

Date : July 08, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21F25-PTH15


Customer identification : Cedarwood Virginian - USA - C70108213R

Type : Essential oil

Source : *Juniperus virginiana*

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

Analysis date : July 06, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow viscous liquid

Refractive index: 1.5048 ± 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
Tricyclene	tr	Monoterpene
α -Pinene	0.09	Monoterpene
Camphene	tr	Monoterpene
α -Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Δ^3 -Carene	0.01	Monoterpene
para-Cymene	tr	Monoterpene
Limonene	tr	Monoterpene
Terpinolene	0.01	Monoterpene
para-Cymenene	0.01	Monoterpene
<i>trans</i> -Pinocarveol	0.01	Monoterpenic alcohol
α -Phellandren-8-ol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.03	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
Carvacrol methyl ether	0.04	Monoterpenic ether
Brasila-1,10-diene	0.02	Sesquiterpene
African-1-ene	0.05	Sesquiterpene
α -Terpinyl acetate	0.12	Monoterpenic ester
Cyclosativene I	0.01	Sesquiterpene
Cyclosativene II	0.02	Sesquiterpene
2-epi- α -Funebrene	0.72	Sesquiterpene
α -Duprezianene	0.88	Sesquiterpene
Isolongifolene	0.04	Sesquiterpene
β -Elemene	1.46	Sesquiterpene
α -Chamipinene	0.25	Sesquiterpene
β -Funebrene	3.21	Sesquiterpene
α -Cedrene	23.04	Sesquiterpene
β -Cedrene	4.77	Sesquiterpene
β -Duprezianene	0.82	Sesquiterpene
β -Caryophyllene	0.93	Sesquiterpene
<i>cis</i> -Thujopsene	18.84	Sesquiterpene
Isobazzanene	0.18	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.10	Sesquiterpene
Prezizaene	0.21	Sesquiterpene
α -Himachalene	0.20	Sesquiterpene
7,8-Dehydro- α -acoradiene?	0.08	Sesquiterpene
α -Humulene	0.14	Sesquiterpene
α -Acoradiene	0.15	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.41	Sesquiterpene
β -Acoradiene	0.36	Sesquiterpene
Thujopsene isomer	0.20	Sesquiterpene
β -Chamigrene	0.97	Sesquiterpene
Unknown	0.13	Sesquiterpene

γ-Himachalene	0.11	Sesquiterpene
Widdra-2,4(14)-diene?	0.07	Sesquiterpene
Unknown	0.34	Sesquiterpene
ar-Curcumene	0.17	Sesquiterpene
Pseudowiddrene	1.37	Sesquiterpene
α-Chamigrene	1.06	Sesquiterpene
β-Himachalene	0.22	Sesquiterpene
α-Cuprenene	1.11	Sesquiterpene
Cuparene	1.30	Sesquiterpene
1,2-Dihydrocuparene	0.08	Sesquiterpene
α-Alaskene	0.27	Sesquiterpene
Unknown	0.35	Sesquiterpene
γ-Cadinene	0.10	Sesquiterpene
α-Dehydro-ar-himachalene	0.03	Sesquiterpene
β-Curcumene	0.11	Sesquiterpene
1,4-Dihydrocuparene	0.09	Sesquiterpene
7-epi-α-Selinene	0.18	Sesquiterpene
γ-Dehydro-ar-himachalene	0.02	Sesquiterpene
β-Sesquiphellandrene	0.36	Sesquiterpene
γ-Cuprenene	0.87	Sesquiterpene
Unknown	0.30	Oxygenated sesquiterpene
ar-Himachalene	0.20	Sesquiterpene
Unknown	0.16	Oxygenated sesquiterpene
δ-Cuprenene epimer I	0.16	Sesquiterpene
δ-Cuprenene epimer II	0.13	Sesquiterpene
Unknown	0.20	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.13	Oxygenated sesquiterpene
Caryophyllenyl alcohol	0.08	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.02	Sesquiterpenic ether
allo-Cedrol	0.46	Sesquiterpenic alcohol
α-Cedrol	19.43	Sesquiterpenic alcohol
Widdrol	2.68	Sesquiterpenic alcohol
epi-Cedrol	0.51	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
10-epi-Cubenol	0.11	Sesquiterpenic alcohol
β-Himachalene oxide	0.03	Sesquiterpenic ether
Unknown	0.17	Oxygenated sesquiterpene
2-epi-α-Cedren-3-one	0.11	Sesquiterpenic ketone
α-Acorenol	0.32	Sesquiterpenic alcohol
β-Acorenol	0.54	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.16	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.62	Oxygenated sesquiterpene
Himachalol	0.13	Sesquiterpenic alcohol
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Cedrenol analog	0.18	Sesquiterpenic alcohol
1,7-diepi-α-Cedrenal?	0.10	Sesquiterpenic aldehyde
Khusiol	0.04	Sesquiterpenic alcohol

Cedr-8-en-13-ol	0.25	Sesquiterpenic alcohol
α -Bisabolol	0.31	Sesquiterpenic alcohol
α -Cedrenol	0.10	Sesquiterpenic alcohol
Unknown	0.29	Oxygenated sesquiterpene
Mayurone?	0.04	Norsesquiterpenic ketone
Thujopsenal	0.05	Sesquiterpenic aldehyde
Unknown	0.05	Oxygenated sesquiterpene
Thujopsenal analog	0.05	Sesquiterpenic aldehyde
Unknown	0.05	Oxygenated sesquiterpene
Cuparenal	0.03	Sesquiterpenic aldehyde
Cedryl acetate	0.05	Sesquiterpenic ester
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
β -Acoradienol?	0.02	Sesquiterpenic alcohol
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Nootkatone analog	0.01	Sesquiterpenic ketone
7,13-Abietadiene	0.01	Diterpene
Consolidated total	95.83%	

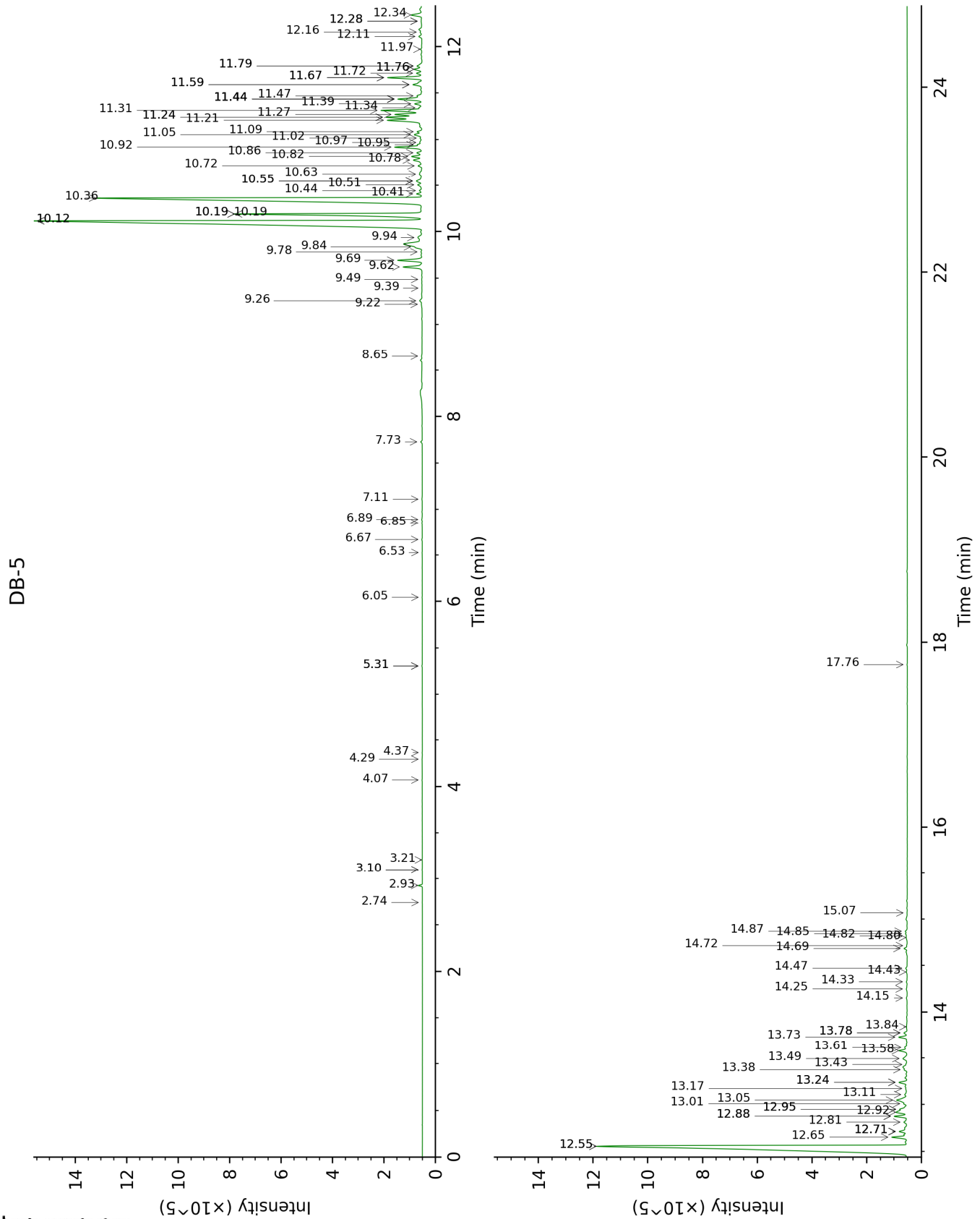
tr: The compound has been detected below 0.005% of total signal.

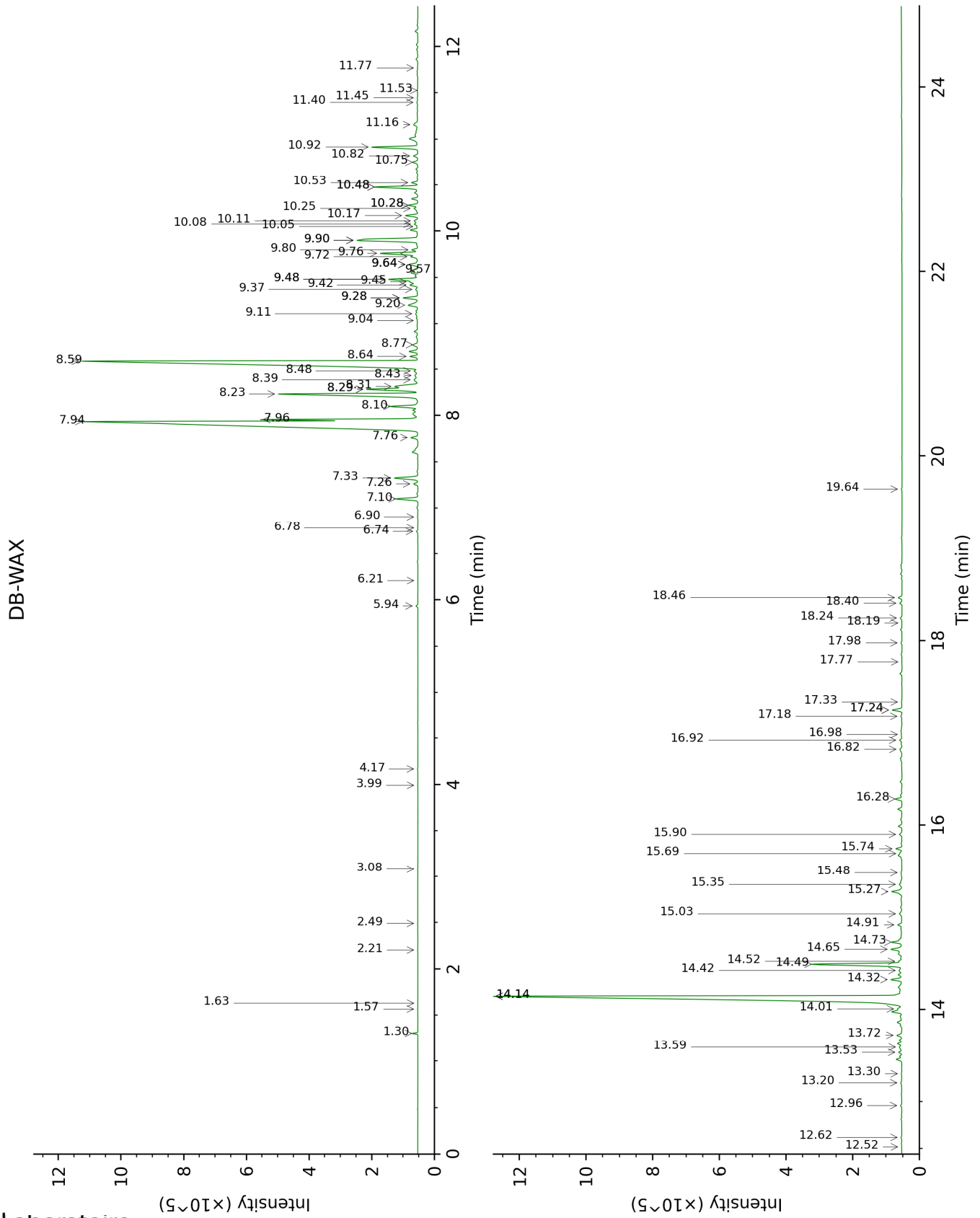
Note: no correction factor was applied

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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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Tricyclene	2.74	918	tr			
α-Pinene	2.93	930	0.09	1.30	990	0.09
Camphene	3.10*	942	0.01	1.63	1026	tr
α-Fenchene	3.10*	942	[0.01]	1.57	1019	0.01
Thuja-2,4(10)-diene	3.21	949	0.01	2.20	1085	0.01
Δ3-Carene	4.07	1008	0.01	2.49	1110	tr
para-Cymene	4.30	1022	tr	3.99	1229	0.01
Limonene	4.37	1026	tr	3.08	1158	tr
Terpinolene	5.31*	1086	0.01	4.17	1242	0.01
para-Cymenene	5.31*	1086	[0.01]	6.21	1388	0.01
trans-Pinocarveol	6.05	1134	0.01	9.04	1602	0.02
α-Phellandren-8-ol	6.53	1165	0.01	10.05	1684	0.02
Terpinen-4-ol	6.67	1175	0.02	8.43	1555	0.13
para-Cymen-8-ol	6.85	1186	0.01	11.40	1798	0.04
α-Terpineol	6.89	1189	0.03	9.64*	1651	0.31
Verbenone	7.11	1203	0.02	9.48*†	1638	[1.03]
Carvacrol methyl ether	7.73	1245	0.04	8.48	1559	0.13
Brasila-1,10-diene	8.65	1305	0.02	5.94	1368	0.05
African-1-ene	9.22	1345	0.05	6.74	1427	0.04
α-Terpinyl acetate	9.26	1348	0.12	9.57	1646	0.18
Cyclosativene I	9.39	1357	0.01	6.78	1430	0.01
Cyclosativene II	9.49	1364	0.02	6.90	1439	0.01
2-epi-α-Funebrene	9.62	1374	0.72	7.10	1454	0.62
α-Duprezianene	9.69	1379	0.88	7.33	1470	0.73
Isolongifolene	9.78	1385	0.04	7.26	1466	0.13
β-Elemene	9.84	1389	1.46	8.28*†	1544	2.49
α-Chamipinene	9.94	1396	0.25	7.76	1503	0.21
β-Funebrene	10.12*	1409	26.77	7.96	1518	3.21
α-Cedrene	10.12*	1409	[26.77]	7.94	1517	23.04
β-Cedrene	10.19*	1415	7.01	8.23	1540	4.77
β-Duprezianene	10.19*	1415	[7.01]	8.10	1529	0.82
β-Caryophyllene	10.19*	1415	[7.01]	8.28*†	1544	[2.49]
cis-Thujopsene	10.36	1428	18.84	8.59	1567	18.45
Isobazzanene	10.41	1431	0.18	8.39	1552	0.18
trans-α-Bergamotene	10.44	1434	0.10	8.32†	1546	[2.49]
Prezizaene	10.51	1438	0.21	8.64	1571	0.21
α-Himachalene	10.55*	1441	0.32	8.77	1581	0.20
7,8-Dehydro-α-acoradiene?	10.55*	1441	[0.32]	9.37	1629	0.08
α-Humulene	10.63	1447	0.14	9.11	1608	0.09
α-Acoradiene	10.72	1454	0.15	9.20	1616	0.41
(E)-β-Farnesene	10.78	1459	0.41	9.42	1633	0.25
β-Acoradiene	10.82	1462	0.36	9.28*	1622	0.42
Thujopsene isomer	10.86	1465	0.20	9.28*	1622	[0.42]
β-Chamigrene	10.92	1469	0.97	9.48*†	1638	[1.03]

Unknown [m/z 91, 105 (93), 161 (77), 93 (73), 119 (71), 133 (69)... 204 (31)]	10.94	1471	0.13			
γ-Himachalene	10.97	1473	0.11	9.45†	1636	1.03
Widdra-2,4(14)-diene?	11.02	1477	0.07	9.64*	1651	[0.31]
Unknown [m/z 189, 91 (95), 105 (93), 133 (84), 119 (75), 41 (59), 93 (46)... 204 (33)]	11.05	1479	0.34	9.72	1658	0.21
ar-Curcumene	11.09	1482	0.17	10.52	1724	0.18
Pseudowiddrene	11.21	1491	1.37	9.76	1661	1.10
α-Chamigrene	11.24*	1493	1.27	9.90*	1672	2.54
β-Himachalene	11.24*	1493	[1.27]	9.64*	1651	[0.31]
α-Cuprenene	11.27†	1496	2.41	9.90*	1672	[2.54]
Cuparene	11.32†	1499	[2.41]	10.92	1757	1.30
1,2-Dihydrocuparene	11.34	1501	0.08	10.11	1689	0.13
α-Alaskene	11.39	1504	0.27	9.80	1664	0.17
Unknown [m/z 121, 123 (45), 91 (24), 107 (24), 122 (24), 95 (23)... 204 (11)]	11.44*	1508	0.95	10.17	1694	0.35
γ-Cadinene	11.44*	1508	[0.95]	10.25	1700	0.10
α-Dehydro-ar-himachalene	11.44*	1508	[0.95]	11.45	1802	0.03
β-Curcumene	11.44*	1508	[0.95]	10.08	1686	0.11
1,4-Dihydrocuparene	11.44*	1508	[0.95]	10.28*	1703	0.27
7-epi-α-Selinene	11.47	1511	0.18	10.28*	1703	[0.27]
γ-Dehydro-ar-himachalene	11.59*	1520	0.38	11.77	1831	0.02
β-Sesquiphellandrene	11.59*	1520	[0.38]	10.48*	1720	1.24
γ-Cuprenene	11.67*	1526	1.17	10.48*	1720	[1.24]
Unknown [m/z 91, 107 (97), 105 (93), 41 (92), 109 (78), 43 (78), 121 (76), 135 (75)... 220 (21)]	11.67*	1526	[1.17]			
ar-Himachalene	11.72	1530	0.20	11.53	1810	0.04
Unknown [m/z 43, 95 (81), 207 (61), 41 (55), 55 (50)... 222 (3)]	11.76*	1534	0.31	13.72	2008	0.16
δ-Cuprenene epimer I	11.76*	1534	[0.31]	10.75	1743	0.16
δ-Cuprenene epimer II	11.79*	1536	0.24	10.82	1749	0.13

Unknown [m/z 106, 41 (86), 43 (84), 149 (75), 69 (75), 91 (63), 93 (61)... 220 (1)]	11.79*	1536	[0.24]	11.16	1778	0.20
Unknown [m/z 91, 119 (98), 121 (91), 105 (85), 43 (82), 41 (76)... 205 (37), 220 (16)]	11.97	1551	0.06	13.20	1960	0.03
Unknown [m/z 95, 191 (52), 107 (50), 121 (32), 81 (31)...]	12.11	1562	0.13	14.01	2036	0.12
Caryophyllenyl alcohol	12.16	1565	0.08	13.53	1990	0.08
Caryophyllene oxide isomer	12.28*	1574	0.06	12.52	1897	0.01
Caryophyllene oxide	12.28*	1574	[0.06]	12.62	1906	0.02
allo-Cedrol	12.34	1580	0.46	14.14*	2049	20.06
α-Cedrol	12.56*	1597	22.11	14.14*	2049	[20.06]
Widdrol	12.56*	1597	[22.11]	14.49	2082	2.68
epi-Cedrol	12.65	1604	0.51	14.65	2098	0.39
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.71*	1609	0.33	13.30	1969	0.02
10-epi-Cubenol	12.71*	1609	[0.33]	13.59	1996	0.11
β-Himachalene oxide	12.71*	1609	[0.33]	12.96	1938	0.03
Unknown [m/z 107, 41 (86), 123 (85), 82 (79), 95 (77), 93 (76), 91 (73), 69 (71)... 220 (13)]	12.81	1618	0.17	14.52	2085	0.08
2-epi-α-Cedren-3-one	12.88*	1623	0.43			
α-Acorenol	12.88*	1623	[0.43]	14.32	2066	0.32
β-Acorenol	12.92	1626	0.54	14.73	2105	0.32
Unknown [m/z 132, 175 (22), 119 (18), 91 (18), 157 (18)... 219 (10)]	12.95*	1629	0.30	15.48	2180	0.03
Unknown [m/z 105, 93 (78), 95 (75), 131 (72), 119 (71), 132 (70), 91 (67), 120 (49)... 202 (39), 220 (9)]	12.95*	1629	[0.30]	15.74	2207	0.16
Unknown [m/z 132, 91 (24), 119 (22),	13.01	1634	0.10			

105 (21), 133 (17), 117 (16)... 219 (3)]						
Unknown [m/z 123, 81 (77), 95 (77), 107 (72), 41 (72), 93 (66), 55 (64)... 220? (13)]	13.05	1637	0.62			
Himachalol	13.11	1642	0.13	15.03	2136	0.11
Unknown [m/z 41, 91 (96), 79 (88), 69 (82), 123 (80), 93 (80)... 220 (8)]	13.17	1648	0.07	17.24*	2365	0.27
Unknown [m/z 43, 81 (84), 41 (64), 67 (62), 95 (58), 79 (58)... 204 (48), 220 (2)]	13.24*	1653	0.31	15.35	2168	0.10
Cedrenol analog	13.24*	1653	[0.31]	16.28	2263	0.18
1,7-diepi- α - Cedrenal?	13.38	1664	0.10	14.92	2124	0.13
Khusiol	13.43	1669	0.04	15.90	2223	0.08
Cedr-8-en-13-ol	13.49	1674	0.25	16.82	2319	0.09
α -Bisabolol	13.58	1681	0.31	15.27	2160	0.38
α -Cedrenol	13.61	1684	0.10	16.92	2330	0.06
Unknown [m/z 91, 105 (87), 123 (74), 135 (70), 107 (60), 79 (59)... 220 (13)]	13.73	1694	0.29			
Mayurone?	13.78*	1698	0.13	16.98	2336	0.04
Thujopsenal	13.78*	1698	[0.13]	15.69	2202	0.05
Unknown [m/z 105, 69 (77), 91 (66), 119 (65), 111 (56), 107 (45), 55 (45)... 220? (2)]	13.84	1703	0.05	17.33	2374	0.02
Thujopsenal analog	14.15	1730	0.05	17.24*	2365	[0.27]
Unknown [m/z 105, 91 (83), 79 (78), 135 (67), 107 (56), 67 (53)... 220 (9)]	14.25	1738	0.05			
Cuparenal	14.33	1745	0.03			
Cedryl acetate	14.43	1754	0.05	14.42	2076	0.12
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.47	1758	0.06	18.24	2475	0.06
Unknown [m/z 121, 136 (47), 119 (27), 91 (27), 105 (22), 41 (21)... 220 (4)]	14.69	1776	0.11			
β -Acoradienol?	14.72	1779	0.02	17.98	2445	0.03
Unknown [m/z 189, 91 (48), 133 (40),	14.80	1787	0.05	18.46	2500	0.10

105 (40), 41 (34), 187 (34)... 220 (5)]						
Unknown [m/z 120, 121 (93), 93 (85), 105 (74), 119 (68), 91 (58), 123 (49)... 220 (8)]	14.82	1788	0.03	18.19	2469	0.01
Unknown [m/z 148, 141 (99), 91 (74), 105 (52), 41 (42), 121 (42), 133 (37)... 218 (32)]	14.85	1790	0.06	19.64	2637	0.02
Unknown [m/z 121, 136 (53), 91 (22), 93 (19), 79 (15), 105 (13)... 220 (3)]	14.87	1793	0.07	18.40	2493	0.06
Nootkatone analog	15.07	1810	0.01	17.77	2423	0.01
7,13-Abietadiene	17.76	2065	0.01	17.18	2358	0.03
Total identified		95.06%			91.54%	
Total reported		97.45%			93.26%	

*: 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