



CERTIFICATE OF ANALYSIS

PRODUCT IDENTIFICATION		COMPANY IDENTIFICATION	
PRODUCT NAME:	White Pine	COMPANY:	ZAYAT AROMA INC.
BOTANICAL NAME:	Pinus strobus	ADDRESS:	1339 SHEFFORD, BROMONT (QC) J2L 1C9, CANADA
SYNONYM(S):	eastern white pine, northern white pine	TELEPHONE:	1.855.534.1671
		FAX:	1.855.553.6010
		WEB:	WWW.ZAYATAROMA.COM
		E-MAIL:	INFO@ZAYATAROMA.COM
INCI NAME:	Pinus strobus (white) oil		
CAS TSCA:	8021-29-2	HS CODE:	3301.29
CAS EINECS:	94266-48-5	EINECS:	304-455-9
FEMA:	N/A	COE:	304-455-9
COUNTRY OF ORIGIN:	Canada	FDA CODE:	N/A
PRODUCTION TYPE:	Organic		
PRODUCTION METHOD:	Steam distilled		
PART DISTILLED:	Needles & Twigs		
LOT NUMBER:	EAB746787CA63721B		
PRODUCTION DATE:	09/2021		
EXPIRATION DATE:	09/2026		

PROPERTIES	SPECIFICATIONS	RESULTS
APPEARANCE	Clear to yellowish liquid	Complies
ODOR	Characteristic pine odor	Complies
SOLUBILITY	Soluble in alcohol and oils. Insoluble in water	Complies
SPECIFIC GRAVITY:	0.835 – 0.915 @ 20°C	0.853
OPTICAL ROTATION:	N/A	NA
REFRACTIVE INDEX:	N/A	NA
PEROXYDE VALUE:	<= 10 mEq O2/KG	N/A

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CERTIFICATE OF ANALYSIS

Date : February 25, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22B11-ZAA01

Customer identification : Pine White - Canada - EAB746787CA63721B

Type : Essential oil

Source : *Pinus strobus*

Customer : ZAYAT AROMA

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005

Analysis date : February 14, 2022

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4737 ± 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
Ethanol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
(3Z)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Santene	0.12	Normonoterpene
Bornylene	0.01	Monoterpene
Tricyclene	0.34	Monoterpene
α -Thujene	0.06	Monoterpene
α -Pinene	36.31	Monoterpene
α -Fenchene	0.06	Monoterpene
Camphene	3.43	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
Benzaldehyde	0.01	Simple phenolic
β -Pinene	34.65	Monoterpene
Sabinene	0.23	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	5.74	Monoterpene
Methyl 4-methylhexanoate	tr	Aliphatic ester
α -Phellandrene	0.32	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ^3 -Carene	2.54	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α -Terpinene	0.14	Monoterpene
para-Cymene	0.12	Monoterpene
Limonene	4.02	Monoterpene
β -Phellandrene	4.28	Monoterpene
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	0.20	Monoterpene
Unknown	0.01	Oxygenated monoterpene
Octanol	tr	Aliphatic alcohol
Fenchone	0.04	Monoterpenic ketone
para-Cymenene	0.04	Monoterpene
Terpinolene	0.97	Monoterpene
α -Pinene oxide	0.01	Monoterpenic ether
α -Thujone	tr	Monoterpenic ketone
Linalool	0.02	Monoterpenic alcohol
endo-Fenchol	0.08	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde
trans-Pinocarveol	0.08	Monoterpenic alcohol
Camphor	0.11	Monoterpenic ketone

Camphene hydrate	0.06	Monoterpenic alcohol
β -Pinene oxide	0.01	Monoterpenic ether
Pinocamphone	0.06	Monoterpenic ketone
Isoborneol	0.02	Monoterpenic alcohol
Pinocarvone	0.02	Monoterpenic ketone
Borneol	0.25	Monoterpenic alcohol
Isopinocamphone	0.07	Monoterpenic ketone
Unknown	0.02	Oxygenated monoterpene
Terpinen-4-ol	0.26	Monoterpenic alcohol
Cryptone	0.01	Normonoterpenic ketone
Dill ether	0.02	Monoterpenic ether
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.58	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde
Myrtenol	0.05	Monoterpenic alcohol
Methylchavicol	0.04	Phenylpropanoid
<i>cis</i> - α -Phellandrene epoxide (iPr vs Me)	0.02	Monoterpenic ether
Unknown	0.01	Unknown
Verbenone	0.02	Monoterpenic ketone
<i>trans</i> -Piperitol	0.01	Monoterpenic alcohol
endo-Fenchyl acetate	0.02	Monoterpenic ester
Thymol methyl ether	0.07	Monoterpenic ether
Unknown	0.01	Oxygenated monoterpene
Piperitone	0.01	Monoterpenic ketone
Unknown	0.02	Unknown
Phellandral	0.02	Monoterpenic aldehyde
α -Terpinen-7-al	0.01	Monoterpenic aldehyde
Bornyl acetate	1.02	Monoterpenic ester
2-Undecanone	0.01	Aliphatic ketone
Methyl myrtenate	0.02	Monoterpenic ester
Pin-2-en-8-yl acetate	0.02	Monoterpenic ester
δ -Elemene isomer	0.01	Sesquiterpene
Terpinyl acetate analog	0.01	Monoterpenic ester
Unknown	0.01	Unknown
α -Longipinene	0.01	Sesquiterpene
α -Cubebene	0.02	Sesquiterpene
α -Terpinyl acetate	0.02	Monoterpenic ester
Dodecanone analog?	0.02	Aliphatic ketone
α -Ylangene	0.02	Sesquiterpene
α -Copaene	0.06	Sesquiterpene
β -Bourbonene	0.01	Sesquiterpene
<i>trans</i> -Myrtanyl acetate	0.01	Monoterpenic ester
β -Cubebene	0.01	Sesquiterpene
β -Elemene	0.03	Sesquiterpene
Longifolene	0.01	Sesquiterpene
β -Caryophyllene	0.59	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
Cadina-3,5-diene isomer I?	0.01	Sesquiterpene
Cadina-3,5-diene?	0.02	Sesquiterpene
α -Humulene	0.18	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene

<i>trans</i> -Cadina-1(6),4-diene	0.03	Sesquiterpene
γ -Murolene	0.08	Sesquiterpene
Germacrene D	0.31	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
γ -Amorphene	0.03	Sesquiterpene
Bicyclogermacrene	0.06	Sesquiterpene
Viridiflorene	0.01	Sesquiterpene
α -Murolene	0.10	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.04	Sesquiterpene
γ -Cadinene	0.18	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
δ -Cadinene	0.43	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.02	Sesquiterpene
α -Cadinene	0.03	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
(<i>E</i>)-Nerolidol	0.03	Sesquiterpenic alcohol
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
1- <i>epi</i> -Cubenol	0.01	Sesquiterpenic alcohol
τ -Cadinol	0.01	Sesquiterpenic alcohol
τ -Murolol	0.01	Sesquiterpenic alcohol
α -Murolol	0.01	Sesquiterpenic alcohol
α -Cadinol	0.02	Sesquiterpenic alcohol
meta-Camphorene	0.01	Diterpene
Manoyl oxide	0.03	Diterpenic ether
(<i>Z</i>)-Abienol	0.01	Diterpenic alcohol
Sandaracopimarinal?	0.01	Diterpenic aldehyde
Palustral	0.01	Diterpenic aldehyde
Consolidated total	99.54%	

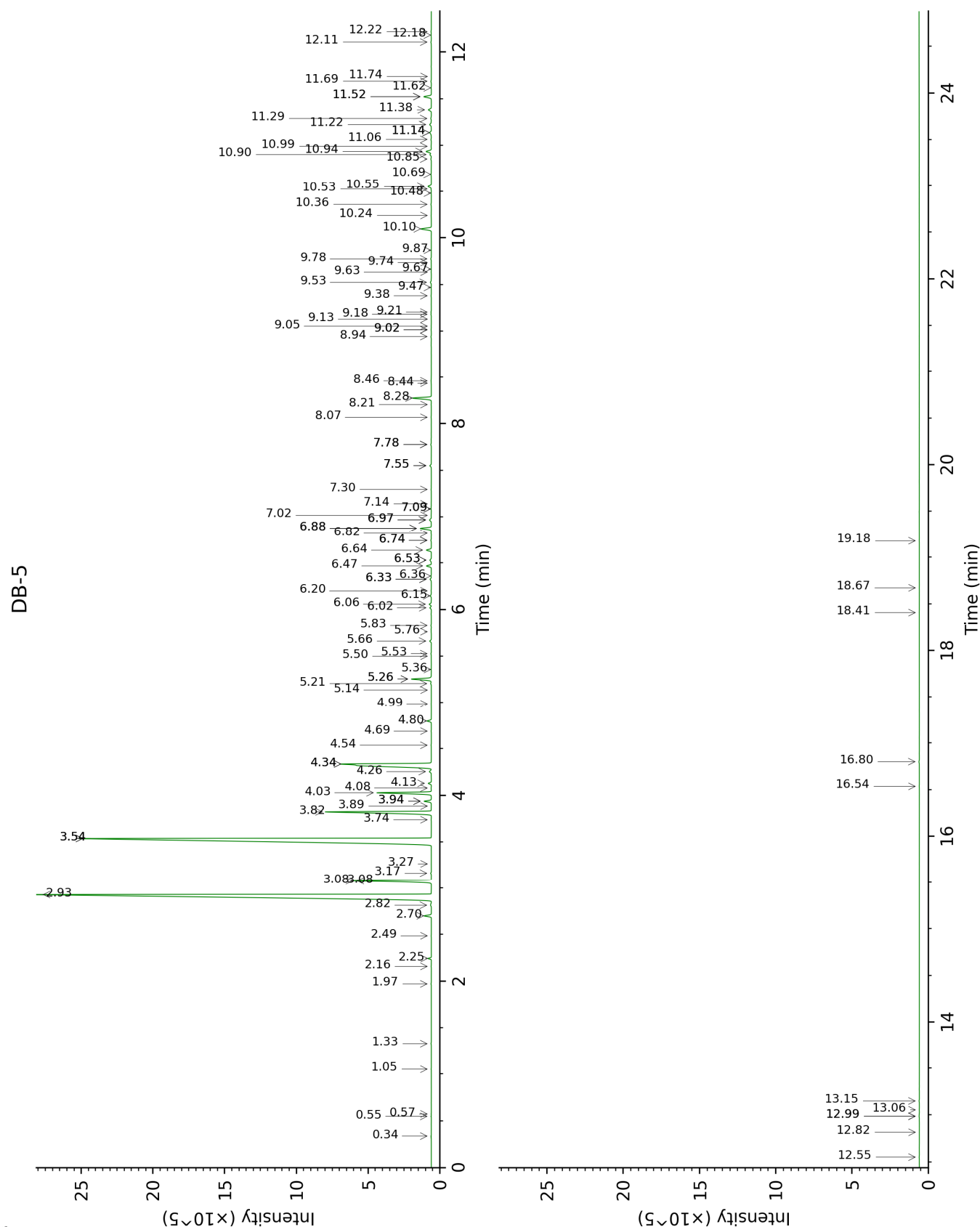
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

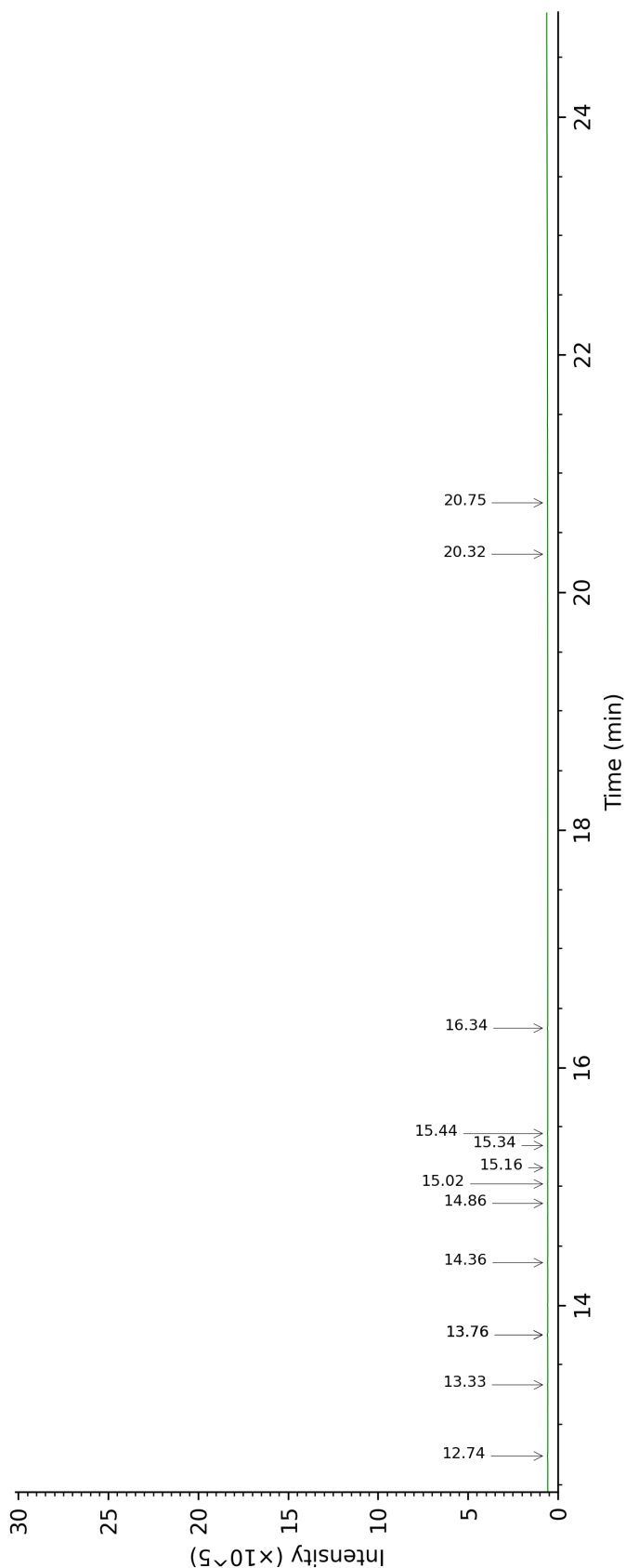
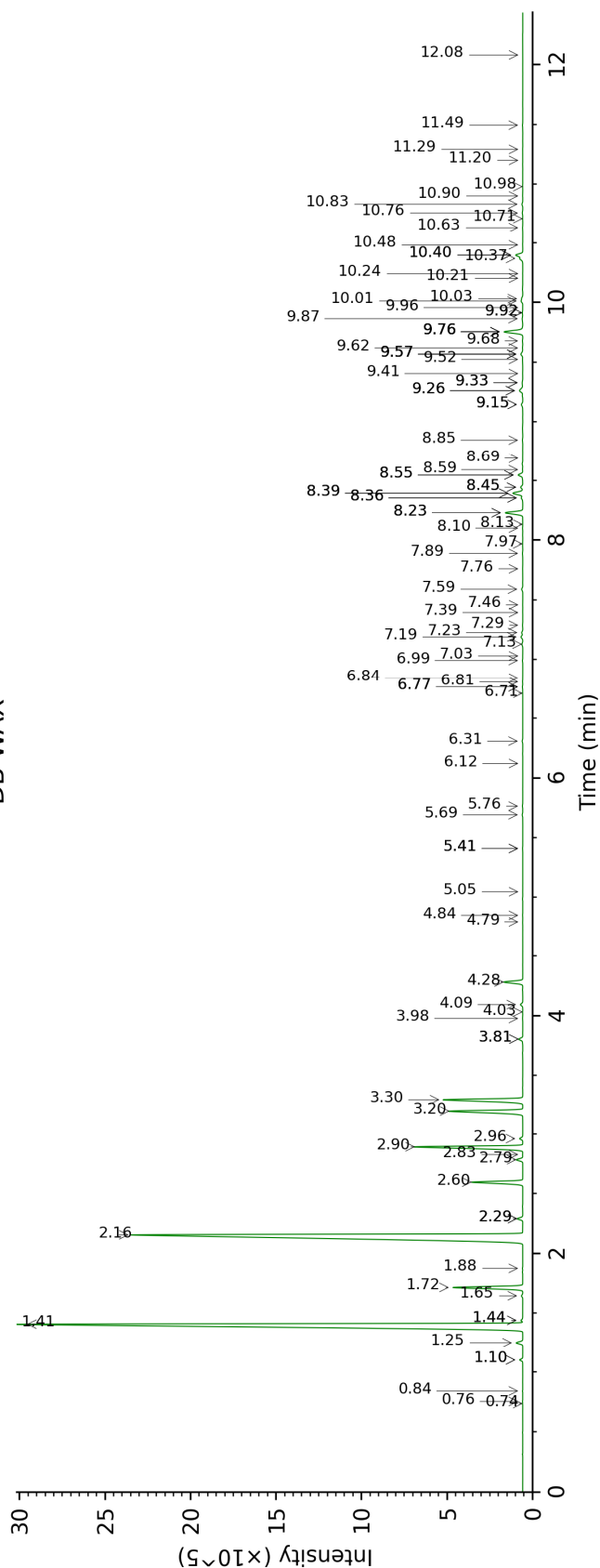
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

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DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.34	499	0.01	0.84	905	0.01
Isovaleral	0.55	641	0.01	0.76	884	0.01
2-Methylbutyral	0.57	651	tr	0.74	878	tr
Toluene	1.05	758	0.01	1.44*	999	0.08
Hexanal	1.33	801	0.01	1.88	1042	0.01
(3Z)-Hexenol	1.97	858	0.02	5.76	1345	0.02
Hexanol	2.16	875	0.01	5.41*	1319	0.02
Santene	2.24	882	0.12	1.10*	947	0.12
Bornylene	2.49	904	0.01	1.10*	947	[0.12]
Tricyclene	2.70	918	0.34	1.25	971	0.33
α -Thujene	2.82	926	0.06	1.44*	999	[0.08]
α -Pinene	2.93	934	36.31	1.41	996	36.20
α -Fenchene	3.08*	944	3.49	1.65	1019	0.06
Camphene	3.08*	944	[3.49]	1.72	1026	3.43
Thuja-2,4(10)-diene	3.16	950	0.03	2.29*	1083	0.26
Benzaldehyde	3.27	957	0.01	7.40	1464	0.01
β -Pinene	3.54*	975	34.92	2.16	1070	34.65
Sabinene	3.54*	975	[34.92]	2.29*	1083	[0.26]
6-Methyl-5-hepten-2-one	3.74	989	0.01	5.05	1298	0.01
Myrcene	3.82	994	5.74	2.90	1133	5.72
Methyl 4-methylhexanoate	3.89	999	tr	4.03	1222	0.01
α -Phellandrene	3.94*	1002	0.34	2.79	1125	0.32
Pseudolimonene	3.94*	1002	[0.34]	2.83	1128	0.01
Δ^3 -Carene	4.03	1008	2.54	2.60	1110	2.53
(3Z)-Hexenyl acetate	4.08	1011	0.01	4.84	1282	0.01
α -Terpinene	4.13	1014	0.14	2.96	1139	0.15
para-Cymene	4.26	1022	0.12	4.09	1226	0.12
Limonene	4.34*	1028	8.29	3.20	1158	4.02
β -Phellandrene	4.34*	1028	[8.29]	3.30	1165	4.28
(Z)- β -Ocimene	4.54	1040	0.02	3.80*	1205	0.22
(E)- β -Ocimene	4.69	1050	0.01	3.98	1218	0.01
γ -Terpinene	4.80	1057	0.20	3.80*	1205	[0.22]
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.99	1069	0.01	4.79	1278	0.01
Octanol	5.14	1078	tr	8.23*	1528	1.03
Fenchone	5.21	1083	0.04	5.69	1339	0.04
para-Cymenene	5.26*	1086	1.02	6.31	1384	0.04
Terpinolene	5.26*	1086	[1.02]	4.28	1241	0.97
α -Pinene oxide	5.36	1092	0.01	5.41*	1319	[0.02]
α -Thujone	5.50	1101	tr	6.12	1370	0.01
Linalool	5.53	1103	0.02	8.10	1518	0.02
endo-Fenchol	5.66	1112	0.08	8.36*	1537	0.09

<i>cis</i> -para-Menth-2-en-1-ol	5.76	1118	0.01	8.14	1520	0.01
α -Campholenal	5.83	1123	0.02	6.99	1434	0.02
<i>trans</i> -Pinocarveol	6.02	1135	0.08	9.15*	1599	0.10
Camphor	6.06	1137	0.11	7.19	1449	0.11
Camphene hydrate	6.15	1143	0.06	8.45*	1544	0.12
β -Pinene oxide	6.20	1146	0.01	6.71	1413	0.01
Pinocamphone	6.33*	1154	0.07	7.23	1452	0.06
Isoborneol	6.33*	1154	[0.07]	9.41	1620	0.02
Pinocarvone	6.36	1157	0.02	7.89	1501	0.03
Borneol	6.47	1164	0.25	9.76*	1648	1.16
Isopinocamphone	6.53*	1168	0.09	7.59	1479	0.07
Unknown [m/z 109, 79 (18), 81 (15), 91 (12), 77 (10)... 152 (3)]	6.53*	1168	[0.09]			
Terpinen-4-ol	6.64	1175	0.26	8.55*	1552	0.28
Cryptone	6.74*	1181	0.03	9.15*	1599	[0.10]
Dill ether	6.74*	1181	[0.03]	7.29	1456	0.02
para-Cymen-8-ol	6.82	1186	0.02	11.50	1793	0.02
α -Terpineol	6.88*	1190	0.59	9.76*	1648	[1.16]
Myrtenal	6.88*	1190	[0.59]	8.69	1563	0.01
Myrtenol	6.97*	1196	0.12	10.83	1737	0.05
Methylchavicol	6.97*	1196	[0.12]	9.33*	1614	0.06
<i>cis</i> - α -Phellandrene epoxide (iPr vs Me)	7.02	1199	0.02	10.98	1750	0.02
Unknown [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	7.09*	1203	0.03	10.90	1743	0.01
Verbenone	7.09*	1203	[0.03]	9.62	1637	0.02
<i>trans</i> -Piperitol	7.14	1207	0.01	10.40*	1700	0.45
endo-Fenchyl acetate	7.30	1217	0.02	6.81	1420	0.02
Thymol methyl ether	7.55*	1234	0.09	8.45*	1544	[0.12]
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.55*	1234	[0.09]	11.29	1776	0.01
Piperitone	7.78*	1250	0.03	9.92*	1661	0.03
Unknown [m/z 43, 97 (55), 107 (44), 41 (38), 109 (32), 55 (27)...]	7.78*	1250	[0.03]			
Phellandral	8.07	1269	0.02	9.96	1664	0.01
α -Terpinen-7-al	8.21	1278	0.01	10.71	1727	0.01
Bornyl acetate	8.28	1283	1.02	8.23*	1528	[1.03]
2-Undecanone	8.44	1294	0.01	8.59	1556	0.02
Methyl myrtenate	8.46	1296	0.02	9.52	1629	0.03
Pin-2-en-8-yl acetate	8.94	1329	0.02	9.57*	1633	0.13
δ -Elemene isomer	9.02*	1334	0.02	6.84	1423	0.01

Terpinyl acetate analog	9.02*	1334	[0.02]	9.57*	1633	[0.13]
Unknown [m/z 93, 121 (67), 91 (62), 105 (56), 120 (56), 79 (47), 41 (47)...]	9.06	1337	0.01	10.48	1708	0.01
α-Longipinene	9.13	1342	0.01	6.77*	1417	0.03
α-Cubebene	9.18	1346	0.02	6.77*	1417	[0.03]
α-Terpinyl acetate	9.21	1348	0.02	9.68	1642	0.02
Dodecanone analog?	9.38	1360	0.02			
α-Ylangene	9.47	1366	0.02	7.03	1437	0.01
α-Copaene	9.52	1370	0.06	7.13	1444	0.05
β-Bourbonene	9.63	1378	0.01	7.46	1469	0.01
trans-Myrtanyl acetate	9.67	1380	0.01	10.24	1688	0.01
β-Cubebene	9.74	1386	0.01	7.76	1491	0.01
β-Elemene	9.78	1388	0.03	8.40*	1540	0.62
Longifolene	9.87	1395	0.01	7.97	1507	0.02
β-Caryophyllene	10.10	1411	0.59	8.40*	1540	[0.62]
β-Copaene	10.24	1422	0.01	8.36*	1537	[0.09]
Aromadendrene	10.36	1431	0.02	8.55*	1552	[0.28]
Cadina-3,5-diene isomer I?	10.48	1440	0.01			
Cadina-3,5-diene?	10.53	1444	0.02	8.85	1575	0.03
α-Humulene	10.56	1446	0.18	9.26*	1608	0.26
cis-Muurolo-4(15),5-diene	10.69	1456	0.02	9.33*	1614	[0.06]
trans-Cadina-1(6),4-diene	10.85	1468	0.03	9.26*	1608	[0.26]
γ-Muurolole	10.90	1472	0.08	9.57*	1633	[0.13]
Germacrene D	10.94	1474	0.31	9.76*	1648	[1.16]
β-Selinene	10.99	1478	0.02	9.92*	1661	[0.03]
γ-Amorphene	11.06	1484	0.03	9.87	1657	0.06
Bicyclogermacrene	11.14*	1489	0.12	10.01†	1669	0.17
Viridiflorene	11.14*	1489	[0.12]	9.76*	1648	[1.16]
α-Muurolole	11.22	1496	0.10	10.03†	1671	[0.17]
(Z)-α-Bisabolene	11.29	1500	0.04	10.20	1684	0.01
γ-Cadinene	11.38	1508	0.18	10.37	1698	0.16
trans-Calamenene	11.52*	1519	0.44	11.20	1768	0.01
δ-Cadinene	11.52*	1519	[0.44]	10.40*	1700	[0.45]
trans-Cadina-1,4-diene	11.62	1526	0.02	10.64	1720	0.02
α-Cadinene	11.69	1532	0.03	10.76	1731	0.03
α-Calacorene	11.74	1536	0.01	12.08	1846	0.01
(E)-Nerolidol	12.11	1565	0.03	13.76*	1998	0.03
Spathulenol	12.18	1571	0.02	14.36	2056	0.02
Caryophyllene oxide	12.22	1574	0.02	12.74	1904	0.03
Humulene epoxide II	12.55	1600	0.01	13.33	1959	0.01
1-epi-Cubenol	12.82	1621	0.01	13.76*	1998	[0.03]
τ-Cadinol	12.99*	1635	0.03	14.86	2105	0.01
τ-Muurolole	12.99*	1635	[0.03]	15.02	2121	0.01

α -Muurolol	13.06	1641	0.01	15.16	2134	0.01
α -Cadinol	13.15	1649	0.02	15.44	2163	0.02
meta-Camphorene	16.54	1949	0.01	15.34	2153	0.01
Manoyl oxide	16.80	1974	0.03	16.34	2255	0.02
(Z)-Abienol	18.41	2134	0.01	20.32	2705	0.01
Sandaracopimarinal?	18.67	2162	0.01			
Palustral	19.18	2214	0.01	20.75	2758	0.01
Total identified	99.66%			99.43%		
Total reported	99.67%			99.48%		

*: 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