

**Date :** October 23, 2019

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 19J08-PTH05-1-SCC

**Customer identification :** Cypress - Spain - CL010893R

**Type :** Essential oil

**Source :** *Cupressus sempervirens*

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-PA-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 :** Sarah-Eve Tremblay, M. Sc. A., Chimiste

**Analysis date :** October 17, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

**Physical aspect:** Faintly yellow liquid

**Refractive index:** 1.4714 ± 0.0003 (20 °C)

NFT 75-254:1992 - OIL OF CUPRESSUS

Compound	Min. %	Max. %	Observed %	Complies?
Manoyl oxide	tr		0.05	Yes
Isopimaradiene	tr		0.01	Yes
Karahanaenone	tr		0.16	Yes
Germacrene D	0.5	3.0	0.5	Yes
α-Cedrol	0.8	7.0	1.7	Yes
α-Terpinyl acetate	1	4	2	Yes
Terpinen-4-ol	0.2	2.0	1.2	Yes
Limonene	1.8	5.0	3.0	Yes
Δ3-Carene	12	25	22	Yes
Myrcene	1.0	3.5	2.1	Yes
β-Pinene	0.5	3.0	1.2	Yes
α-Pinene	40	65	49	Yes
<b>Refractive index</b>	1.4680	1.4780	1.4714	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the AFNOR standard for cupressus oil.

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Classe
Cyclofenchene	0.01	Monoterpene
Bornylene	0.04	Monoterpene
Hashishene	0.01	Monoterpene
Tricyclene	0.17	Monoterpene
$\alpha$ -Thujene	0.53	Monoterpene
$\alpha$ -Pinene	49.46	Monoterpene
Camphene	0.34	Monoterpene
$\alpha$ -Fenchene	0.50	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
meta-Cymene	0.07	Monoterpene
Sabinene	1.24	Monoterpene
$\beta$ -Pinene	1.24	Monoterpene
Pseudolimonene isomer	0.02	Monoterpene
Myrcene	2.05	Monoterpene
2-Carene	0.03	Monoterpene
Pseudolimonene	0.02	Monoterpene
$\alpha$ -Phellandrene	0.11	Monoterpene
$\Delta^3$ -Carene	22.08	Monoterpene
$\alpha$ -Terpinene	0.60	Monoterpene
ortho-Cymene	0.04	Monoterpene
para-Cymene	0.36	Monoterpene
Sylvestrene	0.13	Monoterpene
Limonene	3.02	Monoterpene
$\beta$ -Phellandrene	0.40*	Monoterpene
1,8-Cineole	[0.40]*	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.03	Monoterpene
Unknown	0.03	Monoterpene
$\gamma$ -Terpinene	0.82	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
Terpinolene isomer	0.05	Monoterpene
para-Cymenene	0.07	Monoterpene
Terpinolene	3.12	Monoterpene
$\alpha$ -Pinene oxide	0.02	Monoterpenic ether
Unknown	0.01	Unknown
Linalool	0.30	Monoterpenic alcohol
1,3,8-para-Menthatriene	0.01	Monoterpene
endo-Fenchol	tr	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.02	Aliphatic alcohol
cis-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
Camphor	0.06	Monoterpenic ketone
trans-Pinocarveol	0.05	Monoterpenic alcohol
Epoxyterpinolene	0.03	Monoterpenic ether

meta-Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Karahanaenone	0.16	Monoterpenic ketone
Borneol	0.83	Monoterpenic alcohol
$\alpha$ -Phellandren-8-ol	0.02	Monoterpenic alcohol
Umbellulone	0.07	Monoterpenic ketone
Terpinen-4-ol	1.25	Monoterpenic alcohol
meta-Cymen-8-ol	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
$\alpha$ -Terpineol	0.36	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Verbenone	0.02	Monoterpenic ketone
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Carvacrol methyl ether	tr	Monoterpenic ether
Car-3-en-2-one	0.03	Monoterpenic ketone
Linalyl acetate	0.02	Monoterpenic ester
( <i>trans</i> ?) -Linalool oxide acetate (fur.)?	0.01	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.04	Monoterpenic alcohol
Unknown	0.53	Oxygenated monoterpene
Bornyl acetate	0.95	Monoterpenic ester
Cuminol	0.04	Monoterpenic alcohol
Unknown	0.12	Monoterpenic ester
Terpinen-4-yl acetate	0.06	Monoterpenic ester
Thymol	0.04	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.25	Monoterpenic ester
$\alpha$ -Terpinyl acetate	1.83	Monoterpenic ester
$\alpha$ -Cubebene	0.09	Sesquiterpene
$\alpha$ -Ylangene	0.02	Sesquiterpene
$\alpha$ -Copaene	0.04	Sesquiterpene
2-epi- $\alpha$ -Funebrene	tr	Sesquiterpene
$\beta$ -Bourbonene	0.01	Sesquiterpene
$\beta$ -Elemene	tr	Sesquiterpene
Sesquithujene	0.01	Sesquiterpene
$\alpha$ -Cedrene	0.17	Sesquiterpene
$\beta$ -Funebrene	0.18	Sesquiterpene
$\beta$ -Cedrene	0.11	Sesquiterpene
$\beta$ -Caryophyllene	0.36	Sesquiterpene
$\beta$ -Copaene	0.02	Sesquiterpene
<i>cis</i> -Thujopsene	0.04	Sesquiterpene
<i>cis</i> -Muurolo-3,5-diene	0.05	Sesquiterpene
<i>trans</i> -Muurolo-3,5-diene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.16	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.14	Sesquiterpene
Unknown	0.02	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.03	Sesquiterpene
$\gamma$ -Muurolo-4	0.17	Sesquiterpene
$\alpha$ -Amorphene	0.02	Sesquiterpene
Germacrene D	0.47	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene

β-Alaskene	0.06	Sesquiterpene
Epizonarene	0.07	Sesquiterpene
α-Muurolene	0.10	Sesquiterpene
δ-Amorphene	0.02	Sesquiterpene
γ-Cadinene	0.13	Sesquiterpene
α-Alaskene	0.02	Sesquiterpene
<i>trans</i> -Calamenene	0.08	Sesquiterpene
δ-Cadinene	0.26*	Sesquiterpene
Zonarene	[0.26]*	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	0.02	Sesquiterpenic alcohol
α-Cedrol	1.70	Sesquiterpenic alcohol
Torilenol	tr	Oxygenated sesquiterpene
epi-Cedrol	0.01	Sesquiterpenic alcohol
10-epi-Cubenol	0.02	Sesquiterpenic alcohol
α-Acorenol	0.02	Sesquiterpenic alcohol
1-epi-Cubenol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Unknown
τ-Muurolol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
α-Muurolol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.03	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Isopimaradiene	tr	Diterpene
Manoyl oxide	0.05	Diterpenic ether
7,13-Abietadiene	0.01	Diterpene
Unknown	0.01	Unknown
<b>Consolidated total</b>	<b>98.89%</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

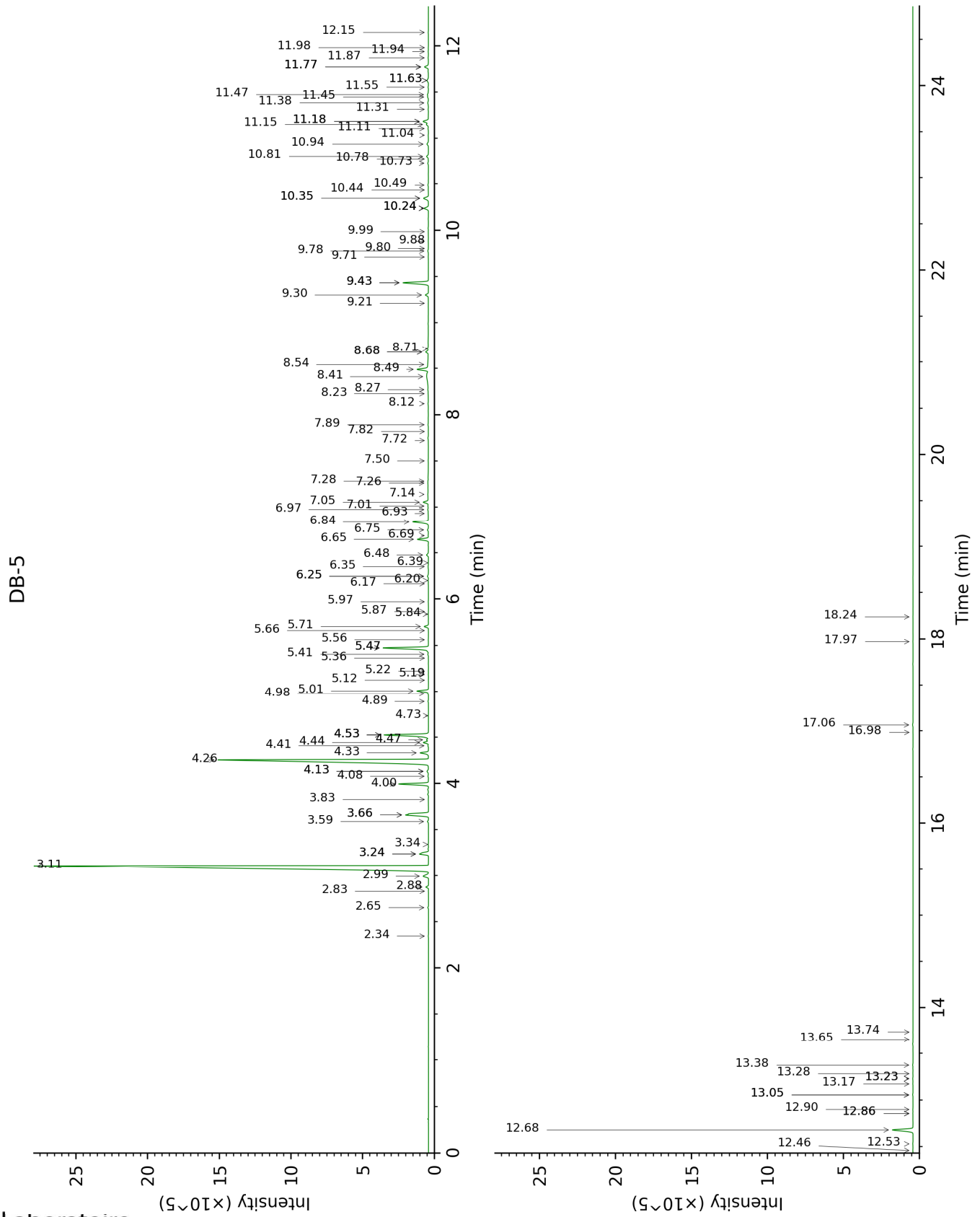
tr: The compound has been detected below 0.005% of total signal.

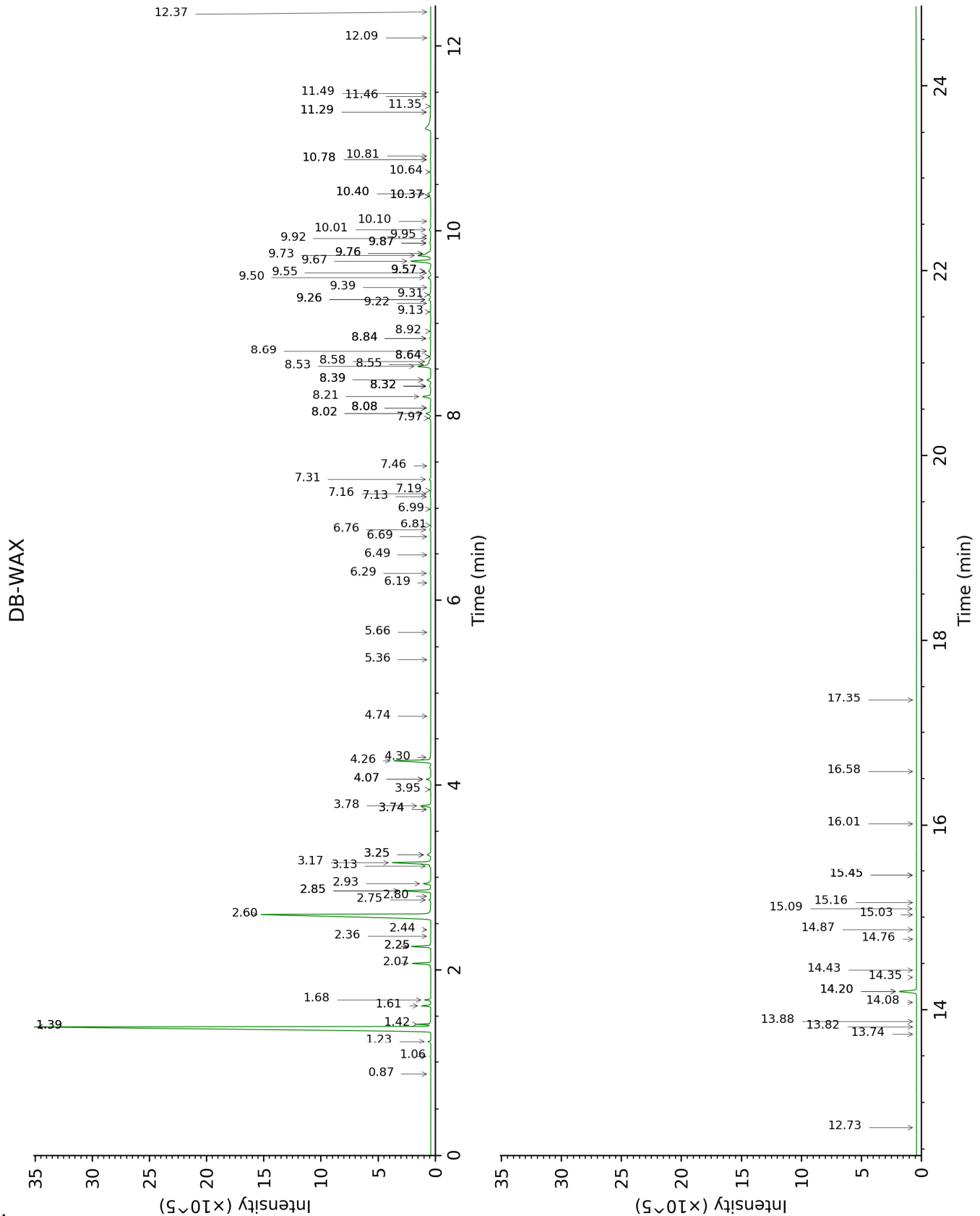
Note: no correction factor was applied

**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.







FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Cyclofenchene	2.34	877	0.01	0.87	916	0.01
Bornylene	2.65	902	0.04	1.06	946	0.04
Hashishene	2.83	914	0.01	1.39*	998	49.07
Tricyclene	2.88	917	0.17	1.23	973	0.16
$\alpha$ -Thujene	2.99	925	0.53	1.42	1002	0.68
$\alpha$ -Pinene	3.11	932	49.46	1.39*	998	[49.07]
Camphene	3.24*	941	0.87	1.68	1028	0.34
$\alpha$ -Fenchene	3.24*	941	[0.87]	1.61	1021	0.50
Thuja-2,4(10)-diene	3.34	948	0.02	2.25*	1084	1.26
meta-Cymene	3.59	964	0.07	2.85*	1134	2.05
Sabinene	3.66*	969	2.48	2.25*	1084	[1.26]
$\beta$ -Pinene	3.66*	969	[2.48]	2.07	1066	1.24
Pseudolimonene isomer	3.83	980	0.02	2.44	1101	0.02
Myrcene	4.00	991	2.05	2.85*	1134	[2.05]
2-Carene	4.08	996	0.03	2.36	1095	0.03
Pseudolimonene	4.13*	1000	0.13	2.80	1129	0.02
$\alpha$ -Phellandrene	4.13*	1000	[0.13]	2.76	1126	0.11
$\Delta^3$ -Carene	4.26	1008	22.08	2.60	1114	21.81
$\alpha$ -Terpinene	4.33	1013	0.60	2.93	1140	0.61
ortho-Cymene	4.41	1018	0.04	4.06*	1226	0.37
para-Cymene	4.44	1020	0.36	4.06*	1226	[0.37]
Sylvestrene	4.47	1022	0.13	3.13	1155	0.11
Limonene	4.53*	1025	3.42	3.17	1158	3.02
$\beta$ -Phellandrene	4.53*	1025	[3.42]	3.25*	1164	0.35
1,8-Cineole	4.53*	1025	[3.42]	3.25*	1164	[0.35]
(Z)- $\beta$ -Ocimene	4.73	1038	0.01	3.74*	1202	0.04
(E)- $\beta$ -Ocimene	4.89	1048	0.03	3.95	1218	0.03
Unknown [m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)]	4.98	1053	0.03	3.74*	1202	[0.04]
$\gamma$ -Terpinene	5.01	1055	0.82	3.78	1205	0.79
cis-Sabinene hydrate	5.12	1063	0.01	6.81	1425	tr
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.19	1067	0.01	4.74	1275	0.01
cis-Linalool oxide (fur.)	5.22	1069	0.01	6.49	1401	0.01
meta-Cymenene	5.36	1078	0.01	6.19	1380	0.01
Terpinolene isomer	5.40	1081	0.05	4.30	1243	0.10
para-Cymenene	5.47*	1085	3.45	6.29	1388	0.07

Terpinolene	5.47*	1085	[3.45]	4.26	1240	3.12
α-Pinene oxide	5.56	1091	0.02	5.36	1320	0.01
Unknown [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	5.66	1097	0.01			
Linalool	5.70	1100	0.30	8.02*	1515	0.49
1,3,8-para- Menthatriene	5.84	1108	0.01	5.66	1341	0.01
endo-Fenchol	5.87	1110	tr	8.32*	1538	0.13
cis-para-Menth-2- en-1-ol	5.97	1117	0.02	8.08*	1520	0.05
4-Hydroxy-4- methylcyclohex- 2-enone	6.17	1130	0.02	14.08	2031	0.01
cis-para-Mentha- 2,8-dien-1-ol	6.20	1132	0.03	9.39	1622	0.01
Camphor	6.25*	1135	0.09	7.16	1451	0.06
trans-Pinocarveol	6.25*	1135	[0.09]	9.13	1600	0.05
Epoxyterpinolene	6.35	1142	0.03	6.69	1416	0.02
meta-Mentha- 4,6-dien-8-ol	6.39	1145	0.01	9.26*	1611	0.23
Karahanaenone	6.48	1150	0.16	7.31	1462	0.13
Borneol	6.65	1161	0.83	9.74†	1649	1.66
α-Phellandren-8- ol	6.69	1164	0.02	10.10	1679	0.02
Umbellulone	6.75	1168	0.07	8.84*	1578	0.08
Terpinen-4-ol	6.84	1174	1.25	8.53†	1554	1.63
meta-Cymen-8-ol	6.93	1180	0.01	11.46	1792	tr
para-Cymen-8-ol	6.98	1183	0.03	11.49	1795	0.03
Unknown [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	7.01	1186	0.02			
α-Terpineol	7.06	1188	0.36	9.76*†	1651	[1.66]
Myrtenol	7.14	1194	0.02	10.81	1738	0.01
Unknown [m/z 109, 91 (100), 81 (88), 94 (75), 119 (74), 96 (73), 41 (63)... 150 (2)]	7.26	1202	0.02	10.78*	1735	0.04
Verbenone	7.28	1203	0.02	9.57*	1636	0.24
trans-Carveol	7.50	1218	0.01	11.35	1784	0.02
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.72	1234	0.01	11.29*	1778	0.09
Carvacrol methyl ether	7.82	1240	tr	8.55†	1556	[1.63]
Car-3-en-2-one	7.89	1246	0.03	10.37*†	1701	0.38
Linalyl acetate	8.12	1260	0.02	8.08*	1520	[0.05]

( <i>trans</i> ?)-Linalool oxide acetate (fur.)?	8.23	1267	0.01	8.64*	1563	0.14
<i>trans</i> -Ascaridole glycol	8.27	1270	0.04			
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.41	1280	0.53	12.37	1873	0.01
Bornyl acetate	8.49	1285	0.95	8.21	1529	0.74
Cuminol	8.54	1288	0.04			
Unknown [m/z 121, 93 (97), 43 (81), 136 (48), 107 (47), 108 (44)...]	8.68*	1297	0.19	8.58†	1558	[1.63]
Terpinen-4-yl acetate	8.68*	1297	[0.19]	8.69	1567	0.06
Thymol	8.72	1300	0.04	15.09	2129	0.06
Unknown [m/z 93, 92 (34), 43 (31), 91 (27)...]	9.21	1334	0.01			
Unknown [m/z 93, 43 (50), 121 (50), 136 (35)...]	9.30	1340	0.25	9.50	1630	0.24
$\alpha$ -Terpinyl acetate	9.43*	1349	2.05	9.67	1644	1.83
$\alpha$ -Cubebene	9.43*	1349	[2.05]	6.76	1421	0.09
$\alpha$ -Ylangene	9.71	1369	0.02	6.99	1438	0.01
$\alpha$ -Copaene	9.78	1373	0.04	7.13	1448	0.04
2- <i>epi</i> - $\alpha$ -Funebrene	9.80	1375	tr	7.19	1453	tr
$\beta$ -Bourbonene	9.88	1381	0.01	7.46	1473	0.01
$\beta$ -Elemene	9.99	1388	tr	8.39*	1543	0.37
Sesquithujene	10.24*	1406	0.38	8.08*	1520	[0.05]
$\alpha$ -Cedrene	10.24*	1406	[0.38]	7.97	1511	0.17
$\beta$ -Funebrene	10.24*	1406	[0.38]	8.02*	1515	[0.49]
$\beta$ -Cedrene	10.35*	1414	0.47	8.32*	1538	[0.13]
$\beta$ -Caryophyllene	10.35*	1414	[0.47]	8.39*	1543	[0.37]
$\beta$ -Copaene	10.44	1420	0.02	8.32*	1538	[0.13]
<i>cis</i> -Thujopsene	10.49	1424	0.04	8.64*	1563	[0.14]
<i>cis</i> -Muurola-3,5-diene	10.73	1442	0.05	8.92	1584	0.02
<i>trans</i> -Muurola-3,5-diene	10.78	1445	0.01	8.84*	1578	[0.08]
$\alpha$ -Humulene	10.81	1447	0.16	9.26*	1611	[0.23]
<i>cis</i> -Muurola-4(15),5-diene	10.94	1457	0.14	9.31	1615	0.18
Unknown [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	11.04	1464	0.02	9.55	1634	0.01

<i>trans</i> -Cadin-1(6),4-diene	11.11	1470	0.03	9.22	1608	0.03
γ-Murolene	11.15	1473	0.17	9.57*	1636	[0.24]
α-Amorphene	11.18*	1475	0.48	9.57*	1636	[0.24]
Germacrene D	11.18*	1475	[0.48]	9.76*†	1651	[1.66]
<i>trans</i> -Muuro-4(15),5-diene	11.32	1485	0.02	9.87*	1660	0.12
β-Alaskene	11.38	1490	0.06	9.57*	1636	[0.24]
Epizonarene	11.45	1495	0.07	9.87*	1660	[0.12]
α-Muuro-1,4-diene	11.47	1497	0.10	10.01	1672	0.15
δ-Amorphene	11.55	1503	0.02	9.92	1664	0.04
γ-Cadinene	11.63*	1508	0.15	10.37*†	1701	[0.38]
α-Alaskene	11.63*	1508	[0.15]	9.95	1666	0.02
<i>trans</i> -Calamenene	11.77*	1520	0.34	11.29*	1778	[0.09]
δ-Cadinene	11.77*	1520	[0.34]	10.40*†	1703	[0.38]
Zonarene	11.77*	1520	[0.34]	10.40*†	1703	[0.38]
<i>trans</i> -Cadin-1,4-diene	11.87	1527	0.03	10.64	1724	0.02
α-Cadinene	11.94	1533	0.02	10.78*	1735	[0.04]
α-Calacorene	11.98	1536	0.01	12.09	1848	0.01
Salviadienol?	12.15	1549	0.02	14.35	2057	0.02
Caryophyllene oxide	12.46	1573	0.02	12.73	1905	0.01
allo-Cedrol	12.53	1579	0.02	14.20*	2042	1.62
α-Cedrol	12.68	1590	1.70	14.20*	2042	[1.62]
Torilenol	12.86*	1604	0.01	15.45*	2166	0.05
epi-Cedrol	12.86*	1604	[0.01]	14.76	2096	0.01
10-epi-Cubenol	12.90	1608	0.02	13.74	1998	0.01
α-Acorenol	13.06*	1620	0.03	14.43	2064	0.02
1-epi-Cubenol	13.06*	1620	[0.03]	13.82	2005	0.01
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.17	1630	0.02	13.88	2011	0.02
τ-Muuro-1,4-diene	13.23*	1635	0.03	15.03	2123	0.01
τ-Cadinol	13.23*	1635	[0.03]	14.87	2107	0.01
α-Muuro-1,4-diene	13.28	1639	0.01	15.16	2136	0.01
α-Cadinol	13.38	1647	0.03	15.45*	2166	[0.05]
Unknown [m/z 85, 57 (59), 79 (26), 67 (18), 41 (16), 80 (15), 81 (10), 77 (8), 238 (7)]	13.66	1670	0.01			
Eudesma-4(15),7-dien-1β-ol	13.74	1677	0.01			
Isopimaradiene	16.98	1968	tr	16.01	2223	0.01
Manoyl oxide	17.06	1975	0.05	16.58	2281	tr
7,13-Abietadiene	17.97	2065	0.01	17.35	2364	0.01
Unknown [m/z 191, 81 (47), 95]	18.24	2092	0.01			

(41), 69 (39), 109 (32), 93 (32)...		
<b>Total identified</b>	<b>98.38%</b>	<b>97.33%</b>
<b>Total reported</b>	<b>99.31%</b>	<b>97.62%</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