 (79), 91 (76), 93 (67), 119 (64), 137 (63), 109 (54), 108 (54)... 152 (4)]	7.15	1203	0.01			
trans-Carveol	7.37	1218	0.03	11.21	1785	0.05
Nerol	7.54	1230	0.10	10.88	1757	0.11
Citronellol	7.58	1233	0.15	10.56	1729	0.15
Neral	7.69	1240	0.08	9.37*	1631	0.12
Unknown [m/z 69, 41 (75), 109 (35), 95 (34), 55 (28), 43 (27), 110 (26)...]	7.92	1255	0.05			
Geraniol	7.96	1258	0.30	11.46	1806	0.29
Chavicol	8.05	1264	0.01	16.25	2264	0.01
Geranial	8.15	1270	0.11	9.93	1677	0.14
cis-Ascaridole glycol	8.40	1288	0.01	14.59*	2096	0.01
Geranyl formate	8.66	1305	0.02	9.76*	1663	0.19
Methyl geranate	8.94	1325	0.09	9.57	1647	0.08
α-Cubebene	9.25	1347	0.01	6.63	1420	0.02
Eugenol	9.38	1356	0.01	14.59*	2096	[0.01]

Isoledene	9.56	1368	0.10	6.74*	1428	[0.61]
α-Copaene	9.60	1371	0.03	6.99	1447	0.04
7-Cubebene	9.64	1374	0.07	6.95	1444	0.07
Geranyl acetate	9.81	1386	0.01	10.38	1714	0.01
β-Elemene	9.85	1389	0.03	8.29	1546	0.07
Phenylethyl isobutyrate	9.90	1393	0.42	11.79	1835	0.44
α-Gurjunene	10.05	1403	0.25	7.45	1481	0.22
β-Caryophyllene	10.17	1412	0.54	8.27	1544	0.55
γ-Maaliene	10.29	1421	0.07	8.35	1551	0.07
β-Gurjunene	10.33*	1424	0.21	8.21	1539	0.10
α-Maaliene	10.33*	1424	[0.21]	8.49*	1561	0.18
Aromadendrene	10.44	1432	1.84	8.40*	1554	[3.40]
Selina-5,11-diene	10.50	1437	0.14	8.49*	1561	[0.18]
Unknown [m/z 161, 105 (69), 119 (42), 91 (41), 204 (38)]	10.55	1440	0.01	8.63*	1572	[0.19]
trans-Muurola-3,5-diene	10.60	1444	0.03	8.70	1578	0.02
α-Humulene	10.63	1446	0.09	9.10	1609	0.06
Valerena-4,7(11)-diene	10.73*	1454	0.79	8.79	1585	0.02
allo-Aromadendrene	10.73*	1454	[0.79]	8.83*	1588	[0.76]
cis-Cadina-1(6),4-diene	10.76	1456	0.05	8.83*	1588	[0.76]
trans-Cadina-1(6),4-diene	10.92*	1468	0.05	9.07	1607	0.03
γ-Gurjunene	10.92*	1468	[0.05]	8.99†	1600	[0.14]
Selina-4,11-diene	10.95	1470	0.03	9.25	1621	0.03
Germacrene D	10.97	1472	0.02	9.62*	1651	[3.59]
β-Selinene	11.06	1479	0.20	9.69	1657	0.22
allo-Aromadendr-9-ene	11.09	1481	0.14	9.37*	1631	[0.12]
δ-Selinene	11.16	1486	0.07	9.47*	1640	0.67
α-Selinene	11.21*	1490	1.19	9.76*	1663	[0.19]
Viridiflorene	11.21*	1490	[1.19]	9.47*	1640	[0.67]
Bicyclogermacrene	11.21*	1490	[1.19]	9.88*	1673	0.55
α-Muurolene	11.29	1496	0.04	9.88*	1673	[0.55]
δ-Guaiene	11.36	1501	0.01	9.76*	1663	[0.19]
γ-Cadinene	11.45	1508	0.06	10.24*	1702	0.22
Unknown [m/z 159, 145 (91), 131 (67), 105 (46), 202 (43)]	11.49	1511	0.05	10.60	1733	0.07
δ-Cadinene	11.59*	1519	0.29	10.24*	1702	[0.22]
trans-Calamenene	11.59*	1519	[0.29]	11.05	1771	0.06
Zonarene	11.59*	1519	[0.29]	10.29	1706	0.07
trans-Cadina-1,4-diene	11.69	1527	0.05	10.48	1722	0.03
α-Calacorene	11.80	1536	0.02	11.94	1848	0.09

α-Elemol	11.91	1544	0.02	13.86	2026	0.03
Epiglobulol	12.02	1552	0.09	13.14	1958	0.16
Palustrol	12.11*	1559	0.14	12.09	1862	0.10
Maaliol	12.11*	1559	[0.14]	12.88	1934	0.01
Spathulenol	12.24	1570	0.27	14.21	2059	0.27
Caryophyllene oxide	12.29	1574	0.20	12.58	1906	0.18
Globulol	12.33	1577	0.40	13.71	2012	0.35
Viridiflorol	12.42	1584	0.47	13.80	2020	0.47
Cubeban-11-ol	12.45	1587	0.09	13.50	1992	0.12
Ledol	12.55	1594	0.29	13.18	1962	0.32
Unknown [m/z 94, 91 (83), 105 (78), 79 (75), 107 (62), 120 (58)... 218 (11)]	12.72	1608	0.03	13.94	2033	0.02
Rosifoliol	12.81	1615	0.12	14.13	2052	0.11
1-epi-Cubenol	12.88	1622	0.06	13.58	1999	0.05
γ-Eudesmol	12.92	1625	0.02	14.78	2115	0.01
Isospathulenol	13.01	1632	0.11	15.24	2162	0.09
Cubenol	13.05	1636	0.04	13.55	1996	0.01
α-Muurolol	13.13*	1642	0.05	15.01	2138	0.03
β-Eudesmol	13.13*	1642	[0.05]	15.20	2157	0.03
α-Eudesmol	13.17	1645	0.05	15.14	2151	0.04
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.42	1666	0.01	16.63	2305	0.01
Methyl eudesmate	13.93	1708	0.01			
Total identified		**98.69%**			**98.65%**	
Total reported		**98.87%**			**98.75%**	

*: 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