

Date : February 02, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23A27-PTH01

Customer identification : Sandalwood ORGANIC - Australia - SW0105R

Type : Essential oil

Source : *Santalum spicatum*

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 : Amélie Simard, Analyste

Analysis date : February 01, 2023

Checked and approved by :

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

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*P*HYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.5065 ± 0.0003 (20 °C; method PC-MAT-016)

*C*ONCLUSION

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
Santene	0.14	Normonoterpene
Tricyclene	tr	Monoterpene
Limonene	0.01	Monoterpene
4-Methylacetophenone	0.01	Simple phenolic
Unknown	0.03	Terpene derivative
Teresantalic acid	0.22	Monoterpenic acid
Unknown	0.06	Terpenic aldehyde
Tricycloekasantalal	0.11	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.06	Terpenic aldehyde
7-epi-Sesquithujene	0.02	Sesquiterpene
γ-4-Dimethylbenzenebutyral	0.08	Simple phenolic
α-Cedrene	0.18	Sesquiterpene
Sesquithujene	0.09	Sesquiterpene
β-Cedrene	0.05	Sesquiterpene
cis-α-Bergamotene	0.02	Sesquiterpene
α-Santalene	0.45	Sesquiterpene
trans-α-Bergamotene	0.17	Sesquiterpene
Unknown	0.02	Sesquiterpene
epi-β-Santalene	0.28	Sesquiterpene
Geranylacetone	0.04	Monoterpenic ketone
α-Acoradiene	0.07	Sesquiterpene
(E)-β-Farnesene	0.07	Sesquiterpene
β-Santalene	0.46	Sesquiterpene
β-Acoradiene	0.03	Sesquiterpene
10-epi-β-Acoradiene	0.07	Sesquiterpene
Unknown	0.26	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
γ-Curcumene	0.24	Sesquiterpene
α-Curcumene	0.38	Sesquiterpene
α-Selinene	0.04	Sesquiterpene
Unknown	0.07	Sesquiterpene
Unknown	0.17	Sesquiterpene
Unknown	0.06	Sesquiterpene
β-Bisabolene	0.18	Sesquiterpene
(3E,6E)-α-Farnesene	0.06	Sesquiterpene
α-Alaskene	0.01	Sesquiterpene
β-Curcumene	0.49	Sesquiterpene
β-Sesquiphellandrene	0.16	Sesquiterpene
8,14-Cedranoxide	0.03	Sesquiterpenic ether
(E)-α-Bisabolene	0.08	Sesquiterpene
(E)-Nerolidol	2.27	Sesquiterpenic alcohol
Unknown	0.09	Oxygenated sesquiterpene
Dendrolasin	0.85	Sesquiterpenic ether
Unknown	0.01	Oxygenated sesquiterpene

Helifolen-12-al A	0.16	Sesquiterpenic aldehyde
α -Cedrol	0.23	Sesquiterpenic alcohol
Guaiol	0.20	Sesquiterpenic alcohol
Helifolen-12-al B	0.09	Sesquiterpenic aldehyde
Unknown	0.16	Oxygenated sesquiterpene
Rosifolol	0.22	Sesquiterpenic alcohol
α -Acorenol	0.22	Sesquiterpenic alcohol
γ -Eudesmol	0.15	Sesquiterpenic alcohol
β -Acorenol	0.05	Sesquiterpenic alcohol
10-epi- β -Acorenol?	0.29	Sesquiterpenic alcohol
β -Eudesmol	0.10	Sesquiterpenic alcohol
Unknown	0.33	Oxygenated sesquiterpene
α -Bisabolol oxide B, epimer 1	0.17	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 2	0.11	Sesquiterpenic alcohol
Unknown	0.76	Oxygenated sesquiterpene
epi- β -Bisabolol	0.33	Sesquiterpenic alcohol
Bulnesol	0.53	Sesquiterpenic alcohol
β -Bisabolol	2.12	Sesquiterpenic alcohol
epi-Cyclosantalal	0.79	Sesquiterpenic aldehyde
(Z)- α -Santalol	14.98	Sesquiterpenic alcohol
(E)- α -Santalal	0.42	Sesquiterpenic aldehyde
Cedr-8-en-13-ol	0.38	Sesquiterpenic alcohol
epi- α -Bisabolol	6.53	Sesquiterpenic alcohol
(Z)- α -trans-Bergamotol	3.19	Sesquiterpenic alcohol
(E)- α -Santalol	0.34	Sesquiterpenic alcohol
Unknown	0.51	Oxygenated sesquiterpene
(Z)-epi- β -Santalol	1.56	Sesquiterpenic alcohol
(E)- α -trans-Bergamotol	1.27	Sesquiterpenic alcohol
(Z)- β -Santalol	5.98	Sesquiterpenic alcohol
Unknown	0.54	Oxygenated sesquiterpene
(2E,6E)-Farnesol	11.68	Sesquiterpenic alcohol
(Z)-Nuciferol	9.29	Sesquiterpenic alcohol
(Z)- γ -Curcumene-12-ol	6.02	Sesquiterpenic alcohol
Unknown	1.34	Oxygenated sesquiterpene
(2E,6E)-Farnesal	0.15	Sesquiterpenic aldehyde
(E)- β -Santalol	0.48	Sesquiterpenic alcohol
Unknown	1.12	Oxygenated sesquiterpene
Curcumene-12-ol analog	1.22	Sesquiterpenic alcohol
Unknown	1.02	Oxygenated sesquiterpene
(Z)- β -Curcumene-12-ol	6.99	Sesquiterpenic alcohol
(Z)-Lanceol	2.76	Sesquiterpenic alcohol
12-Hydroxy-(Z)-sesquicineole	0.17	Sesquiterpenic alcohol
Unknown	0.99	Oxygenated sesquiterpene
Unknown	0.68	Oxygenated sesquiterpene
Unknown	0.50	Unknown
Unknown	0.70	Oxygenated sesquiterpene
Unknown	0.45	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Unknown	0.17	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
(2E,6E)-Farnesyl acetate	0.10	Sesquiterpenic ester
Unknown	0.21	Oxygenated sesquiterpene

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Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Consolidated total	97.35%	

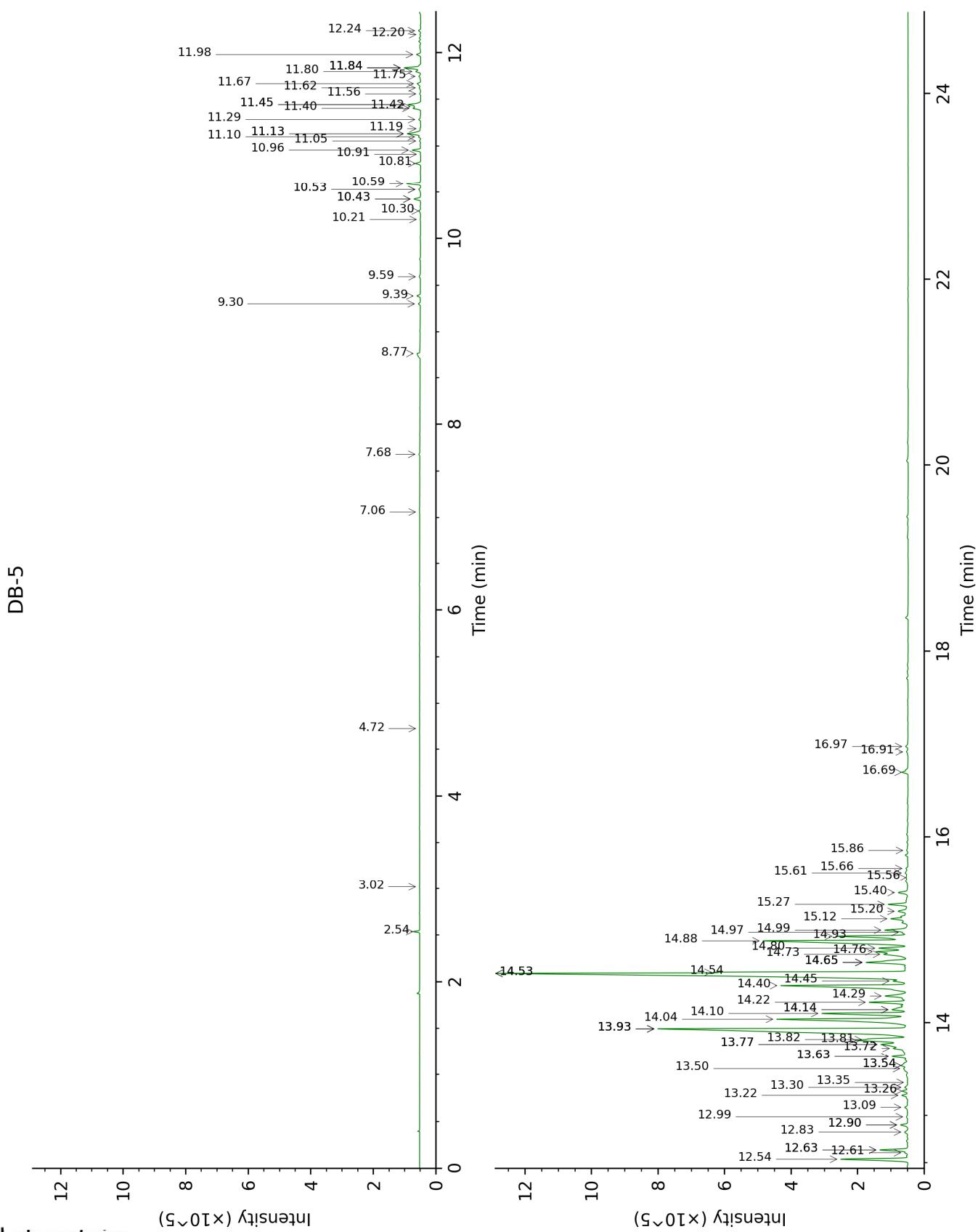
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

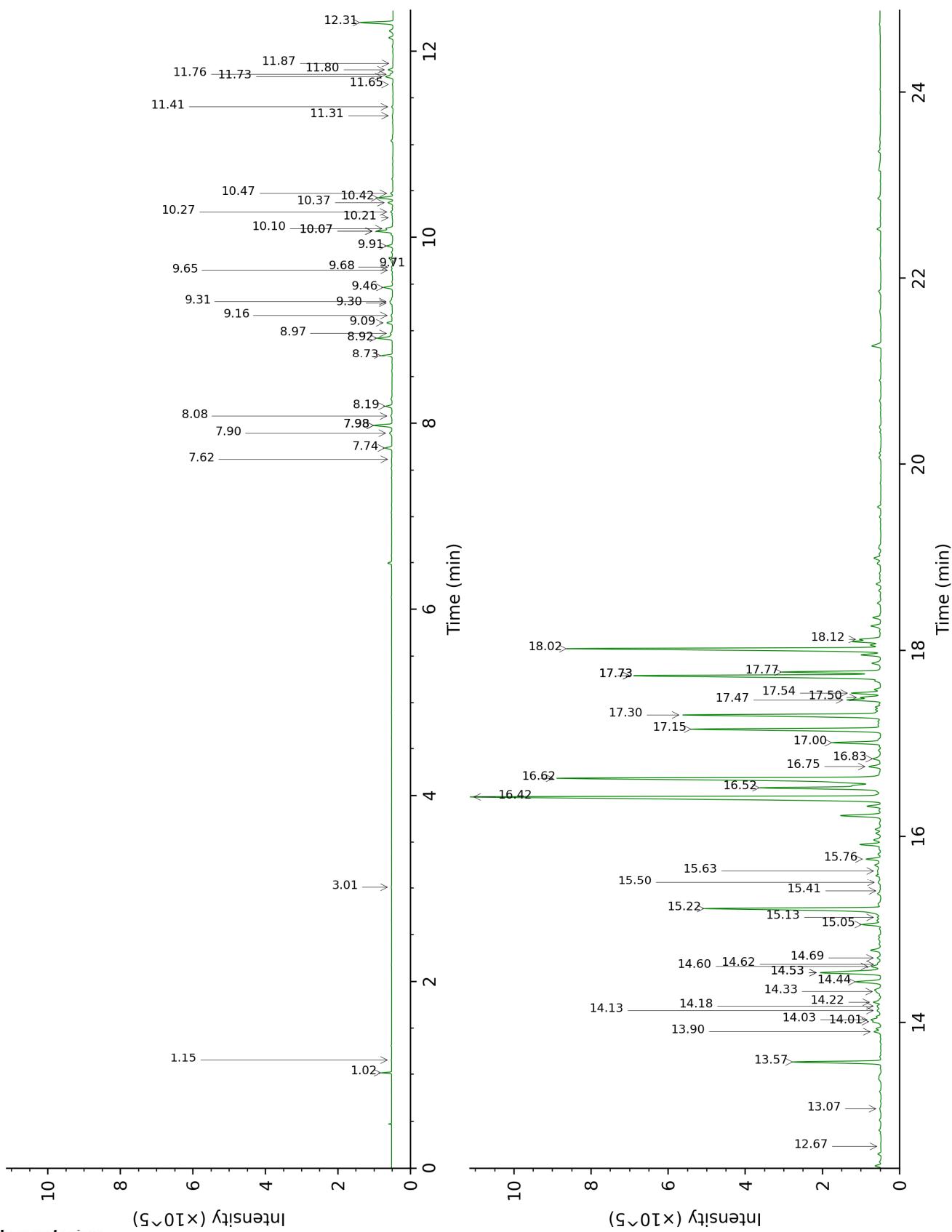
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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



DB-WAX



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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Santene	2.54	882	0.14	1.02	944	0.14
Tricyclene	3.02	918	tr	1.15	968	tr
Limonene	4.72	1028	0.01	3.01	1155	tr
4-Methylacetophenone	7.06	1175	0.01	10.21	1703	0.02
Unknown [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	7.68	1215	0.03	8.97	1602	0.07
Teresantalic acid	8.77	1288	0.22	15.50	2189	0.14
Unknown [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]	9.30	1324	0.06			
Tricycloekasantalal (1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	9.39	1330	0.11	10.07*†	1690	0.66
7-epi-Sesquithujene	10.21	1388	0.02	7.62	1496	0.02
γ-4-Dimethylbenzenebutyral	10.30	1394	0.08			
α-Cedrene	10.42*	1403	0.24	7.74	1506	0.18
Sesquithujene	10.42*	1403	[0.24]	7.90	1518	0.09
β-Cedrene	10.53*	1411	0.07	8.08	1532	0.05
cis-α-Bergamotene	10.53*	1411	[0.07]	7.98*	1524	0.49
α-Santalene	10.59	1416	0.45	7.98*	1524	[0.49]
trans-α-Bergamotene	10.81	1432	0.17	8.18	1540	0.16
Unknown [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]	10.91	1440	0.02			
epi-β-Santalene	10.96	1443	0.28	8.73	1583	0.27
Geranylacetone	11.06	1450	0.04	11.41	1804	0.04
α-Acoradiene	11.10	1453	0.07	9.09	1611	0.14
(E)-β-Farnesene	11.13*	1456	0.59	9.30†	1628	0.14
β-Santalene	11.13*	1456	[0.59]	8.92	1598	0.46
β-Acoradiene	11.19	1460	0.03	9.16	1617	0.05
10-epi-β-Acoradiene	11.28	1467	0.07	9.31†	1630	[0.14]
Unknown [m/z 119, 91 (24), 105 (16), 121 (16), 93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]	11.40	1476	0.26			
β-Selinene	11.42†	1478	0.64	9.65	1657	0.04
γ-Curcumene	11.44*†	1479	[0.64]	9.46	1642	0.24
α-Curcumene	11.44*†	1479	[0.64]	10.42	1721	0.38
α-Selinene	11.56	1488	0.04	9.68	1659	0.03
Unknown [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	11.62	1492	0.07	11.80	1839	0.13
Unknown [m/z 119, 93 (52), 105 (38), 91 (33), 41 (31), 79 (25)... 204 (2)]	11.67	1496	0.17	11.73	1833	0.23

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Unknown [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	11.75	1502	0.06	11.65	1826	0.03
β-Bisabolene	11.80	1506	0.18	9.91	1678	0.15
(3E,6E)-α-Farnesene	11.84*	1509	0.60	10.27	1708	0.06
α-Alaskene	11.84*	1509	[0.60]	9.71	1662	0.01
β-Curcumene	11.84*	1509	[0.60]	10.07*†	1690	[0.66]
β-Sesquiphellandrene	11.98	1520	0.16	10.37	1716	0.14
8,14-Cedranoxide	12.20	1537	0.03	11.31	1796	0.03
(E)-α-Bisabolene	12.24	1540	0.08	10.47	1725	0.06
(E)-Nerolidol	12.54	1563	2.27	13.57	2000	2.17
Unknown [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.61	1569	0.09	11.76	1835	0.07
Dendrolasin	12.64*	1571	0.90	12.31	1884	0.85
Unknown [m/z 43, 125 (91), 107 (39), 41 (24), 67 (24), 93 (21)... 220 (4)]	12.64*	1571	[0.90]	11.87	1845	0.01
Helifolen-12-al A	12.83	1586	0.16	12.67	1917	0.01
α-Cedrol	12.90*	1592	0.29	14.01	2042	0.23
Guaiol	12.90*	1592	[0.29]	13.90	2032	0.20
Helifolen-12-al B	12.99	1599	0.09	13.07	1954	0.04
Unknown [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]	13.09	1607	0.16			
Rosifoliol	13.22	1617	0.22	14.13	2054	0.17
α-Acorenol	13.26	1621	0.22	14.22	2062	0.28
γ-Eudesmol	13.30	1624	0.15	14.69	2108	0.13
β-Acorenol	13.35	1628	0.05	14.62	2101	0.12
10-epi-β-Acorenol?	13.50	1641	0.29			
β-Eudesmol	13.54*	1643	0.43	15.13	2152	0.10
Unknown [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]	13.54*	1643	[0.43]			
α-Bisabolol oxide B, epimer 1	13.63*	1651	0.58	14.18	2058	0.17
α-Bisabolol oxide B, epimer 2	13.63*	1651	[0.58]	14.33	2073	0.11
Unknown [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	13.72	1659	0.76	14.03	2044	0.31
epi-β-Bisabolol	13.77*	1662	1.48	14.60	2099	0.33
Bulnesol	13.77*	1662	[1.48]	15.05	2144	0.53
β-Bisabolol	13.81†	1666	2.91	14.53*	2092	2.24
epi-Cyclosomalal	13.82†	1667	[2.91]	14.44	2083	0.79
(Z)-α-Santalol	13.93*	1676	15.78	16.42	2284	14.98
(E)-α-Santalal	13.93*	1676	[15.78]	14.53*	2092	[2.24]
Cedr-8-en-13-ol	13.93*	1676	[15.78]	16.75	2319	0.38
epi-α-Bisabolol	14.04	1685	6.53	15.22	2161	5.42
(Z)-α-trans-Bergamotol	14.10	1690	3.19	16.52	2295	3.45
(E)-α-Santalol	14.14*	1693	0.84	16.83	2328	0.34

Unknown [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]	14.14*	1693	[0.84]			
(Z)-epi- β -Santalol	14.22	1700	1.56	17.00	2347	1.27
(E)- α -trans-Bergamotol	14.29	1705	1.27	17.54	2405	0.80
(Z)- β -Santalol	14.40	1715	5.98	17.15	2362	5.43
Unknown [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	14.45	1719	0.54	15.41	2180	0.03
(2E,6E)-Farnesol	14.53*†	1726	24.94	16.62	2306	11.68
(Z)-Nuciferol	14.53*†	1726	[24.94]	18.02	2458	9.29
(Z)- γ -Circumen-12-ol	14.54†	1727	[24.94]	17.30	2378	6.02
Unknown [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	14.65*	1737	2.09	18.12	2469	1.34
(2E,6E)-Farnesal	14.65*	1737	[2.09]	15.63	2202	0.15
(E)- β -Santalol	14.65*	1737	[2.09]	17.50	2400	0.48
Unknown [m/z 119, 93 (73), 110 (64), 111 (62), 95 (50), 81 (45), 109 943), 105 (43)... 220 (17), 238 (20)]	14.73	1744	1.12			
Circumen-12-ol analog	14.76	1746	1.22	17.47	2397	0.93
Unknown [m/z 119, 93 (70), 111 (61), 110 (60), 109 (45), 95 (43)... 220 (17), 238 (16)]	14.80	1750	1.02			
(Z)- β -Circumen-12-ol	14.88	1756	6.99	17.73*	2426	7.80
(Z)-Lanceol	14.93	1761	2.76	17.77	2430	2.41
12-Hydroxy-(Z)-sesquicineole	14.97	1764	0.17			
Unknown [m/z 93, 107 (80), 43 (74), 91 (55), 41 (49), 79 (48), 119 (48)... 236 (3)]	14.99	1766	0.99			
Unknown [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	15.12	1777	0.68	17.73*	2426	[7.80]
Unknown [m/z 159, 43 (40), 202 (21), 91 (19), 79 (18), 131 (17)...]	15.20	1784	0.50			
Unknown [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]	15.27	1790	0.70			
Unknown [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	15.40	1801	0.45			
Unknown [m/z 119, 145 (62), 105 (52), 91 (52), 121 (38)...]	15.56	1816	0.12			
Unknown [m/z 43, 81 (61), 41 (49), 93 (47), 119 (39), 141 (35)...]	15.61	1821	0.17			

Unknown [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]	15.66	1825	0.09			
(2E,6E)-Farnesyl acetate	15.86	1843	0.10	15.76	2216	0.45
Unknown [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]	16.69	1920	0.21			
Unknown [m/z 43, 107 (24), 93 (23), 125 (23), 95 (23), 119 (23)...220 (1)]	16.91	1940	0.06			
Unknown [m/z 43, 107 (23), 119 (23), 93 (22), 125 (22), 132 (22)...220 (1)]	16.97	1946	0.10			
Total identified		87.88%			83.94%	
Total reported		96.31%			86.16%	

*: 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