

**Date :** October 07, 2022

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 22I22-NSO02


**Customer identification :** Essential Oil: Cypress Lot # J0F0422M Botanical Species: Cupressus sempervirens

**Type :** Essential oil

**Source :** Cupressus sempervirens

**Customer :** Natural Sourcing LLC

**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 :** Amélie Simard, Analyste

**Analysis date :** October 06, 2022

Checked and approved by :

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

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### PHYSICOCHEMICAL DATA

**Physical aspect:** Faintly yellow liquid

**Refractive index:**  $1.4703 \pm 0.0003$  (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
3-Methylfuran	tr	Furan
Toluene	tr	Simple phenolic
Cyclofenchene	0.01	Monoterpene
Santene	0.03	Normonoterpene
Bornylene	0.04	Monoterpene
Hashishene	0.03	Monoterpene
Tricyclene	0.16	Monoterpene
$\alpha$ -Thujene	0.49	Monoterpene
$\alpha$ -Pinene	56.09	Monoterpene
$\alpha$ -Fenchene	0.37	Monoterpene
Camphene	0.46	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.06	Monoterpene
$\beta$ -Pinene	2.49	Monoterpene
Sabinene	0.70	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	1.19	Monoterpene
Pseudolimonene	0.02	Monoterpene
$\alpha$ -Phellandrene	0.06	Monoterpene
Menthatriene isomer I	0.01	Monoterpene
$\Delta^3$ -Carene	21.43	Monoterpene
$\alpha$ -Terpinene	0.24	Monoterpene
meta-Cymene	0.04	Monoterpene
para-Cymene	0.19	Monoterpene
Sylvestrene	0.09	Monoterpene
Limonene	4.32	Monoterpene
$\beta$ -Phellandrene	0.22	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.03	Monoterpene
Unknown	0.03	Monoterpene
$\gamma$ -Terpinene	0.35	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
meta-Cymenene	0.01	Monoterpene
Isoterpinolene	0.08	Monoterpene
Terpinolene	1.30	Monoterpene
para-Cymenene	0.03	Monoterpene
$\alpha$ -Pinene oxide	0.04	Monoterpenic ether
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Perillene	0.02	Monoterpenic ether
Linalool	0.39	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
cis-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol

<i>trans</i> -Pinocarveol	0.04	Monoterpenic alcohol
Camphor	0.04	Monoterpenic ketone
<i>trans</i> -para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Camphene hydrate	0.01	Monoterpenic alcohol
Epoxyterpinolene	0.02	Monoterpenic ether
Karahanaenone	0.14	Monoterpenic ketone
Borneol	0.04	Monoterpenic alcohol
$\alpha$ -Phellandren-8-ol	0.02	Monoterpenic alcohol
Umbellulone	0.04	Monoterpenic ketone
Terpinen-4-ol	1.38	Monoterpenic alcohol
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.04	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Myrtenal	0.01	Monoterpenic aldehyde
$\alpha$ -Terpineol	0.27	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Unknown
Verbenone	0.05	Monoterpenic ketone
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Carvacrol methyl ether	0.02	Monoterpenic ether
Car-3-en-2-one	0.02	Monoterpenic ketone
( <i>cis</i> ?)-Linalool oxide acetate (fur.)?	0.02	Monoterpenic ester
Linalyl acetate	0.03	Monoterpenic ester
( <i>trans</i> ?) -Linalool oxide acetate (fur.)?	0.04	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Bornyl acetate	0.34	Monoterpenic ester
Unknown	0.15	Monoterpenic ester
Terpinen-4-yl acetate	0.01	Monoterpenic ester
Unknown	0.03	Oxygenated monoterpene
Unknown	0.01	Unknown
Unknown	0.20	Monoterpenic ester
$\alpha$ -Terpinyl acetate	1.06	Monoterpenic ester
$\alpha$ -Cubebene	0.12	Sesquiterpene
$\alpha$ -Ylangene	0.01	Sesquiterpene
$\alpha$ -Copaene	0.04	Sesquiterpene
2-epi- $\alpha$ -Funebrene	0.01	Sesquiterpene
$\beta$ -Bourbonene	0.01	Sesquiterpene
$\beta$ -Cubebene	0.02	Sesquiterpene
$\beta$ -Elemene	0.02	Sesquiterpene
$\alpha$ -Cedrene	0.26	Sesquiterpene
$\beta$ -Cedrene	0.09	Sesquiterpene
$\beta$ -Caryophyllene	0.10	Sesquiterpene
$\beta$ -Copaene	0.03	Sesquiterpene
<i>cis</i> -Muuroala-3,5-diene	0.03	Sesquiterpene
<i>trans</i> -Muuroala-3,5-diene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.12	Sesquiterpene
<i>cis</i> -Muuroala-4(15),5-diene	0.10	Sesquiterpene
Unknown	0.02	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.02	Sesquiterpene
$\alpha$ -Amorphene	0.10	Sesquiterpene

Germacrene D	0.65	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene
$\beta$ -Alaskene	0.05	Sesquiterpene
Epizonarene	0.04	Sesquiterpene
$\alpha$ -Muurolene	0.06	Sesquiterpene
$\delta$ -Amorphene	0.02	Sesquiterpene
$\gamma$ -Cadinene	0.04	Sesquiterpene
$\alpha$ -Alaskene	0.02	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
$\delta$ -Cadinene	0.18	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.03	Sesquiterpene
$\alpha$ -Cadinene	0.01	Sesquiterpene
$\alpha$ -Calacorene	0.01	Sesquiterpene
Salviadienol?	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
allo-Cedrol	0.02	Sesquiterpenic alcohol
$\alpha$ -Cedrol	1.30	Sesquiterpenic alcohol
epi-Cedrol	0.01	Sesquiterpenic alcohol
Torilenol	0.01	Oxygenated sesquiterpene
10-epi-Cubenol	0.02	Sesquiterpenic alcohol
1-epi-Cubenol	0.01	Sesquiterpenic alcohol
$\alpha$ -Acorenol	0.02	Sesquiterpenic alcohol
Unknown	0.05	Unknown
$\tau$ -Muurolol	0.01	Sesquiterpenic alcohol
$\tau$ -Cadinol	0.01	Sesquiterpenic alcohol
$\alpha$ -Muurolol	0.01	Sesquiterpenic alcohol
$\alpha$ -Cadinol	0.02	Sesquiterpenic alcohol
Unknown	0.03	Unknown
Eudesma-4(15),7-dien-1 $\beta$ -ol	0.01	Sesquiterpenic alcohol
$\beta$ -Turmerone	0.01	Sesquiterpenic ketone
Manoyl oxide	0.03	Diterpenic ether
7,13-Abietadiene	0.01	Diterpene
Unknown	0.01	Unknown
Isopimaradiene	0.02	Diterpene
<b>Consolidated total</b>	<b>99.25%</b>	

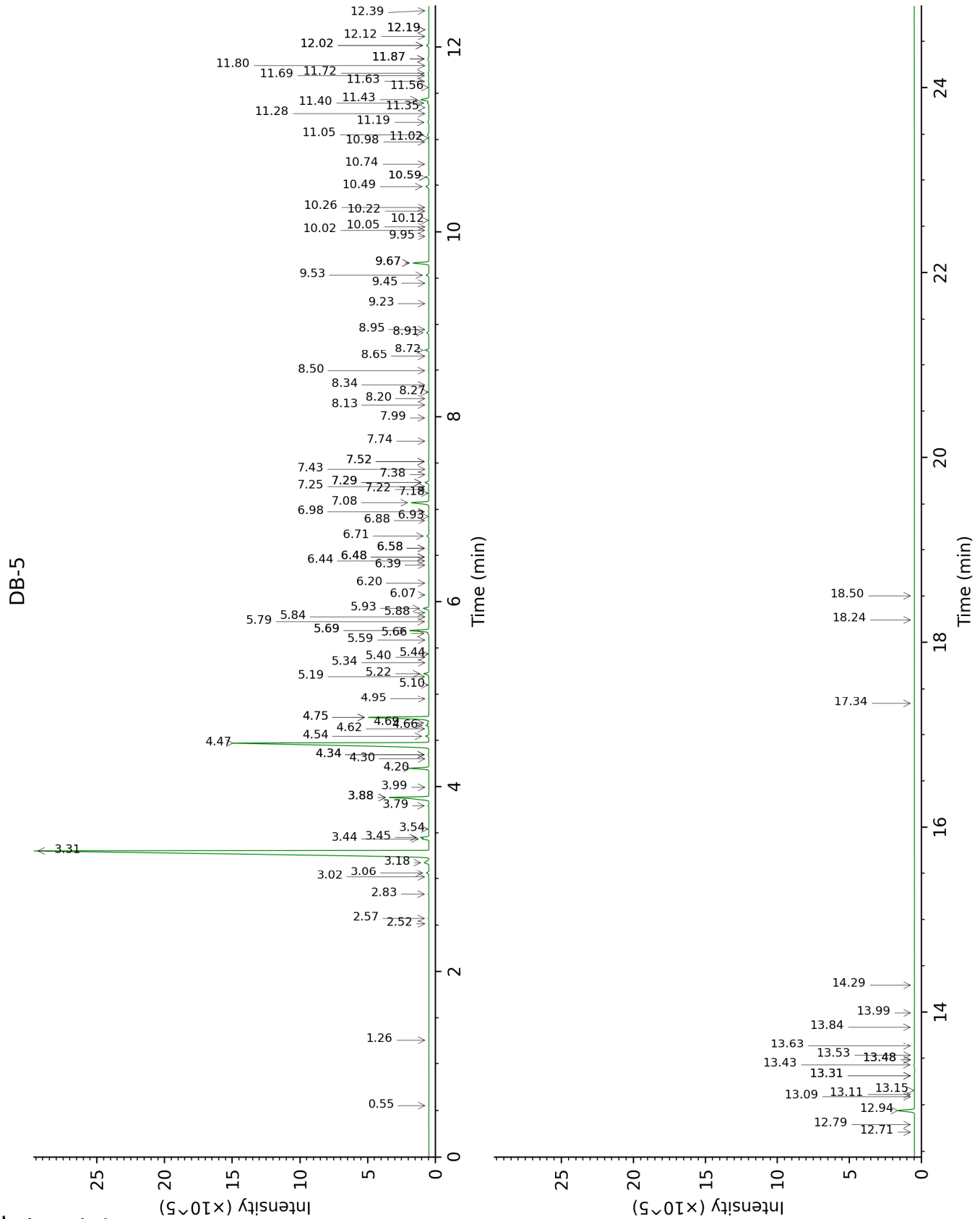
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

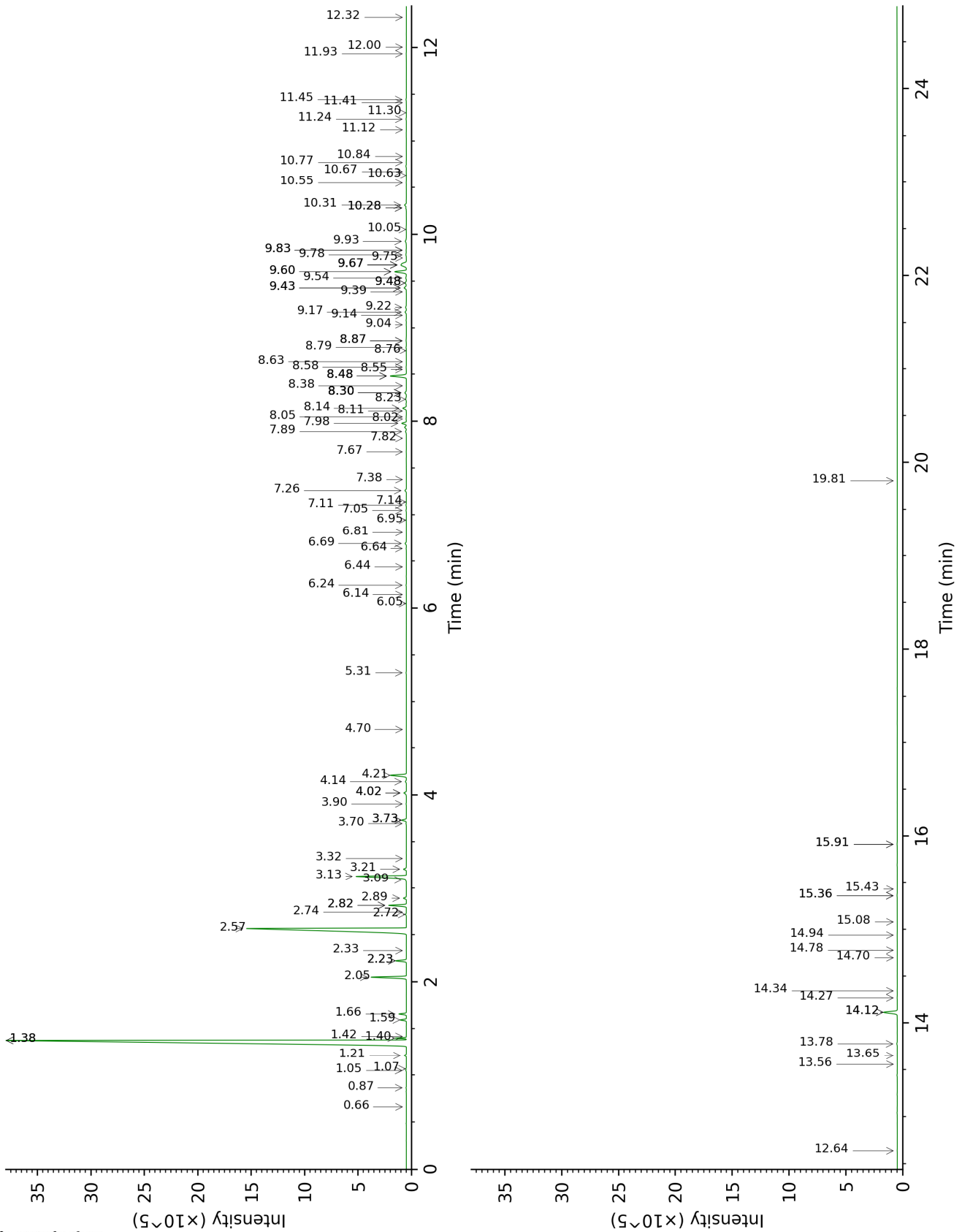
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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	%
3-Methylfuran	0.55	609	tr	0.66	858	tr
Toluene	1.26	757	tr	1.42	1002	tr
Cyclofenchene	2.52	878	0.01	0.87	913	0.02
Santene	2.57	882	0.03	1.07	948	0.03
Bornylene	2.83	904	0.04	1.05	945	0.03
Hashishene	3.02	916	0.03	1.38*	998	56.33
Tricyclene	3.06	919	0.16	1.21	972	0.16
$\alpha$ -Thujene	3.18	926	0.49	1.40	1001	0.48
$\alpha$ -Pinene	3.31	935	56.09	1.38*	998	[56.33]
$\alpha$ -Fenchene	3.44†	943	0.82	1.59	1020	0.37
Camphene	3.45†	944	[0.82]	1.66	1027	0.46
Thuja-2,4(10)-diene 3,7,7-	3.54	950	0.03	2.22*	1084	0.74
Trimethylcyclohepta- 1,3,5-triene	3.79	967	0.06	2.82*	1133	1.24
$\beta$ -Pinene	3.88*	973	3.18	2.05	1066	2.49
Sabinene	3.88*	973	[3.18]	2.22*	1084	[0.74]
Pseudolimonene isomer	3.99	980	0.01	2.33	1095	0.01
Myrcene	4.20	993	1.19	2.82*	1133	[1.24]
Pseudolimonene	4.30	1000	0.02	2.74	1127	0.01
$\alpha$ -Phellandrene	4.34*	1003	0.07	2.72	1125	0.06
Menthatriene isomer I	4.34*	1003	[0.07]	3.32	1173	0.01
$\Delta$ 3-Carene	4.47	1011	21.43	2.57	1114	21.51
$\alpha$ -Terpinene	4.54	1015	0.24	2.89	1139	0.21
meta-Cymene	4.62	1020	0.04	4.02*	1225	0.22
para-Cymene	4.66	1023	0.19	4.02*	1225	[0.22]
Sylvestrene	4.69	1024	0.09	3.09	1155	0.07
Limonene	4.75*	1028	4.48	3.13	1158	4.32
$\beta$ -Phellandrene	4.75*	1028	[4.48]	3.21	1164	0.22
(Z)- $\beta$ -Ocimene	4.95	1041	0.01	3.70	1202	0.04
(E)- $\beta$ -Ocimene	5.10	1050	0.03	3.90	1217	0.03
Unknown [m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)]	5.19	1056	0.03	3.73*	1204	0.35
$\gamma$ -Terpinene	5.22	1058	0.35	3.73*	1204	[0.35]
cis-Sabinene hydrate	5.34	1065	0.01	6.81	1428	0.01
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.40	1069	0.01	4.70	1274	0.01
cis-Linalool oxide (fur.)	5.44	1071	0.01	6.44	1401	0.01
meta-Cymenene	5.59	1081	0.01	6.14	1379	0.01
Isoterpinolene	5.66	1085	0.08	4.14	1234	0.08
Terpinolene	5.69*	1087	1.33	4.21	1239	1.30

para-Cymenene	5.69*	1087	[1.33]	6.24	1386	0.03
α-Pinene oxide	5.78	1093	0.04	5.31	1319	0.03
<i>trans</i> -Sabinene hydrate	5.84	1096	0.01	7.82	1504	0.01
Perillene	5.88	1099	0.02	6.05	1372	0.01
Linalool	5.93	1102	0.39	7.98	1516	0.37
endo-Fenchol	6.07	1111	0.01	8.30*	1542	0.16
<i>cis</i> -para-Menth-2-en-1-ol	6.20	1119	0.02	8.02	1520	0.03
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.39	1132	0.03	9.39	1627	0.01
<i>trans</i> -Pinocarveol	6.44	1134	0.04	9.04	1599	0.02
Camphor	6.48*	1137	0.06	7.10	1450	0.04
<i>trans</i> -para-Menth-2-en-1-ol	6.48*	1137	[0.06]	8.86*	1585	0.06
Camphene hydrate	6.58*	1143	0.05	8.38	1547	0.01
Epoxyterpinolene	6.58*	1143	[0.05]	6.64	1415	0.02
Karahanaenone	6.71	1152	0.14	7.26	1462	0.13
Borneol	6.88	1163	0.04	9.67*	1650	0.95
α-Phellandren-8-ol	6.93	1166	0.02	10.05	1681	0.03
Umbellulone	6.98	1169	0.04	8.79	1580	0.03
Terpinen-4-ol	7.08	1175	1.38	8.48*	1556	1.45
meta-Cymen-8-ol	7.18	1182	0.02	11.41	1796	0.01
para-Cymen-8-ol	7.22	1184	0.04	11.44	1799	0.04
Unknown [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	7.25	1186	0.02	9.60*	1645	1.09
Myrtenal	7.29*	1189	0.29	8.55	1561	0.01
α-Terpineol	7.29*	1189	[0.29]	9.67*	1650	[0.95]
Myrtenol	7.38	1194	0.02	10.77	1742	0.01
Unknown [m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)]	7.43	1198	0.01	10.67	1733	0.01
Unknown [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	7.52*	1203	0.06	10.84	1747	0.01
Verbenone	7.52*	1203	[0.06]	9.48*	1635	0.13
<i>trans</i> -Carveol	7.74	1218	0.02	11.30	1787	0.01
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.99	1235	0.04	11.24	1781	0.03
Carvacrol methyl ether	8.13	1244	0.02	8.48*	1556	[1.45]
Car-3-en-2-one	8.20	1249	0.02	10.28*	1700	0.06
( <i>cis</i> ?)–Linalool oxide acetate (fur.)?	8.27	1253	0.02	8.11	1526	0.01
Linalyl acetate	8.34	1258	0.03	8.05	1522	0.02

( <i>trans?</i> )-Linalool oxide acetate (fur.)?	8.50	1269	0.04	8.58	1563	0.03
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.65	1279	0.02	12.32	1877	0.01
Bornyl acetate	8.72	1284	0.34	8.14	1529	0.33
Unknown [m/z 121, 93 (97), 43 (81), 136 (48), 107 (47), 108 (44)...]	8.91	1296	0.15	8.48*	1556	[1.45]
Terpinen-4-yl acetate	8.95	1299	0.01	8.64	1567	0.01
Unknown [m/z 150, 107 (98), 91 (79), 108 (61)]	9.23	1316	0.03	11.93	1842	0.02
Unknown [m/z 93, 92 (34), 43 (31), 91 (27)...]	9.45	1332	0.01			
Unknown [m/z 93, 43 (50), 121 (50), 136 (35)...]	9.53	1338	0.20	9.43*	1631	0.23
$\alpha$ -Terpinyl acetate	9.67*	1347	1.18	9.60*	1645	[1.09]
$\alpha$ -Cubebene	9.67*	1347	[1.18]	6.69	1419	0.12
$\alpha$ -Ylangene	9.95	1367	0.01	6.94	1438	0.01
$\alpha$ -Copaene	10.02	1372	0.04	7.05	1446	0.03
2-epi- $\alpha$ -Funebrene	10.06	1374	0.01	7.14	1453	0.01
$\beta$ -Bourbonene	10.12	1379	0.01	7.38	1471	0.01
$\beta$ -Cubebene	10.22	1386	0.02	7.67	1493	0.02
$\beta$ -Elemene	10.26	1389	0.02	8.30*	1542	[0.16]
$\alpha$ -Cedrene	10.49	1405	0.26	7.89	1510	0.09
$\beta$ -Cedrene	10.59*	1413	0.22	8.23	1536	0.09
$\beta$ -Caryophyllene	10.59*	1413	[0.22]	8.30*	1542	[0.16]
$\beta$ -Copaene	10.74	1424	0.03	8.30*	1542	[0.16]
<i>cis</i> -Muurolo-3,5-diene	10.98	1442	0.03	8.86*	1585	[0.06]
<i>trans</i> -Muurolo-3,5-diene	11.02	1445	0.01	8.76	1577	0.01
$\alpha$ -Humulene	11.06	1447	0.12	9.17	1610	0.12
<i>cis</i> -Muurolo-4(15),5-diene	11.19	1457	0.10	9.22	1614	0.08
Unknown [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	11.28	1464	0.02	9.43*	1631	[0.23]
<i>trans</i> -Cadina-1(6),4-diene	11.35	1469	0.02	9.14	1607	0.02
$\alpha$ -Amorphene	11.40	1473	0.10	9.54	1639	0.07
Germacrene D	11.43	1476	0.65	9.67*	1650	[0.95]
<i>trans</i> -Muurolo-4(15),5-diene	11.56	1485	0.02	9.75	1656	0.01
$\beta$ -Alaskene	11.63	1490	0.05	9.48*	1635	[0.13]
Epizonarene	11.69	1495	0.04	9.78	1659	0.06

α-Muurolene	11.72	1497	0.06	9.93	1671	0.15
δ-Amorphene	11.80	1503	0.02	9.83*	1663	0.03
γ-Cadinene	11.87*	1509	0.11	10.28*	1700	[0.06]
α-Alaskene	11.87*	1509	[0.11]	9.83*	1663	[0.03]
<i>trans</i> -Calamenene	12.02*	1520	0.19	11.12	1771	0.01
δ-Cadinene	12.02*	1520	[0.19]	10.31	1703	0.18
<i>trans</i> -Cadina-1,4-diene	12.12	1528	0.03	10.55	1723	0.02
α-Cadinene	12.19*	1533	0.02	10.64	1730	0.01
α-Calacorene	12.19*	1533	[0.02]	12.00	1849	0.01
Salviadienol?	12.39	1549	0.02	14.27	2057	0.02
Caryophyllene oxide	12.71	1574	0.02	12.64	1907	0.01
allo-Cedrol	12.79	1580	0.02	14.12*	2043	1.29
α-Cedrol	12.94	1592	1.30	14.12*	2043	[1.29]
epi-Cedrol	13.09	1604	0.01	14.70	2098	0.01
Torilenol	13.11	1606	0.01	15.36*	2164	0.04
10-epi-Cubenol	13.16	1609	0.02	13.56	1990	0.01
1-epi-Cubenol	13.31*	1622	0.03	13.65	1999	0.01
α-Acorenol	13.31*	1622	[0.03]	14.34	2064	0.02
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.43	1632	0.05	13.78	2011	0.05
τ-Muurolol	13.48*	1636	0.02	14.94	2122	0.01
τ-Cadinol	13.48*	1636	[0.02]	14.78	2106	0.01
α-Muurolol	13.53	1640	0.01	15.08	2136	0.01
α-Cadinol	13.63	1649	0.02	15.36*	2164	[0.04]
Unknown [m/z 85, 57 (59), 79 (26), 67 (18), 41 (16), 80 (15), 81 (10), 77 (8), 238 (7)]	13.84	1666	0.03			
Eudesma-4(15),7-dien-1β-ol	13.99	1678	0.01	15.91*	2220	0.03
β-Turmerone	14.29	1703	0.01	15.43	2171	0.01
Manoyl oxide	17.34	1977	0.03			
7,13-Abietadiene	18.24	2065	0.01			
Unknown [m/z 191, 81 (47), 95 (41), 69 (39), 109 (32), 93 (32)...]	18.50	2091	0.01	19.81	2655	0.01
Isopimaradiene				15.91*	2220	[0.03]
<b>Total identified</b>		<b>98.65%</b>			<b>98.87%</b>	
<b>Total reported</b>		<b>99.29%</b>			<b>99.03%</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