

Date : April 27, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21D16-PTH09

Customer identification : Juniper Berry ORGANIC - Hungary - J50104203R

Type : Essential oil

Source : *Juniperus communis*

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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : avril 22, 2021

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update of the version first issued on April 23, 2021 to make a minor correction.

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4725 ± 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	tr	Simple phenolic
Unknown	tr	Alkene
(2E)-Hexenal	tr	Aliphatic aldehyde
Tricyclene	0.06	Monoterpene
α -Thujene	1.68	Monoterpene
α -Pinene	39.25	Monoterpene
Camphene	0.22	Monoterpene
α -Fenchene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
meta-Cymene	0.01	Monoterpene
Sabinene	22.34	Monoterpene
β -Pinene	5.02	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	5.69	Monoterpene
Pseudolimonene	tr	Monoterpene
α -Phellandrene	0.11	Monoterpene
Δ^3 -Carene	0.06	Monoterpene
α -Terpinene	1.50	Monoterpene
para-Cymene	0.62	Monoterpene
Limonene	4.64	Monoterpene
1,8-Cineole	0.28	Monoterpenic ether
(Z)- β -Ocimene	tr	Monoterpene
(E)- β -Ocimene	0.02	Monoterpene
γ -Terpinene	3.82	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Fenchone	0.02	Monoterpenic ketone
Terpinolene	1.55	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
para-Cymenene	tr	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
α -Thujone	tr	Monoterpenic ketone
Linalool	0.03	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α -Campholenal	tr	Monoterpenic aldehyde
1-Terpineol	tr	Monoterpenic alcohol
trans-Pinocarveol	0.03	Monoterpenic alcohol
cis-Verbenol	0.03	Monoterpenic alcohol
trans-Verbenol	0.02	Monoterpenic alcohol
Camphene hydrate	0.02	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.02	Monoterpenic alcohol
Citronellal	0.01	Monoterpenic aldehyde

Pinocamphone	tr	Monoterpenic ketone
Pinocarvone	tr	Monoterpenic ketone
Borneol	0.02	Monoterpenic alcohol
α -Phellandren-8-ol	0.01	Monoterpenic alcohol
Isopinocamphone	0.01	Monoterpenic ketone
Terpinen-4-ol	2.87	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
α -Terpineol	0.13	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
Decanal	0.01	Aliphatic aldehyde
endo-Fenchyl acetate	0.01	Monoterpenic ester
<i>trans</i> -Carveol	tr	Monoterpenic alcohol
<i>cis</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
Carvone	0.01	Monoterpenic ketone
Carvacrol methyl ether	tr	Monoterpenic ether
Piperitone	0.01	Monoterpenic ketone
Geraniol	tr	Monoterpenic alcohol
Methyl citronellate	0.04	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Bornyl acetate	0.10	Monoterpenic ester
2-Undecanone	0.03	Aliphatic ketone
Terpinen-4-yl acetate	0.02	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Carvacrol	tr	Monoterpenic alcohol
Methyl nerate?	tr	Monoterpenic ester
Myrtenyl acetate	0.01	Monoterpenic ester
Bicycloelemene analog	0.01	Sesquiterpene
Terpinyl acetate analog	0.01	Monoterpenic ester
α -Cubebene	0.16	Sesquiterpene
α -Terpinyl acetate	0.04	Monoterpenic ester
Citronellyl acetate	0.01	Monoterpenic ester
α -Copaene	0.14	Sesquiterpene
<i>cis</i> - β -Elemene	tr	Sesquiterpene
<i>trans</i> -Myrtanyl acetate	0.01	Monoterpenic ester
β -Cubebene	0.04	Sesquiterpene
β -Elemene	0.38	Sesquiterpene
α -Funebrene	0.05	Sesquiterpene
Longifolene	0.01	Sesquiterpene
α -Gurjunene	tr	Sesquiterpene
β -Caryophyllene	0.78	Sesquiterpene
β -Copaene	0.05	Sesquiterpene
γ -Elemene	0.26	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
α -Himachalene	0.01	Sesquiterpene
α -Humulene	0.70	Sesquiterpene
allo-Aromadendrene	0.03	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.14	Sesquiterpene

β-Acoradiene	0.03	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.06	Sesquiterpene
γ-Muurolene	0.28	Sesquiterpene
Germacrene D	1.15	Sesquiterpene
β-Selinene	0.11	Sesquiterpene
γ-Amorphene	0.03	Sesquiterpene
α-Selinene	0.13	Sesquiterpene
Bicyclogermacrene	0.14	Sesquiterpene
epi-Cubebol	tr	Sesquiterpenic alcohol
Viridiflorene	0.02	Sesquiterpene
Germacrene A	0.09	Sesquiterpene
α-Muurolene	0.14	Sesquiterpene
Cuparene	tr	Sesquiterpene
γ-Cadinene	0.24	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
(3 <i>E</i> ,6 <i>E</i>)-α-Farnesene	0.05	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
δ-Cadinene	0.83	Sesquiterpene
Selina-4(15),7(11)-diene	0.13	Sesquiterpene
α-Cadinene	0.10	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Selina-3,7(11)-diene	0.05	Sesquiterpene
α-Elemol	0.03	Sesquiterpenic alcohol
Salviadienol?	tr	Sesquiterpenic alcohol
Germacrene B	0.74	Sesquiterpene
Caryophyllenyl alcohol	0.02	Sesquiterpenic alcohol
Spathulenol	0.06	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
allo-Cedrol	tr	Sesquiterpenic alcohol
Humulene epoxide II	0.02	Sesquiterpenic ether
epi-Cedrol	0.02	Sesquiterpenic alcohol
10-epi-Cubenol	0.01	Sesquiterpenic alcohol
Junenol	tr	Sesquiterpenic alcohol
Alismol	0.01	Sesquiterpenic alcohol
α-Acorenol	tr	Sesquiterpenic alcohol
β-Acorenol	0.01	Sesquiterpenic alcohol
τ-Muurolol	0.08	Sesquiterpenic alcohol
τ-Cadinol	0.08	Sesquiterpenic alcohol
α-Muurolol	0.04	Sesquiterpenic alcohol
β-Eudesmol	0.04	Sesquiterpenic alcohol
α-Cadinol	0.13	Sesquiterpenic alcohol
Cedrenol analog	tr	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5β-ol	0.02	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Shyobunol	tr	Sesquiterpenic alcohol
epi-α-Bisabolol	0.02	Sesquiterpenic alcohol
Mayurone?	tr	Norsesquiterpenic ketone
Germacra-4(15),5,10(14)-trien-1β-ol?	0.01	Sesquiterpenic alcohol
Thujopsenal analog	0.03	Sesquiterpenic aldehyde
Cedryl acetate	0.05	Sesquiterpenic ester
meta-Camphorene	0.15	Diterpene
Unknown	0.04	Oxygenated diterpene

para-Camphorene	0.06	Diterpene
13-epi-Manoyl oxide	tr	Diterpenic ether
18-Norabieta-8,11,13-triene?	0.01	Norditerpene
ar-Abietatriene	tr	Diterpene
7,13-Abietadiene	tr	Diterpene
Unknown	0.01	Unknown
Sandaracopimarinal?	0.02	Diterpenic aldehyde
Dehydroabietol?	tr	Diterpenic alcohol
Consolidated total	98.89%	

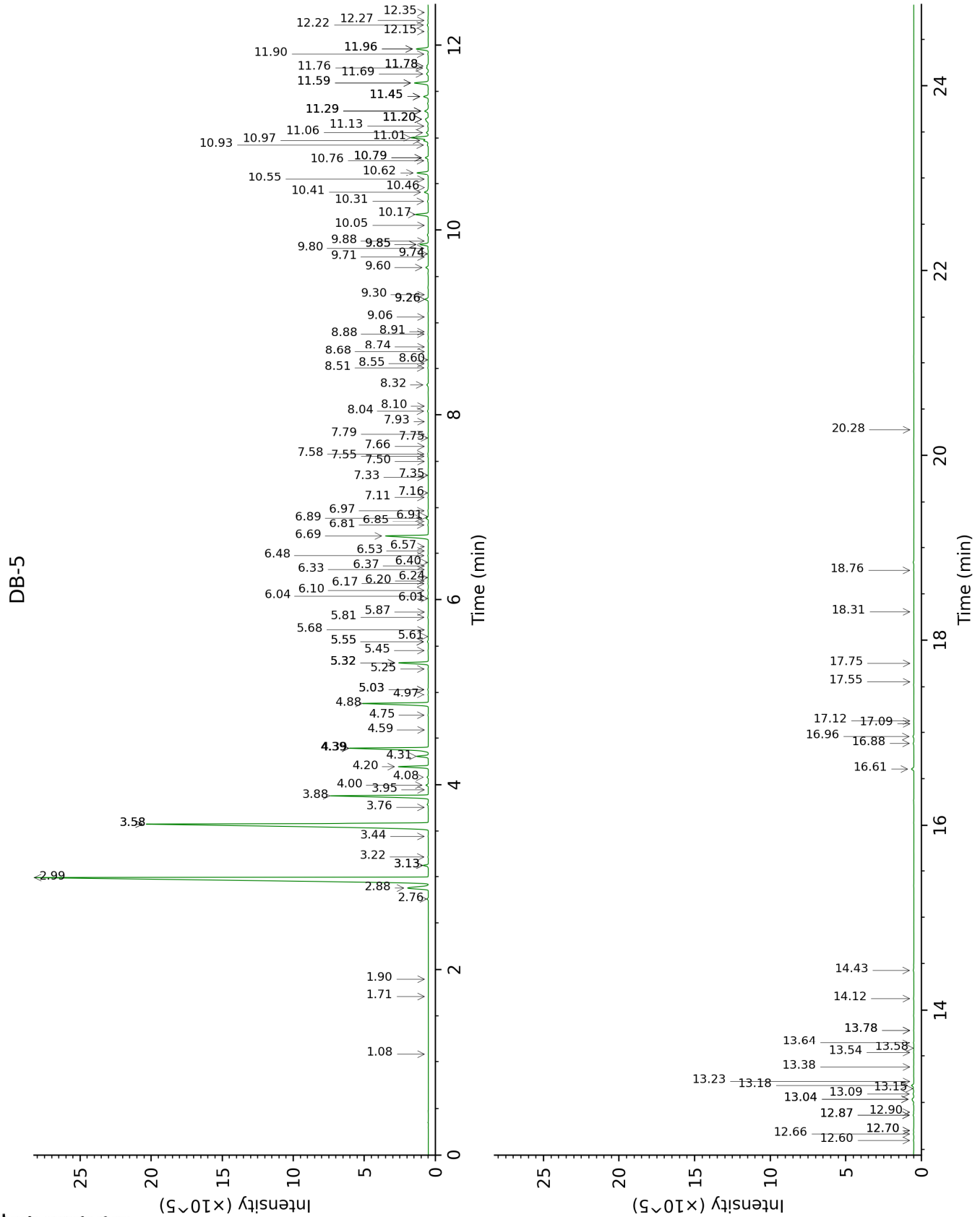
tr: The compound has been detected below 0.005% of total signal.

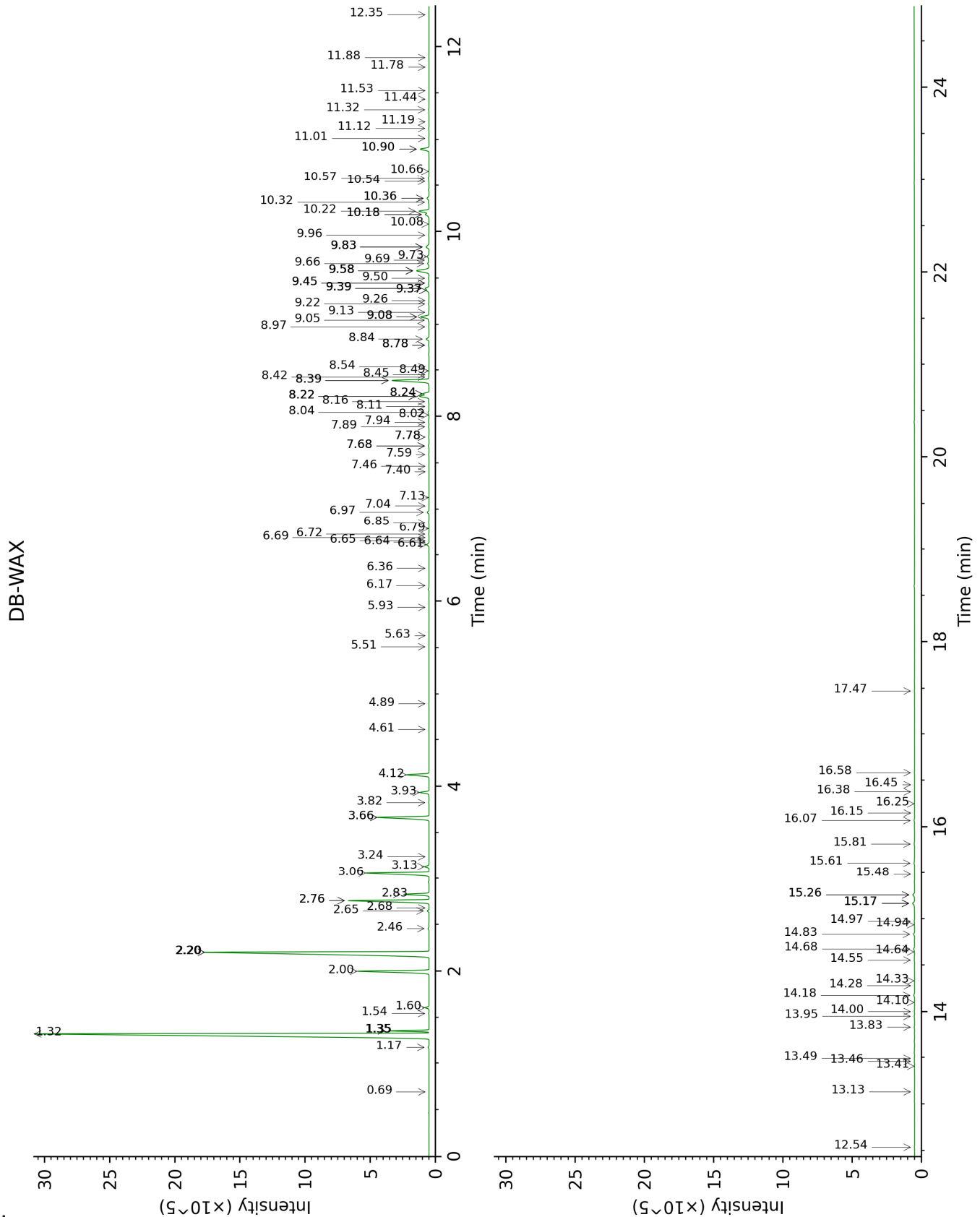
Note: no correction factor was applied

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	%
Toluene	1.08	758	tr	1.36*	1002	1.70
Unknown [m/z 109, 67 (32), 81 (14), 41 (12), 124 (10)]	1.71	833	tr	0.69	881	tr
(2E)-Hexenal	1.90	849	tr	3.24	1173	0.01
Tricyclene	2.76	920	0.06	1.17	973	0.06
α -Thujene	2.88	928	1.68	1.36*	1002	[1.70]
α -Pinene	2.99	935	39.25	1.32	999	39.40
Camphene	3.13*	945	0.24	1.60	1028	0.22
α -Fenchene	3.13*	945	[0.24]	1.54	1021	0.02
Thuja-2,4(10)-diene	3.22	951	0.02	2.20*	1088	22.44
meta-Cymene	3.44	966	0.01	2.76*	1135	5.71
Sabinene	3.58*	975	27.36	2.20*	1088	[22.44]
β -Pinene	3.58*	975	[27.36]	2.00	1067	5.02
6-Methyl-5-hepten-2-one	3.76	987	0.01	4.89	1298	0.01
Myrcene	3.88	995	5.69	2.76*	1135	[5.71]
Pseudolimonene	3.95	1000	tr	2.68	1129	tr
α -Phellandrene	4.00	1003	0.11	2.65	1126	0.10
Δ 3-Carene	4.08	1009	0.06	2.46	1111	0.06
α -Terpinene	4.20	1016	1.50	2.83	1140	1.50
para-Cymene	4.31	1023	0.62	3.93	1227	0.61
Limonene	4.39*	1028	4.91	3.06	1159	4.64
1,8-Cineole	4.39*	1028	[4.91]	3.13	1165	0.28
(Z)- β -Ocimene	4.59	1041	tr	3.66*	1207	3.85
(E)- β -Ocimene	4.75	1051	0.02	3.82	1219	0.02
γ -Terpinene	4.88	1059	3.82	3.66*	1207	[3.85]
cis-Sabinene hydrate	4.98	1065	0.02	6.72	1429	0.02
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.03*	1069	0.03	4.61	1278	0.01
cis-Linalool oxide (fur.)	5.03*	1069	[0.03]	6.36	1402	0.01
Fenchone	5.26	1083	0.02	5.51	1340	0.01
Terpinolene	5.32*	1087	1.59	4.12	1241	1.55
trans-Linalool oxide (fur.)	5.32*	1087	[1.59]	6.69	1426	tr
para-Cymenene	5.32*	1087	[1.59]	6.17	1388	tr
trans-Sabinene hydrate	5.45	1096	0.01	7.78*	1508	0.03
α -Thujone	5.55*	1102	0.05	5.94	1371	tr
Linalool	5.55*	1102	[0.05]	7.89	1517	0.03
Nonanal	5.60	1105	0.01	5.63	1349	tr
endo-Fenchol	5.68	1110	0.01	8.22*†	1543	1.24
cis-para-Menth-2-en-1-ol	5.81	1118	0.03	7.94	1521	0.02

α-Campholenal	5.87	1122	tr	6.85	1439	0.01
1-Terpineol	6.02	1132	tr	8.16	1538	0.04
<i>trans</i> -Pinocarveol	6.04	1133	0.03	8.97	1602	0.02
<i>cis</i> -Verbenol	6.10	1137	0.03	9.05	1608	0.05
<i>trans</i> -Verbenol	6.18	1142	0.02	9.37*	1634	0.16
Camphene hydrate	6.20	1144	0.02	8.24*†	1545	[1.24]
meta-Mentha-4,6-dien-8-ol	6.24	1146	0.02	9.13	1615	0.03
Citronellal	6.33	1152	0.01	6.79	1434	0.01
Pinocamphone	6.37	1154	tr	7.04	1453	tr
Pinocarvone	6.40	1156	tr	7.68*	1501	0.05
Borneol	6.48	1161	0.02	9.58*	1651	1.26
α-Phellandren-8-ol	6.53	1165	0.01	9.96	1683	0.03
Isopinocamphone	6.57	1168	0.01	7.40	1480	0.01
Terpinen-4-ol	6.69	1175	2.87	8.39*	1556	2.87
para-Cymen-8-ol	6.81	1182	0.02	11.32	1798	0.03
Unknown [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	6.85	1185	tr			
α-Terpineol	6.89	1188	0.13	9.58*	1651	[1.26]
Myrtenal	6.91	1189	0.01	8.49	1564	0.01
Myrtenol	6.97	1193	0.02	10.66	1741	0.02
Verbenone	7.11	1202	0.02	9.44*	1640	0.03
Decanal	7.16	1205	0.01	7.13	1459	0.01
endo-Fenchyl acetate	7.33	1217	0.01	6.65	1424	0.01
<i>trans</i> -Carveol	7.35	1218	tr	11.19	1787	0.01
<i>cis</i> -Carveol	7.50	1228	0.01	11.53	1816	tr
Citronellol	7.56	1232	0.02	10.54	1732	0.02
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.58	1233	0.03	11.12	1781	0.02
Carvone	7.66	1239	0.01	9.83*	1672	0.29
Carvacrol methyl ether	7.75	1245	tr	8.42	1559	0.02
Piperitone	7.79	1248	0.01	9.69	1661	0.05
Geraniol	7.93	1257	tr	11.44	1808	tr
Methyl citronellate	8.04	1264	0.04	8.02	1527	0.01
<i>trans</i> -Ascaridole glycol	8.10	1268	0.01	13.95	2039	0.03
Bornyl acetate	8.32	1284	0.10	8.04	1529	0.08
2-Undecanone	8.51	1296	0.03	8.45	1561	0.01
Terpinen-4-yl acetate	8.55	1299	0.02	8.54	1568	0.01
Thymol	8.60	1302	0.01	14.94	2136	0.01
Carvacrol	8.68	1308	tr	15.17*	2160	0.19
Methyl nerate?	8.74	1312	tr			
Myrtenyl acetate	8.88	1322	0.01	9.39*	1636	0.35
Bicycloelemene analog	8.91	1324	0.01	6.64	1423	tr

Terpinyl acetate analog	9.06	1335	0.01	9.39*	1636	[0.35]
α-Cubebene	9.26*	1348	0.19	6.61	1421	0.16
α-Terpinyl acetate	9.26*	1348	[0.19]	9.50	1645	0.04
Citronellyl acetate	9.30	1352	0.01	9.26	1625	0.02
α-Copaene	9.60	1372	0.14	6.97	1447	0.14
cis-β-Elemene	9.71	1380	tr	8.11	1534	0.01
trans-Myrtanyl acetate	9.74	1383	0.01	10.08	1692	tr
β-Cubebene	9.80	1387	0.04	7.59	1494	0.02
β-Elemene	9.85*	1390	0.49	8.24*†	1545	[1.24]
α-Funebrene	9.85*	1390	[0.49]	7.68*	1501	[0.05]
Longifolene	9.88	1393	0.01	7.78*	1508	[0.03]
α-Gurjunene	10.05	1405	tr	7.46	1485	0.01
β-Caryophyllene	10.17	1413	0.78	8.22*†	1543	[1.24]
β-Copaene	10.31	1424	0.05	8.22*†	1543	[1.24]
γ-Elemene	10.41	1431	0.26	8.84	1592	0.24
Aromadendrene	10.46	1435	0.01	8.39*	1556	[2.87]
α-Himachalene	10.55	1442	0.01	8.78*	1586	0.05
α-Humulene	10.62	1447	0.70	9.08*	1611	0.68
allo-Aromadendrene	10.76	1457	0.03	8.78*	1586	[0.05]
(E)-β-Farnesene	10.79*	1460	0.17	9.37*	1634	[0.16]
β-Acoradiene	10.79*	1460	[0.17]	9.22	1622	0.03
trans-Cadina-1(6),4-diene	10.92	1470	0.06	9.08*	1611	[0.68]
γ-Murolene	10.97	1474	0.28	9.39*	1636	[0.35]
Germacrene D	11.00	1476	1.15	9.58*	1651	[1.26]
β-Selinene	11.06	1480	0.11	9.66	1658	0.10
γ-Amorphene	11.13	1485	0.03	9.58*	1651	[1.26]
α-Selinene	11.20*	1491	0.30	9.73	1664	0.13
Bicyclogermacrene	11.20*	1491	[0.30]	9.83*	1672	[0.29]
epi-Cubebol	11.20*	1491	[0.30]	11.78	1839	tr
Viridiflorene	11.20*	1491	[0.30]	9.44*	1640	[0.03]
Germacrene A	11.29*	1497	0.27	10.18*	1701	0.33
α-Murolene	11.29*	1497	[0.27]	9.83*	1672	[0.29]
Cuparene	11.29*	1497	[0.27]	10.90*	1762	0.73
γ-Cadinene	11.45*	1509	0.30	10.18*	1701	[0.33]
Cubebol	11.45*	1509	[0.30]	12.34	1889	0.01
(3E,6E)-α-Farnesene	11.45*	1509	[0.30]	10.32	1712	0.05
trans-Calamenene	11.59*	1521	0.87	11.01	1772	0.01
δ-Cadinene	11.59*	1521	[0.87]	10.22	1704	0.83
Selina-4(15),7(11)-diene	11.69	1528	0.13	10.36*	1716	0.18
α-Cadinene	11.76	1533	0.10	10.58	1734	0.06
α-Calacorene	11.78*	1535	0.09	11.88	1848	0.01
Selina-3,7(11)-diene	11.78*	1535	[0.09]	10.36*	1716	[0.18]
α-Elemol	11.90	1545	0.03	13.83	2028	0.03
Salviadienol?	11.96*	1550	0.74	14.10	2054	tr
Germacrene B	11.96*	1550	[0.74]	10.90*	1762	[0.73]
Caryophyllenyl alcohol	12.15	1564	0.02	13.46	1992	0.01
Spathulenol	12.22	1570	0.06	14.18	2061	0.07

Caryophyllene oxide	12.27	1574	0.03	12.54	1907	0.02
allo-Cedrol	12.35	1580	tr	14.00	2044	0.02
Humulene epoxide II	12.60	1600	0.02	13.13	1962	0.02
epi-Cedrol	12.66	1605	0.02	14.56	2098	0.03
10-epi-Cubenol	12.70*	1608	0.03	13.49	1995	0.01
Junenol	12.70*	1608	[0.03]	13.41	1987	tr
Alismol	12.87*	1622	0.04	15.48	2192	0.01
α-Acorenol	12.87*	1622	[0.04]	14.28	2072	tr
β-Acorenol	12.90	1624	0.01	14.64	2107	0.01
τ-Muurolol	13.04*	1636	0.16	14.83	2126	0.08
τ-Cadinol	13.04*	1636	[0.16]	14.68	2110	0.08
α-Muurolol	13.09	1640	0.04	14.97	2140	0.03
β-Eudesmol	13.15	1645	0.04	15.17*	2160	[0.19]
α-Cadinol	13.18	1648	0.13	15.26*	2169	0.16
Cedrenol analog	13.23	1651	tr	16.25	2271	0.01
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.38	1664	0.02	16.58	2306	0.02
Unknown [m/z 109, 91 (67), 79 (57), 81 (49), 107 (48)... 220 (7)]	13.54	1677	0.01	16.45	2293	tr
Shyobunol	13.58	1681	tr	16.07	2252	0.04
epi-α-Bisabolol	13.64	1686	0.02	15.26*	2169	[0.16]
Mayurone?	13.78*	1697	0.01			
Germacra-4(15),5,10(14)-trien-1β-ol?	13.78*	1697	[0.01]	16.38	2285	0.01
Thujopsenal analog	14.12	1727	0.03			
Cedryl acetate	14.43	1753	0.05	14.33	2077	tr
meta-Camphorene	16.61	1951	0.15	15.17*	2160	[0.19]
Unknown [m/z 105, 91 (100), 81 (89), 79 (86), 109 (86), 257 (83)... 275 (12)...]	16.88	1978	0.04	15.81	2226	0.05
para-Camphorene	16.96	1985	0.06	15.61	2204	0.05
13-epi-Manoyl oxide	17.09	1998	tr	16.15	2261	0.01
18-Norabieta-8,11,13-triene?	17.12	2000	0.01			
ar-Abietatriene	17.55	2043	tr	17.47	2403	0.02
7,13-Abietadiene	17.75	2063	tr			
Unknown [m/z 93, 81 (88), 79 (69), 107 (65), 95 (61)...]	18.31	2119	0.01			
Sandaracopimarinal?	18.76	2165	0.02			
Dehydroabietol?	20.28	2329	tr			
Total identified		99.03%			98.91%	
Total reported		99.13%			98.99%	

*: 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

