

Date : March 24, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20C11-PSC03

Customer identification : Lavender Fine A.O.P. - France - B530051

Type : Essential oil

Source : *Lavandula angustifolia*

Customer : Pacha Soap Co.

ANALYSIS

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sylvain Mercier, M. Sc., Chimiste

Analysis date : March 20, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4621 $\pm$ 0.0003 (20 °C)

ISO 3515:2004 - OIL OF SPONTANEOUS LAVENDER - FRANCE

Compound	Min. %	Max. %	Observed %	Complies?
α -Terpineol		1.0	0.3	Yes
Lavandulyl acetate	2.0		4.8	Yes
Terpinen-4-ol	2	6	4	Yes
Lavandulol	0.3		1.2	Yes
Linalyl acetate	25	45	32	Yes
Linalool	25	38	28	Yes
Camphor	tr	0.50	0.25	Yes
Octan-3-one	tr	2.0	0.6	Yes
(E)- β -Ocimene	1.5	6.0	3.5	Yes
(Z)- β -Ocimene	4	10	5	Yes
β -Phellandrene	tr	0.50	0.06	Yes
1,8-Cineole		1.0	0.6	Yes
Limonene		0.5	0.2	Yes
Refractive index	1.4580	1.4640	1.4621	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for spontaneous French lavender oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
Acetone	tr	Aliphatic ketone
Isobutyral	tr	Aliphatic aldehyde
Methacrolein	tr	Aliphatic aldehyde
3-Buten-2-one	tr	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	tr	Aliphatic aldehyde
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.03	Aliphatic ether
Hexanol	0.03	Aliphatic alcohol
Hashishene	0.01	Monoterpene
Tricyclene	0.02	Monoterpene
α -Thujene	0.09	Monoterpene
α -Pinene	0.19	Monoterpene
Camphene	0.14	Monoterpene
α -Fenchene	tr	Monoterpene
Thujadiene isomer	tr	Monoterpene
5,5-Dimethyl-2(5H)-furanone	0.01	Aliphatic lactone
Butyl isobutyrate	0.01	Aliphatic ester
endo-Isocamphane	0.01	Monoterpene
β -Pinene	0.12	Monoterpene
Sabinene	0.04	Monoterpene
Octen-3-ol	0.22	Aliphatic alcohol
Dehydro-1,8-cineole	tr	Monoterpenic ether
Octan-3-one	0.57	Aliphatic ketone
Myrcene	0.30	Monoterpene
trans-Dehydroxylinalool oxide	0.01	Monoterpenic ether
Butyl butyrate	0.09	Aliphatic ester
Octan-3-ol	0.10	Aliphatic alcohol
α -Phellandrene	0.03	Monoterpene
cis-Dehydroxylinalool oxide	0.01	Monoterpenic ether
Pseudolimonene	tr	Monoterpene
Δ^3 -Carene	0.07	Monoterpene
α -Terpinene	0.04	Monoterpene
Hexyl acetate	0.32	Aliphatic ester
ortho-Cymene	0.05	Monoterpene
para-Cymene	0.14	Monoterpene
Limonene	0.20	Monoterpene
β -Phellandrene	0.06	Monoterpene
1,8-Cineole	0.64	Monoterpenic ether
(Z)- β -Ocimene	4.65	Monoterpene
(E)- β -Ocimene	3.46	Monoterpene
γ -Terpinene	0.13	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol

<i>cis</i> -Linalool oxide (fur.)	0.12	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.04	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.09	Monoterpenic alcohol
Rosefuran	0.02	Monoterpenic ether
<i>trans</i> -Sabinene hydrate	0.07	Monoterpenic alcohol
Linalool	28.41	Monoterpenic alcohol
(<i>Z</i>)-6-Methyl-3,5-heptadien-2-one	0.03	Aliphatic ketone
Octen-3-yl acetate	0.70	Aliphatic ester
Unknown	0.04	Unknown
α -Campholenal	0.01	Monoterpenic aldehyde
Octan-3-yl acetate	0.08	Aliphatic ester
allo-Ocimene	0.03	Monoterpene
(<i>Z</i>)-Myroxide	0.03	Monoterpenic ether
Camphor	0.25	Monoterpenic ketone
(<i>E</i>)-Myroxide	0.03	Monoterpenic ether
Hexyl isobutyrate	0.06	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	0.80	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (pyr.)	0.02	Monoterpenic alcohol
Lavandulol	1.20	Monoterpenic alcohol
Terpinen-4-ol	3.86	Monoterpenic alcohol
meta-Cymen-8-ol	0.07	Monoterpenic alcohol
Cryptone	0.21	Normonoterpenic ketone
para-Cymen-8-ol	0.08	Monoterpenic alcohol
Myrtenal	0.07	Monoterpenic aldehyde
α -Terpineol	0.32	Monoterpenic alcohol
Hodiendiol	0.01	Monoterpenic alcohol
Hexyl butyrate	0.29	Aliphatic ester
Verbenone	0.02	Monoterpenic ketone
Unknown	0.04	Unknown
(3 <i>E</i> ,5 <i>E</i>)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Octyl acetate	0.03	Aliphatic ester
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Bornyl formate	0.02	Monoterpenic ester
exo-2-Hydroxycineole	0.02	Monoterpenic alcohol
Nerol	0.07	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.08	Aliphatic ester
Carvone	0.02	Monoterpenic ketone
Neral	0.04	Monoterpenic aldehyde
Hexyl isovalerate	0.01	Aliphatic ester
Linalyl acetate	32.49	Monoterpenic ester
Geraniol	0.20	Monoterpenic alcohol
Geranial	0.04	Monoterpenic aldehyde
2,6-Dimethyl-1,7-octadiene-3,6-diol	0.03	Monoterpenic alcohol
Bornyl acetate	0.15	Monoterpenic ester
Cuminol	0.02	Monoterpenic alcohol
Lavandulyl acetate	4.82	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
Hexyl tiglate	0.05	Aliphatic ester
Hodiendiol derivative	0.02	Oxygenated monoterpene
Unknown	0.05	Oxygenated monoterpene

Unknown	0.06	Oxygenated monoterpene
Hodiendiol derivative III	0.02	Oxygenated monoterpene
Neryl acetate	0.17	Monoterpenic ester
α -Copaene	0.02	Sesquiterpene
7-Cubebene	0.01	Sesquiterpene
β -Bourbonene	0.02	Sesquiterpene
Geranyl acetate	0.24	Monoterpenic ester
7-epi-Sesquithujene	0.04	Sesquiterpene
Hexyl hexanoate	0.05	Aliphatic ester
Isocaryophyllene	0.02	Sesquiterpene
β -Caryophyllene	5.44	Sesquiterpene
α -Santalene	0.45	Sesquiterpene
Coumarin	0.02	Coumarin
<i>trans</i> - α -Bergamotene	0.14	Sesquiterpene
Sesquisabinene A	0.02	Sesquiterpene
<i>cis</i> - β -Bergamotene?	0.05	Sesquiterpene
α -Humulene	0.18	Sesquiterpene
Lavandulyl butyrate?	0.11	Monoterpenic ester
β -Santalene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	1.62	Sesquiterpene
Germacrene D	0.47	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.07	Sesquiterpene
Isodaucene	0.02	Sesquiterpene
β -Bisabolene	0.01	Sesquiterpene
Lavandulyl isovalerate	0.04	Monoterpenic ester
γ -Cadinene	0.42	Sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
β -Sesquiphellandrene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.06	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.46	Sesquiterpenic ether
Caryophyllene oxide isomer	0.06	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
τ -Cadinol	0.32	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.02	Sesquiterpenic alcohol
<i>cis</i> -14-nor-Muuro-5-en-4-one?	0.03	Norsesquiterpenic ketone
α -Bisabolol	0.01	Sesquiterpenic alcohol
Herniarin	0.01	Coumarin
Hexahydrofarnesyl acetone	0.01	Terpene derivative
9-(15,16-Dihydro-15-methylenegeranyl)- α -terpinene	0.06	Homoditerpene
Consolidated total	98.06%	

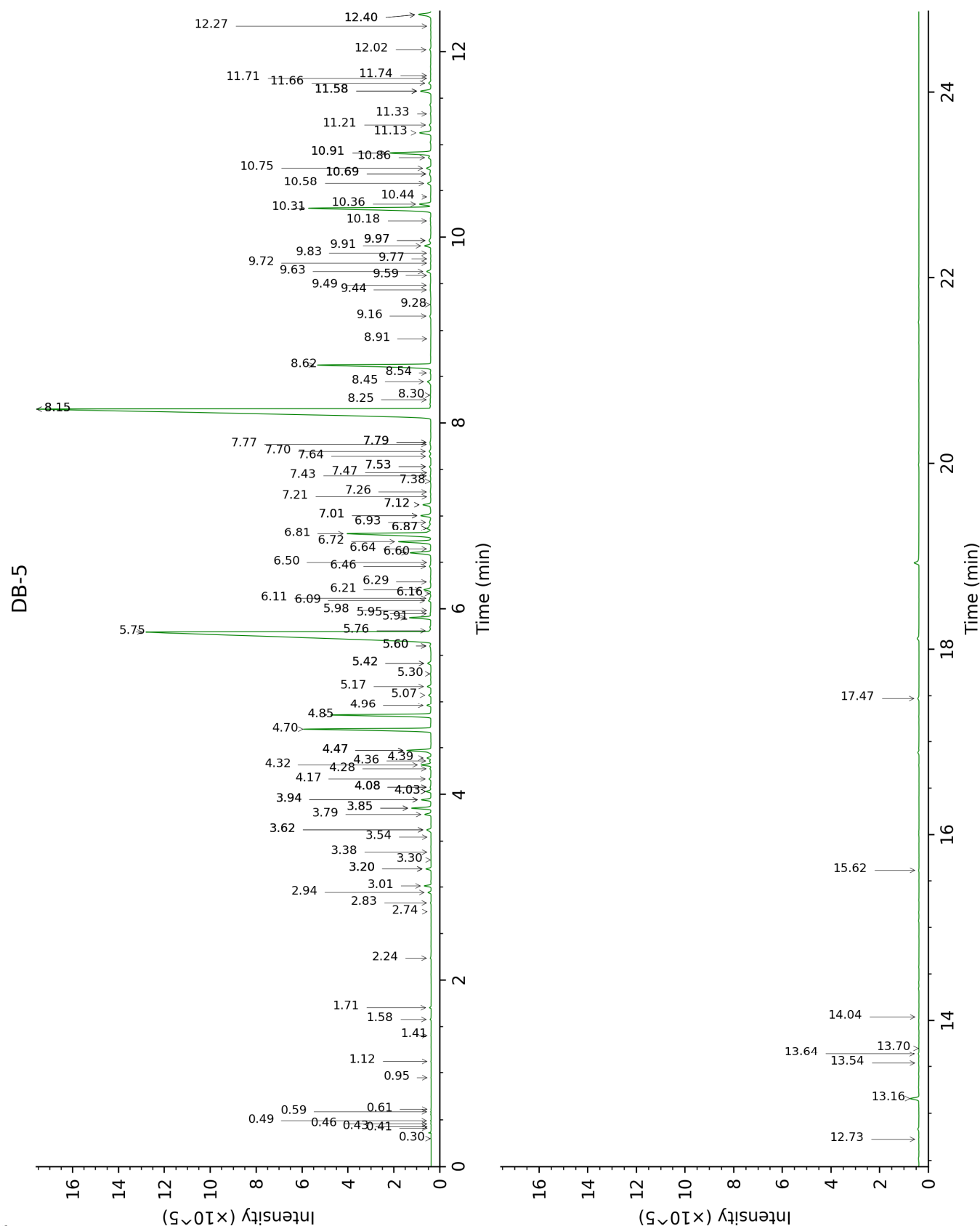
tr: The compound has been detected below 0.005% of total signal.

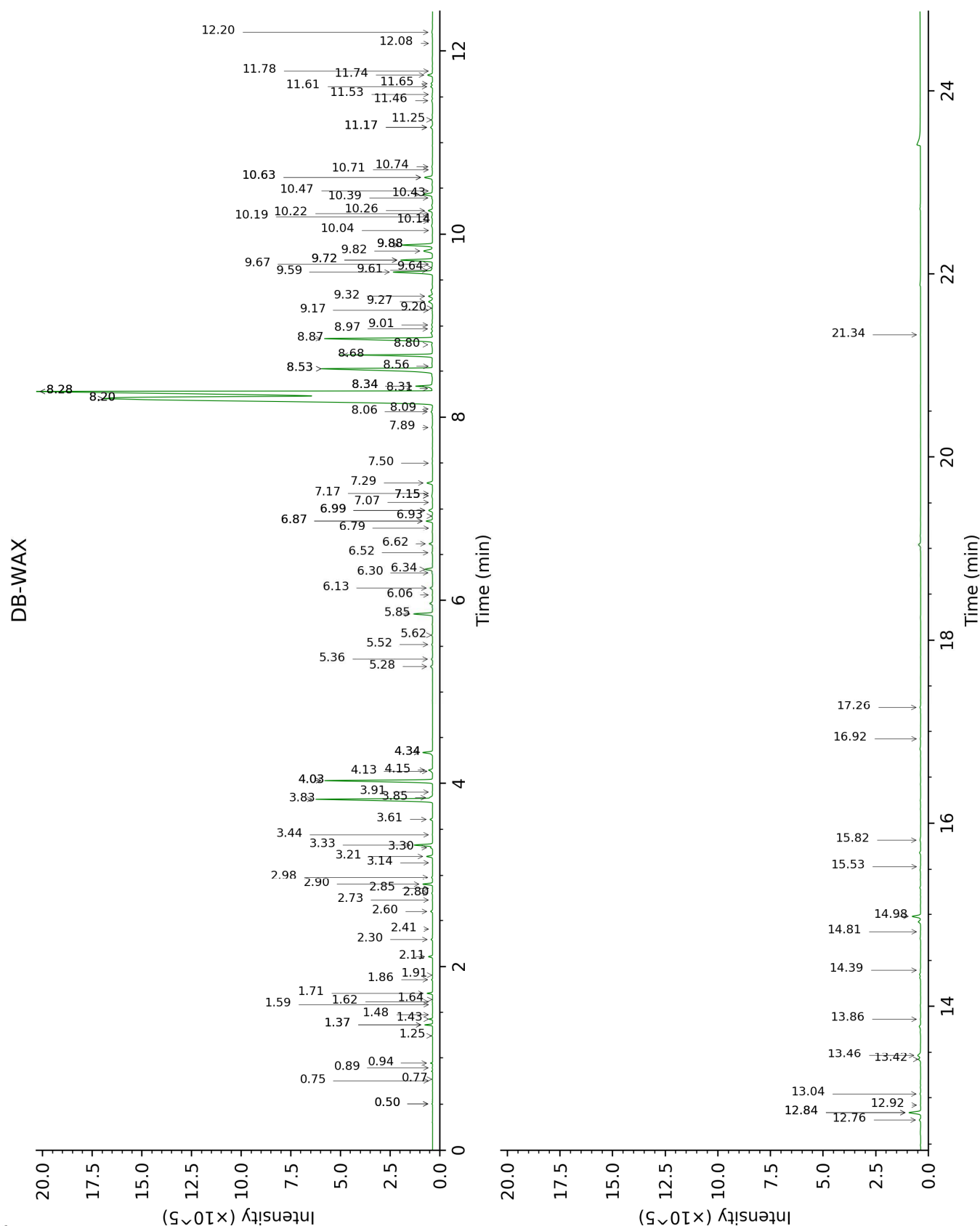
Note: no correction factor was applied

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	%
Acetone	0.30	521	tr	0.50*	780	0.01
Isobutyral	0.41	529	tr	0.50*	780	[0.01]
Methacrolein	0.43	539	tr			
3-Buten-2-one	0.46	561	tr	0.89	908	0.01
2-Methyl-3-buten-2-ol	0.49	586	0.01	1.62	1015	0.01
Isovaleral	0.59	640	0.01	0.77	886	0.01
2-Methylbutyral	0.61	651	tr	0.75	879	tr
Isoamyl alcohol	0.95	738	tr			
Toluene	1.12	762	tr	1.48	1000	0.01
Hexanal	1.41	802	tr	1.91	1044	tr
Butyl acetate	1.58	818	0.02	1.86	1039	0.03
Methyl hexyl ether	1.71	828	0.03	0.94	917	0.03
Hexanol	2.24	872	0.03	5.52	1324	0.03
Hashishene	2.74	912	0.01	1.37*	989	0.19
Tricyclene	2.83	918	0.02	1.25	968	0.02
α -Thujene	2.94	925	0.09	1.43	996	0.08
α -Pinene	3.01	930	0.19	1.37*	989	[0.19]
Camphene	3.20*	942	0.16	1.71	1024	0.14
α -Fenchene	3.20*	942	[0.16]	1.64	1017	tr
Thujadiene isomer	3.20*	942	[0.16]	2.41	1093	tr
5,5-Dimethyl-2(5H)-furanone	3.30	949	0.01	8.56	1548	0.02
Butyl isobutyrate	3.38	954	0.01	2.72	1118	0.01
endo-Isocamphane	3.54	965	0.01	1.59	1011	tr
β -Pinene	3.62*	970	0.17	2.11	1064	0.12
Sabinene	3.62*	970	[0.17]	2.30	1082	0.04
Octen-3-ol	3.79	981	0.22	6.87*	1422	0.22
Dehydro-1,8-cineole	3.85*	985	0.62	3.14	1150	tr
Octan-3-one	3.85*	985	[0.62]	4.03*	1217	4.04
Myrcene	3.94*	991	0.32	2.90	1131	0.30
trans-Dehydroxylinalool oxide	3.94*	991	[0.32]	3.44	1174	0.01
Butyl butyrate	4.03*	997	0.16	3.61	1187	0.09
Octan-3-ol	4.03*	997	[0.16]	6.14	1368	0.10
α -Phellandrene	4.08*	1000	0.05	2.80	1124	0.03
cis-Dehydroxylinalool oxide	4.08*	1000	[0.05]	3.91	1208	0.01
Pseudolimonene	4.08*	1000	[0.05]	2.85	1128	tr
Δ 3-Carene	4.17	1006	0.07	2.60	1108	0.06
α -Terpinene	4.28	1013	0.04	2.98	1138	0.03
Hexyl acetate	4.32	1015	0.32	4.34*	1239	0.36
ortho-Cymene	4.36	1018	0.05	4.13	1224	0.03
para-Cymene	4.39	1020	0.14	4.15	1225	0.14
Limonene	4.47*	1025	0.91	3.21	1155	0.20

β-Phellandrene	4.47*	1025	[0.91]	3.30	1163	0.06
1,8-Cineole	4.47*	1025	[0.91]	3.33	1165	0.64
(Z)-β-Ocimene	4.70	1039	4.65	3.83†	1202	4.73
(E)-β-Ocimene	4.85	1049	3.46	4.03*	1217	[4.04]
γ-Terpinene	4.96	1056	0.13	3.85†	1204	[4.73]
cis-Sabinene hydrate	5.07	1063	0.08	6.99*	1430	0.17
cis-Linalool oxide (fur.)	5.17	1069	0.12	6.62	1403	0.13
Octanol	5.30	1077	0.02	8.28*†	1527	[60.95]
Terpinolene	5.42*	1084	0.13	4.34*	1239	[0.36]
trans-Linalool oxide (fur.)	5.42*	1084	[0.13]	6.99*	1430	[0.17]
Rosefuran	5.60*†	1096	0.07	6.06	1362	0.02
trans-Sabinene hydrate	5.60*†	1096	[0.07]	8.06	1510	0.07
Linalool	5.75	1106	28.41	8.20*†	1521	60.95
(Z)-6-Methyl-3,5-heptadien-2-one	5.76	1107	0.03	8.31	1529	0.03
Octen-3-yl acetate	5.90	1116	0.70	5.85	1348	0.68
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.95	1119	0.04	9.72*	1639	1.20
α-Campholenal	5.98	1121	0.01	7.07	1436	0.01
Octan-3-yl acetate	6.09	1128	0.08	5.28	1307	0.09
allo-Ocimene	6.11	1129	0.03	5.62	1331	0.03
(Z)-Myroxide	6.16	1133	0.03	6.93	1426	0.03
Camphor	6.20	1135	0.25	7.29	1452	0.22
(E)-Myroxide	6.29	1141	0.03	7.17	1444	0.01
Hexyl isobutyrate	6.46	1152	0.06	5.36	1312	0.04
Nerol oxide	6.50	1154	0.01	6.87*	1422	[0.22]
Borneol	6.60	1161	0.80	9.88*	1653	1.17
cis-Linalool oxide (pyr.)	6.64	1164	0.02	10.40	1694	0.03
Lavandulol	6.72	1169	1.20	9.72*	1639	[1.20]
Terpinen-4-ol	6.81	1175	3.86	8.68	1558	3.75
meta-Cymen-8-ol	6.87*†	1179	0.23	11.61	1796	0.07
Cryptone	6.87*†	1179	[0.23]	9.27	1603	0.21
para-Cymen-8-ol	6.94	1183	0.08	11.65	1799	0.06
Myrtenal	7.01*	1188	0.39	8.80	1566	0.07
α-Terpineol	7.01*	1188	[0.39]	9.88*	1653	[1.17]
Hodiendiol	7.12*	1195	0.33	12.92	1912	0.01
Hexyl butyrate	7.12*	1195	[0.33]	6.34	1382	0.29
Verbenone	7.21	1201	0.02	9.67	1636	0.02
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.26	1204	0.04	6.30	1380	0.02
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.38	1212	0.03	11.46	1783	0.05
Octyl acetate	7.44	1216	0.03	7.15*	1442	0.05
trans-Carveol	7.47	1219	0.01	11.53	1789	0.01

Bornyl formate	7.53*	1223	0.05	8.09	1512	0.02
exo-2-Hydroxycineole	7.53*	1223	[0.05]	11.78	1811	0.02
Nerol	7.64	1231	0.07	11.17*	1759	0.09
Hexyl 2-methylbutyrate	7.70	1234	0.08	6.52	1396	0.03
Carvone	7.77†	1240	0.07	10.14	1673	0.02
Neral	7.79*†	1241	[0.07]	9.61	1631	0.04
Hexyl isovalerate	7.79*†	1241	[0.07]	6.79	1416	0.01
Linalyl acetate	8.15*	1266	33.38	8.28*†	1527	[60.95]
Geraniol	8.15*	1266	[33.38]	11.74	1808	0.20
Geranial	8.25	1273	0.04	10.19	1677	0.06
2,6-Dimethyl-1,7-octadiene-3,6-diol	8.30	1276	0.03	14.81	2088	0.01
Bornyl acetate	8.44	1286	0.15	8.34*	1531	0.59
Cuminol	8.54	1293	0.02	14.40	2048	0.02
Lavandulyl acetate	8.62	1299	4.82	8.86	1572	4.82
Unknown [m/z 150, 107 (98), 91 (79), 108 (61)]	8.91	1314	0.01	12.08	1837	0.01
Hexyl tiglate	9.16	1331	0.05	9.01	1583	0.05
Hodiendiol derivative	9.28	1340	0.02	13.04	1923	0.03
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.44	1351	0.05	11.17*	1759	[0.09]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.49	1354	0.06	11.25	1766	0.04
Hodiendiol derivative III	9.59	1362	0.02	12.84*	1905	0.49
Neryl acetate	9.63	1365	0.17	10.26	1683	0.18
α-Copaene	9.72	1371	0.02	7.15*	1442	[0.05]
7-Cubebene	9.77	1374	0.01	7.15*	1442	[0.05]
β-Bourbonene	9.83	1379	0.02	7.50	1468	0.02
Geranyl acetate	9.91	1384	0.24	10.63*	1713	0.37
7-epi-Sesquithujene	9.97*	1388	0.10	7.89	1497	0.04
Hexyl hexanoate	9.97*	1388	[0.10]	8.97	1580	0.05
Isocaryophyllene	10.18	1403	0.02	8.20*†	1521	[60.95]
β-Caryophyllene	10.31	1413	5.44	8.53*	1546	5.44
α-Santalene	10.36	1417	0.45	8.34*	1531	[0.59]
Coumarin	10.44	1422	0.02	17.26	2337	0.03
trans-α-Bergamotene	10.58	1433	0.14	8.53*	1546	[5.44]
Sesquisabinene A	10.69*	1441	0.08	9.17	1596	0.02
cis-β-Bergamotene?	10.69*	1441	[0.08]			
α-Humulene	10.75	1446	0.18	9.32	1608	0.17
Lavandulyl butyrate?	10.86	1454	0.11	10.63*	1713	[0.37]

β-Santalene	10.91*	1458	1.63	9.20	1598	0.01
(E)-β-Farnesene	10.91*	1458	[1.63]	9.59	1629	1.62
Germacrene D	11.13	1474	0.47	9.82	1647	0.49
trans-β-Bergamotene	11.21	1480	0.07	9.64	1633	0.04
Isodaucene	11.33	1489	0.02	10.04	1665	0.01
β-Bisabolene	11.58*	1508	0.45	10.22	1680	0.01
Lavandulyl isovalerate	11.58*	1508	[0.45]	10.74	1723	0.04
γ-Cadinene	11.58*	1508	[0.45]	10.43	1697	0.42
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.66	1514	0.10	13.42	1957	0.09
δ-Cadinene	11.71	1518	0.02	10.47	1700	0.02
β-Sesquiphellandrene	11.74	1521	0.02	10.71	1720	0.02
Isocaryophyllene epoxide B	12.02	1543	0.06	12.20	1848	0.05
(E)-Nerolidol	12.27	1562	0.01	13.86	1998	0.02
Caryophyllene oxide	12.40*	1572	0.57	12.84*	1905	[0.49]
Caryophyllene oxide isomer	12.40*	1572	[0.57]	12.76	1897	0.06
Humulene epoxide II	12.73	1598	0.01	13.46	1961	0.16
τ-Cadinol	13.16	1634	0.32	14.98	2105	0.36
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.54	1665	0.02	16.92	2301	0.02
cis-14-nor-Murol-5-en-4-one?	13.64	1673	0.03			
α-Bisabolol	13.70	1679	0.01	15.53	2159	0.01
Herniarin	14.04	1707	0.01	21.34	2806	0.01
Hexahydrofarnesyl acetone	15.62	1846	0.01			
9-(15,16-Dihydro-15-methylenegeranyl)-α-terpinene	17.47	2020	0.06	15.82	2188	0.04
Total identified		98.55%		97.49%		
Total reported		98.83%		97.66%		

*: 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