

**Date :** February 07, 2023

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 23A31-PTH02

**Customer identification :** Cypress - Spain - CL0112R

**Type :** Essential oil

**Source :** *Cupressus sempervirens*

**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 :** Candide Morin, analyste

**Analysis date :** February 06, 2023

Checked and approved by :

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

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Faintly yellow liquid

**Refractive index:**  $1.4712 \pm 0.0003$  (20 °C; method PC-MAT-016)

*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
Toluene	0.01	Simple phenolic
Cyclofenchene	0.02	Monoterpene
Bornylene	0.05	Monoterpene
Hashishene	0.01	Monoterpene
Tricyclene	0.24	Monoterpene
$\alpha$ -Thujene	0.50	Monoterpene
$\alpha$ -Pinene	52.94	Monoterpene
$\alpha$ -Fenchene	0.49	Monoterpene
Camphene	0.27	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.07	Monoterpene
Sabinene	0.80	Monoterpene
$\beta$ -Pinene	1.17	Monoterpene
Pseudolimonene isomer	0.02	Monoterpene
Myrcene	2.09	Monoterpene
2-Carene	0.05	Monoterpene
Pseudolimonene	0.06	Monoterpene
$\alpha$ -Phellandrene	0.09	Monoterpene
$\Delta$ 3-Carene	22.61	Monoterpene
$\alpha$ -Terpinene	0.41	Monoterpene
meta-Cymene	0.03	Monoterpene
para-Cymene	0.27	Monoterpene
Sylvestrene	0.12	Monoterpene
$\beta$ -Phellandrene	0.23*	Monoterpene
1,8-Cineole	0.23*	Monoterpenic ether
Limonene	3.09	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.03	Monoterpene
Unknown	0.04	Monoterpene
$\gamma$ -Terpinene	0.62	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
meta-Cymenene	0.01	Monoterpene
Terpinolene isomer	0.01	Monoterpene
Isoterpinolene	0.11	Monoterpene
para-Cymenene	0.06	Monoterpene
Terpinolene	3.08	Monoterpene
$\alpha$ -Pinene oxide	0.03	Monoterpenic ether
Perillene	0.01	Monoterpenic ether
Unknown	0.01	Oxygenated monoterpene
Linalool	0.08	Monoterpenic alcohol
endo-Fenchol	0.03	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.02	Aliphatic alcohol

<i>trans</i> -Pinocarveol	0.04	Monoterpenic alcohol
Camphor	0.25	Monoterpenic ketone
Epoxyterpinolene	0.09	Monoterpenic ether
meta-Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Karahanaenone	0.12	Monoterpenic ketone
Borneol	0.07	Monoterpenic alcohol
$\alpha$ -Phellandren-8-ol	0.02	Monoterpenic alcohol
Umbellulone	0.04	Monoterpenic ketone
Terpinen-4-ol	1.11	Monoterpenic alcohol
meta-Cymen-8-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
$\alpha$ -Terpineol	0.21	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Verbenone	0.02	Monoterpenic ketone
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Carvacrol methyl ether	0.01	Monoterpenic ether
Car-3-en-2-one	0.02	Monoterpenic ketone
Linalyl acetate	0.03	Monoterpenic ester
( <i>trans</i> ?)-Linalool oxide acetate (fur.)?	0.02	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Bornyl acetate	0.40	Monoterpenic ester
Unknown	0.14	Monoterpenic ester
Terpinen-4-yl acetate	0.02	Monoterpenic ester
Thymol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.23	Monoterpenic ester
$\alpha$ -Cubebene	0.07	Sesquiterpene
$\alpha$ -Terpinyl acetate	1.61	Monoterpenic ester
$\alpha$ -Ylangene	0.01	Sesquiterpene
$\alpha$ -Copaene	0.05	Sesquiterpene
$\beta$ -Bourbonene	0.01	Sesquiterpene
$\beta$ -Cubebene	0.02	Sesquiterpene
$\beta$ -Elemene	0.03	Sesquiterpene
Sesquithujene	0.18	Sesquiterpene
$\alpha$ -Cedrene	0.22	Sesquiterpene
$\beta$ -Cedrene	0.17	Sesquiterpene
$\beta$ -Caryophyllene	0.13	Sesquiterpene
$\beta$ -Copaene	0.04	Sesquiterpene
<i>cis</i> -Muurolo-3,5-diene	0.03	Sesquiterpene
<i>trans</i> -Muurolo-3,5-diene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.15	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.11	Sesquiterpene
Unknown	0.02	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.03	Sesquiterpene
$\gamma$ -Muurolo-4	0.14	Sesquiterpene
Germacrene D	0.43	Sesquiterpene
$\alpha$ -Amorphene	0.06	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene

β-Alaskene	0.07	Sesquiterpene
Epizonarene	0.05	Sesquiterpene
α-Muurolene	0.08	Sesquiterpene
δ-Amorphene	0.02	Sesquiterpene
γ-Cadinene	0.08	Sesquiterpene
α-Alaskene	0.01	Sesquiterpene
δ-Cadinene	0.23	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.03	Sesquiterpene
α-Cadinene	0.02	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Salviadienol?	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
allo-Cedrol	0.03	Sesquiterpenic alcohol
α-Cedrol	1.76	Sesquiterpenic alcohol
epi-Cedrol	0.01	Sesquiterpenic alcohol
Torilenol	0.02	Oxygenated sesquiterpene
10-epi-Cubenol	0.02	Sesquiterpenic alcohol
1-epi-Cubenol	0.01	Sesquiterpenic alcohol
α-Acorenol	0.02	Sesquiterpenic alcohol
Unknown	0.03	Unknown
τ-Cadinol	0.01	Sesquiterpenic alcohol
τ-Muurolol	0.01	Sesquiterpenic alcohol
α-Muurolol	0.02	Sesquiterpenic alcohol
α-Cadinol	0.02	Sesquiterpenic alcohol
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Manoyl oxide	0.03	Diterpenic ether
Isopimaradiene	0.01	Diterpene
<b>Consolidated total</b>	<b>99.20%</b>	

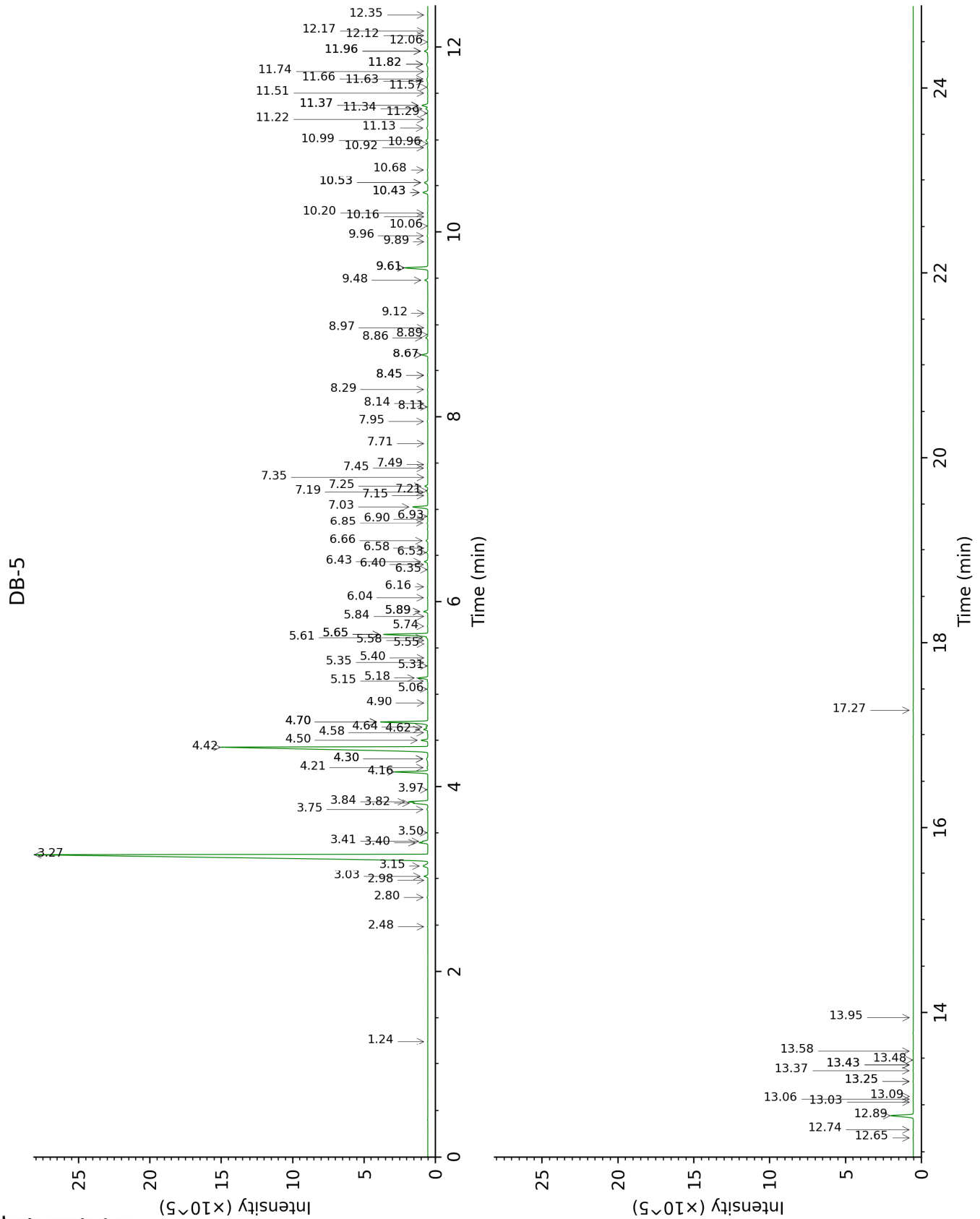
\*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered  
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total  
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

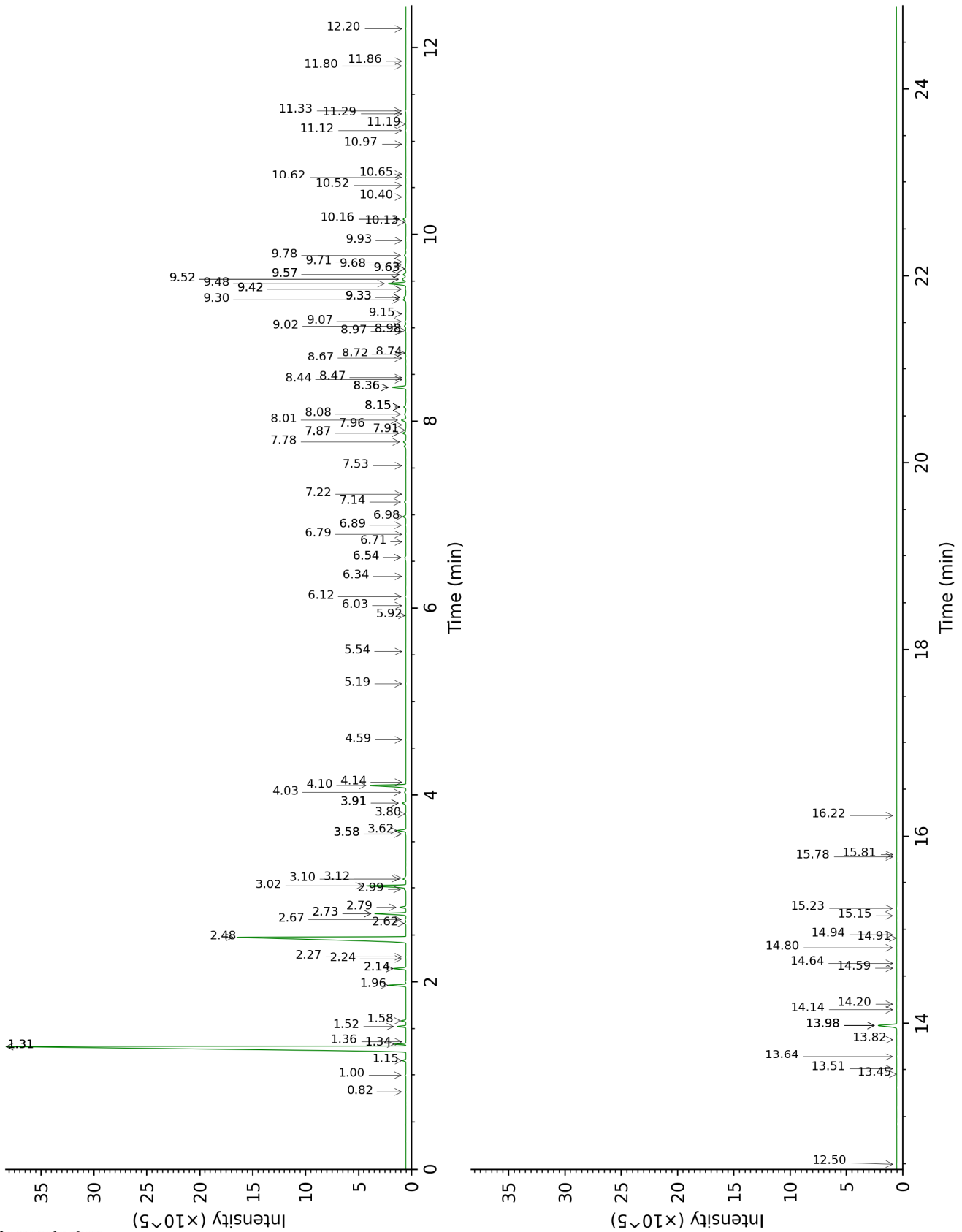
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

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



DB-WAX





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.24	759	0.01	1.36	1002	0.01
Cyclofenchene	2.48	878	0.02	0.82	912	0.01
Bornylene	2.80	904	0.05	1.00	943	0.04
Hashishene	2.98	916	0.01	1.31*	997	53.06
Tricyclene	3.03	919	0.24	1.15	971	0.24
$\alpha$ -Thujene	3.14	926	0.50	1.34	1000	0.49
$\alpha$ -Pinene	3.27	934	52.94	1.31*	997	[53.06]
$\alpha$ -Fenchene	3.40†	943	0.77	1.52	1019	0.49
Camphene	3.41†	944	[0.77]	1.58	1025	0.27
Thuja-2,4(10)-diene	3.50	950	0.03	2.14*	1084	0.83
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.76	966	0.07	2.73*	1134	2.17
Sabinene	3.82†	971	1.97	2.14*	1084	[0.83]
$\beta$ -Pinene	3.84†	972	[1.97]	1.96	1065	1.17
Pseudolimonene isomer	3.97	980	0.02	2.27	1097	0.01
Myrcene	4.16	993	2.09	2.73*	1134	[2.17]
2-Carene	4.21	996	0.05	2.24	1094	tr
Pseudolimonene	4.30*	1002	0.14	2.67	1129	0.06
$\alpha$ -Phellandrene	4.30*	1002	[0.14]	2.62	1126	0.09
$\Delta$ 3-Carene	4.42	1010	22.61	2.48	1114	22.65
$\alpha$ -Terpinene	4.50	1015	0.41	2.80	1140	0.41
meta-Cymene	4.58	1020	0.03	3.91*	1229	0.30
para-Cymene	4.62	1022	0.27	3.91*	1229	[0.30]
Sylvestrene	4.64	1024	0.12	2.99†	1155	3.21
$\beta$ -Phellandrene	4.70*	1027	3.32	3.10†	1165	0.27
1,8-Cineole	4.70*	1027	[3.32]	3.12†	1166	[0.27]
Limonene	4.70*	1027	[3.32]	3.02†	1158	[3.21]
(Z)- $\beta$ -Ocimene	4.90	1040	0.01	3.58*	1204	0.04
(E)- $\beta$ -Ocimene	5.06	1050	0.03	3.80	1220	0.03
Unknown [m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)]	5.15	1055	0.04	3.58*	1204	[0.04]
$\gamma$ -Terpinene	5.18	1057	0.62	3.62	1207	0.62
cis-Sabinene hydrate	5.31	1065	0.01	6.71	1431	0.01
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.35	1068	0.02	4.59	1281	0.01
cis-Linalool oxide (fur.)	5.40	1071	0.02	6.34	1404	0.01
meta-Cymenene	5.55	1080	0.01	6.03	1381	0.02
Terpinolene isomer	5.58	1082	0.01	4.14	1246	0.01
Isoterpinolene	5.61†	1084	3.23	4.03	1238	0.11
para-Cymenene	5.65*†	1086	[3.23]	6.12	1388	0.06
Terpinolene	5.65*†	1086	[3.23]	4.10	1244	3.08

α-Pinene oxide	5.74	1092	0.03	5.19	1321	0.02
Perillene	5.84	1099	0.01	5.92	1374	0.01
Unknown [m/z 95, 150 (45), 110 (35), 107 (23), 109 (21)]	5.90*	1102	0.28	5.54	1346	0.01
Linalool	5.90*	1102	[0.28]	7.87*	1519	0.26
endo-Fenchol	6.04	1111	0.03	8.15*	1540	0.22
cis-para-Menth-2-en-1-ol	6.16	1119	0.02	7.91	1521	0.04
4-Hydroxy-4-methylcyclohex-2-enone	6.35	1130	0.02	13.82	2028	0.01
trans-Pinocarveol	6.40	1134	0.04	8.97†	1604	0.05
Camphor	6.43	1136	0.25	6.98	1452	0.25
Epoxyterpinolene	6.53	1142	0.09	6.54*†	1419	0.16
meta-Mentha-4,6-dien-8-ol	6.58	1145	0.01	9.15	1619	0.02
Karahanaenone	6.66	1150	0.12	7.14	1463	0.12
Borneol	6.85	1163	0.07	9.57*	1653	0.26
α-Phellandren-8-ol	6.90	1166	0.02	9.93	1682	0.02
Umbellulone	6.93	1168	0.04	8.72	1584	0.03
Terpinen-4-ol	7.03	1174	1.11	8.36*	1557	1.18
meta-Cymen-8-ol	7.15	1182	0.01	11.29	1797	0.01
para-Cymen-8-ol	7.19	1184	0.06	11.33	1800	0.06
Unknown [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	7.21	1185	0.02	9.52*	1649	0.45
α-Terpineol	7.25	1188	0.21	9.57*	1653	[0.26]
Myrtenol	7.35	1194	0.02	10.65	1743	0.01
Unknown [m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)]	7.45	1201	0.04	10.62	1740	0.03
Verbenone	7.49	1203	0.02	9.42*	1640	0.07
trans-Carveol	7.71	1218	0.02	11.18	1788	0.02
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.95	1234	0.04	11.12	1782	0.05
Carvacrol methyl ether	8.11	1244	0.01	8.36*	1557	[1.18]
Car-3-en-2-one	8.14	1247	0.02	10.16*	1701	0.25
Linalyl acetate	8.30	1257	0.03	7.96	1526	0.01
(trans?)-Linalool oxide acetate (fur.)?	8.45*	1267	0.03	8.47	1565	0.02
trans-Ascaridole glycol	8.45*	1267	[0.03]	13.98*	2043	1.75
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.67*	1282	0.41	12.20	1878	0.02
Bornyl acetate	8.67*	1282	[0.41]	8.01	1530	0.40

Unknown [m/z 121, 93 (97), 43 (81), 136 (48), 107 (47), 108 (44)...]	8.86	1295	0.14	8.36*	1557	[1.18]
Terpinen-4-yl acetate	8.90	1297	0.02	8.44	1563	0.01
Thymol	8.97	1302	0.02	14.91	2135	0.01
Unknown [m/z 150, 107 (98), 91 (79), 108 (61)]	9.12	1313	0.01	11.80	1842	0.02
Unknown [m/z 93, 43 (50), 121 (50), 136 (35)...]	9.48	1338	0.23	9.30†	1631	0.45
α-Cubebene	9.61*	1347	1.70	6.54*†	1419	[0.16]
α-Terpinyl acetate	9.61*	1347	[1.70]	9.48	1645	1.61
α-Ylangene	9.90	1367	0.01	6.79	1437	0.03
α-Copaene	9.96	1372	0.05	6.89	1445	0.05
β-Bourbonene	10.06	1379	0.01	7.22	1470	0.01
β-Cubebene	10.16	1386	0.02	7.53	1492	0.01
β-Elemene	10.20	1389	0.03	8.15*	1540	[0.22]
Sesquithujene	10.43*	1404	0.40	7.87*	1519	[0.26]
α-Cedrene	10.43*	1404	[0.40]	7.78	1512	0.22
β-Cedrene	10.53*	1412	0.30	8.08	1534	0.17
β-Caryophyllene	10.53*	1412	[0.30]	8.15*	1540	[0.22]
β-Copaene	10.68	1423	0.04	8.15*	1540	[0.22]
<i>cis</i> -Muuro-la-3,5-diene	10.92	1441	0.03	8.74	1586	0.03
<i>trans</i> -Muuro-la-3,5-diene	10.96	1444	0.01	8.67	1581	0.03
α-Humulene	10.99	1447	0.15	9.02	1608	0.13
<i>cis</i> -Muuro-la-4(15),5-diene	11.13	1457	0.11	9.07	1612	0.08
Unknown [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	11.22	1463	0.02	9.33*†	1633	[0.45]
<i>trans</i> -Cadina-1(6),4-diene	11.29	1468	0.03	8.98†	1605	[0.05]
γ-Muuro-lene	11.34	1472	0.14	9.33*†	1633	[0.45]
Germacrene D	11.37*	1475	0.46	9.52*	1649	[0.45]
α-Amorphene	11.37*	1475	[0.46]	9.33*†	1633	[0.45]
<i>trans</i> -Muuro-la-4(15),5-diene	11.50	1484	0.02	9.63*	1658	0.08
β-Alaskene	11.57	1489	0.07	9.42*	1640	[0.07]
Epizonarene	11.63	1494	0.05	9.63*	1658	[0.08]
α-Muuro-lene	11.66	1496	0.08	9.78	1670	0.15
δ-Amorphene	11.74	1502	0.02	9.68	1662	0.04
γ-Cadinene	11.82*	1508	0.15	10.13	1698	0.08
α-Alaskene	11.82*	1508	[0.15]	9.71	1664	0.01
δ-Cadinene	11.96*	1519	0.27	10.16*	1701	[0.25]
<i>trans</i> -Calamenene	11.96*	1519	[0.27]	10.97	1770	0.01

<i>trans</i> -Cadin-1,4-diene	12.06	1527	0.03	10.40	1721	0.02
$\alpha$ -Cadinene	12.12	1532	0.02	10.52	1732	0.02
$\alpha$ -Calacorene	12.17	1536	0.01	11.86	1847	0.01
Salviadienol?	12.35	1550	0.02	14.14	2059	0.02
Caryophyllene oxide	12.65	1573	0.02	12.50	1904	0.01
allo-Cedrol	12.74	1580	0.03	13.98*	2043	[1.75]
$\alpha$ -Cedrol	12.89	1592	1.76	13.98*	2043	[1.75]
epi-Cedrol	13.03	1603	0.01	14.59	2102	0.01
Torilenol	13.06	1606	0.02	15.15	2158	0.01
10-epi-Cubenol	13.09	1608	0.02	13.45	1992	0.01
1-epi-Cubenol	13.25*	1621	0.03	13.51	1998	0.01
$\alpha$ -Acorenol	13.25*	1621	[0.03]	14.20	2065	0.02
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.37	1631	0.03	13.64	2010	0.02
$\tau$ -Cadinol	13.43*	1636	0.03	14.64	2108	0.01
$\tau$ -Muurolol	13.43*	1636	[0.03]	14.80	2124	0.01
$\alpha$ -Muurolol	13.48	1640	0.02	14.94	2138	0.01
$\alpha$ -Cadinol	13.58	1648	0.02	15.23	2166	0.04
Eudesma-4(15),7-dien-1 $\beta$ -ol	13.94	1678	0.01	15.78	2224	0.01
Manoyl oxide	17.26	1976	0.03	16.22	2270	0.01
Isopimaradiene				15.81	2226	0.01
<b>Total identified</b>		<b>98.85%</b>			<b>98.48%</b>	
<b>Total reported</b>		<b>99.44%</b>			<b>99.09%</b>	

\*: 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