

Date : December 08, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21K24-PTH01

Customer identification : Sandalwood Indian - Australia - SA2104213R

Type : Essential oil

Source : *Santalum album*

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 : Seydou Ka, Ph. D.

Analysis date : December 01, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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: Faintly yellow viscous liquid

Refractive index: 1.5069 ± 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
4-Methylacetophenone	0.05	Simple phenolic
Dihydroalbene	0.01	Terpene derivative
Unknown	0.01	Terpene derivative
Teresantalic acid	0.05	Monoterpenic acid
Tricycloekasantalal	0.13	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.03	Terpenic aldehyde
Unknown	0.05	Unknown
7-epi-Sesquithujene	0.02	Sesquiterpene
γ-4-Dimethylbenzenebutyral	0.04	Simple phenolic
α-Cedrene	0.01	Sesquiterpene
β-Cedrene	0.01	Sesquiterpene
α-Santalene	0.75	Sesquiterpene
trans-α-Bergamotene	0.18	Sesquiterpene
Unknown	0.02	Sesquiterpene
epi-β-Santalene	0.84	Sesquiterpene
Geranylacetone	0.05	Monoterpenic ketone
β-Santalene	1.27	Sesquiterpene
β-Acoradiene	0.04	Sesquiterpene
10-epi-β-Acoradiene	0.01	Sesquiterpene
γ-Curcumene	0.10	Sesquiterpene
ar-Curcumene	0.27	Sesquiterpene
α-Selinene	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
α-Alaskene	0.09	Sesquiterpene
β-Bisabolene	0.01	Sesquiterpene
β-Curcumene	0.11	Sesquiterpene
Unknown	0.08	Oxygenated sesquiterpene
β-Sesquiphellandrene	0.01	Sesquiterpene
8,14-Cedranoxide	0.01	Sesquiterpenic ether
Unknown	0.15	Sesquiterpene
Unknown	0.01	Sesquiterpene
(E)-Nerolidol	0.10	Sesquiterpenic alcohol
Unknown	0.08	Oxygenated sesquiterpene
Dendrolasin	0.03	Sesquiterpenic ether
Helifolen-12-al A	0.12	Sesquiterpenic aldehyde
Guaïol	0.04	Sesquiterpenic alcohol
Unknown	0.10	Oxygenated sesquiterpene
Rosifoliol	0.04	Sesquiterpenic alcohol
α-Acorenol	0.15	Sesquiterpenic alcohol
β-Acorenol	0.01	Sesquiterpenic alcohol
10-epi-β-Acorenol?	0.05	Sesquiterpenic alcohol
β-Eudesmol	0.25	Sesquiterpenic alcohol
Unknown	0.38	Oxygenated sesquiterpene
α-Bisabolol oxide B, epimer 1	0.18	Sesquiterpenic alcohol

α -Bisabolol oxide B, epimer 2	0.11	Sesquiterpenic alcohol
Unknown	0.11	Oxygenated sesquiterpene
Unknown	0.88	Oxygenated sesquiterpene
Bulnesol	0.29	Sesquiterpenic alcohol
β -Bisabolol	0.63	Sesquiterpenic alcohol
epi-Cyclosantalal	0.56	Sesquiterpenic aldehyde
(E)- α -Santalal	2.35	Sesquiterpenic aldehyde
(Z)- α -Santalol	45.19	Sesquiterpenic alcohol
(Z)- α -trans-Bergamotol	4.69	Sesquiterpenic alcohol
(E)- α -Santalol	0.44	Sesquiterpenic alcohol
Unknown	0.39	Oxygenated sesquiterpene
(Z)-epi- β -Santalol	4.01	Sesquiterpenic alcohol
(E)- α -trans-Bergamotol	0.40	Sesquiterpenic alcohol
(Z)- β -Santalol	18.64	Sesquiterpenic alcohol
Unknown	0.12	Oxygenated sesquiterpene
Unknown	0.29	Oxygenated sesquiterpene
(Z)-Nuciferol	3.02	Sesquiterpenic alcohol
(E)- β -Santalol	1.70	Sesquiterpenic alcohol
Unknown	0.23	Oxygenated sesquiterpene
(2E,6E)-Farnesal	0.43	Sesquiterpenic aldehyde
Curcumen-12-ol analog	0.34	Sesquiterpenic alcohol
(Z)- β -Curcumen-12-ol	0.79	Sesquiterpenic alcohol
(Z)-Lanceol	2.86	Sesquiterpenic alcohol
Unknown	0.11	Oxygenated sesquiterpene
(Z)- α -Santalyl acetate	0.08	Sesquiterpenic ester
Unknown	0.07	Oxygenated sesquiterpene
Bisabola-2,7(Z),10(Z)-trien-13-ol?	0.35	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	tr	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.02	Unknown
Consolidated total	95.27%	

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

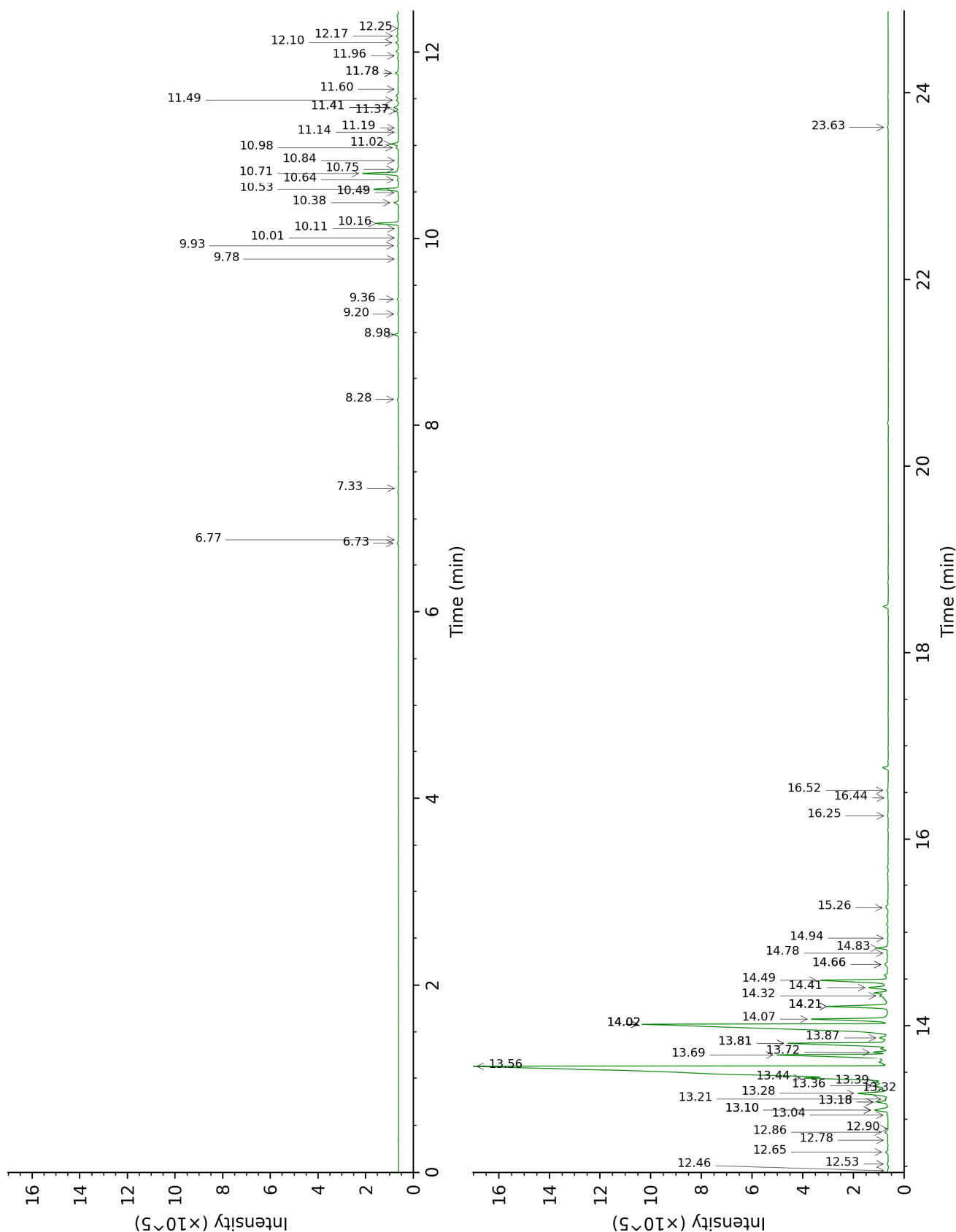
Note: no correction factor was applied

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.

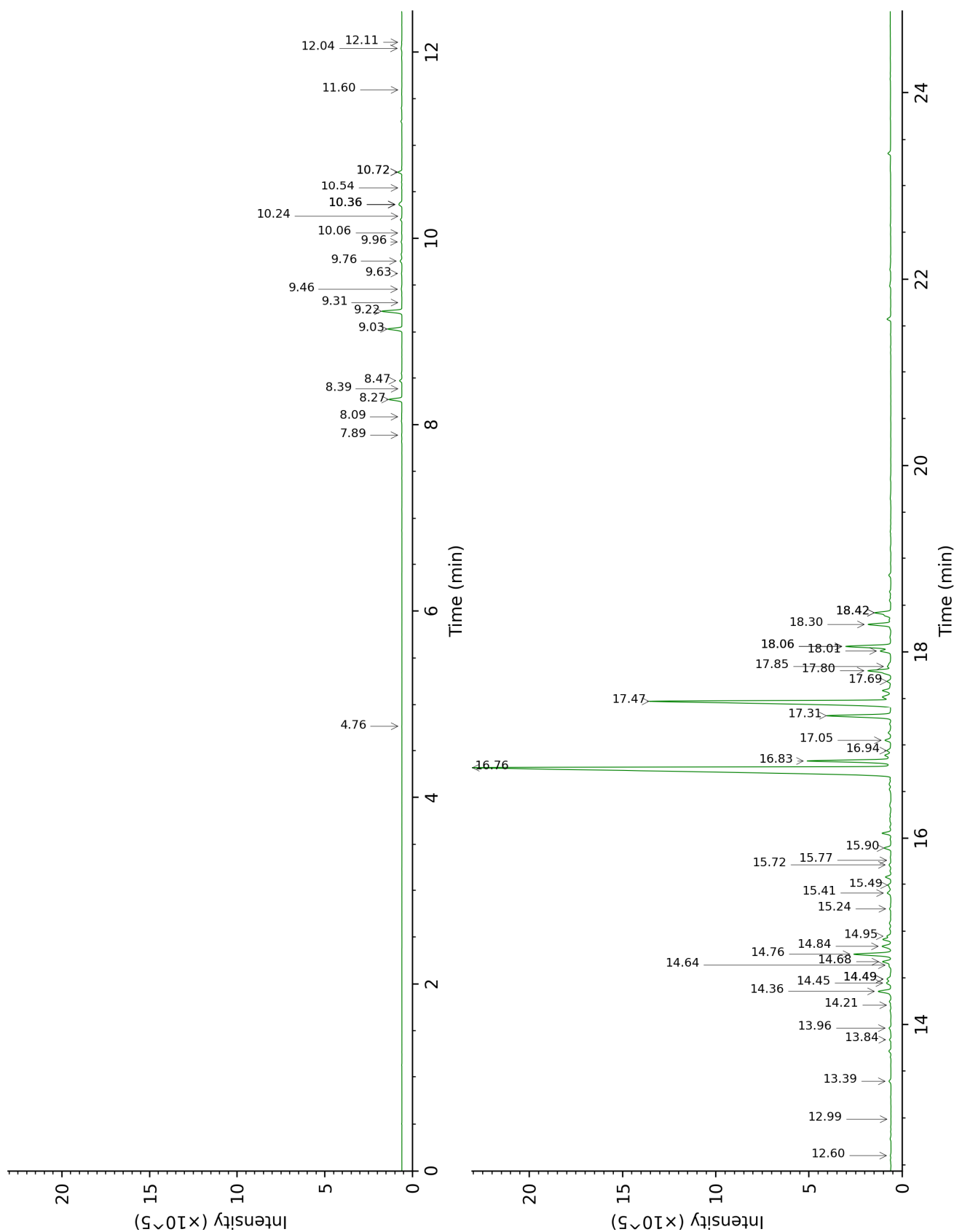
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

This page was intentionally left blank. The following pages present the complete data of the analysis.

DB-5



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
4-Methylacetophenone	6.73	1179	0.05	10.54	1708	0.02
Dihydroalbene	6.77	1182	0.01	4.76	1273	tr
Unknown [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	7.33	1218	0.01	9.32	1608	0.01
Teresantalic acid	8.28	1282	0.05	15.77	2189	0.01
Tricycloekasantalal	8.98	1330	0.13	10.36*	1693	0.27
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	9.20	1346	0.03	10.36*	1693	[0.27]
Unknown [m/z 93, 160 (81), 91 (58), 94 (53), 134 (53)...]	9.36	1357	0.05			
7-epi-Sesquithujene	9.78	1387	0.02	7.89	1498	0.02
γ-4-Dimethylbenzenebutyral	9.93	1397	0.04			
α-Cedrene	10.01	1403	0.01	8.09	1513	0.02
β-Cedrene	10.11	1410	0.01	8.39	1536	0.01
α-Santalene	10.16	1415	0.75	8.27	1527	0.78
trans-α-Bergamotene	10.38	1431	0.18	8.47	1542	0.14
Unknown [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]	10.49	1439	0.02			
epi-β-Santalene	10.53	1442	0.84	9.03	1586	0.82
Geranylacetone	10.64	1450	0.05			
β-Santalene	10.70	1455	1.27	9.22	1601	1.22
β-Acoradiene	10.75	1458	0.04	9.46	1620	0.06
10-epi-β-Acoradiene	10.84	1465	0.01	9.63	1633	0.03
γ-Curcumene	10.98	1476	0.10	9.76	1644	0.12
ar-Curcumene	11.02	1479	0.27	10.72*	1722	0.22
α-Selinene	11.14	1488	0.01	10.06	1668	0.02
Unknown [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	11.19	1492	0.01	12.10	1842	0.01
α-Alaskene	11.37	1505	0.09	9.96	1660	0.05
β-Bisabolene	11.41*	1508	0.19	10.24	1682	0.01
β-Curcumene	11.41*	1508	[0.19]	10.36*	1693	[0.27]
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.49	1514	0.08	13.39	1958	0.13
β-Sesquiphellandrene	11.60	1523	0.01	10.72*	1722	[0.22]
8,14-Cedranoxide	11.78*	1537	0.10	11.60	1797	0.01
Unknown [m/z 121, 93 (91), 79 (57), 91 (25), 43 (23), 77 (18)...202 (8)]	11.78*	1537	[0.10]	13.96	2012	0.15
Unknown [m/z 121, 93 (79), 79 (51), 91 (21), 77 (16), 43 (15)...202 (5)]	11.96	1552	0.01			
(E)-Nerolidol	12.10	1563	0.10	13.84	2000	0.08

Unknown [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.17	1568	0.08	12.04	1836	0.08
Dendrolasin	12.25	1574	0.03	12.60	1886	0.04
Helifolen-12-al A	12.46	1590	0.12	12.99	1921	tr
Guaiol	12.53	1596	0.04	14.21	2036	0.03
Unknown [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]	12.65	1606	0.10			
Rosifolol	12.78	1617	0.04	14.45	2058	0.31
α -Acorenol	12.86	1624	0.15	14.49*	2062	0.32
β -Acorenol	12.90	1627	0.01	14.95	2107	0.24
10-epi- β -Acorenol?	13.04	1639	0.05			
β -Eudesmol	13.10*	1643	0.64	15.49	2162	0.25
Unknown [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]	13.10*	1643	[0.64]			
α -Bisabolol oxide B, epimer 1	13.18*	1650	0.43	14.49*	2062	[0.32]
α -Bisabolol oxide B, epimer 2	13.18*	1650	[0.43]	14.64	2077	0.11
Unknown [m/z 93, 121 (97), 91 (30), 92 (27), 79 (26), 94 (21), 105 (19), 122 (18)... 222 (9)]	13.22	1653	0.11			
Unknown [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	13.28†	1658	2.84	14.36	2050	0.88
Bulnesol	13.32†	1661	[2.84]	15.41	2153	0.29
β -Bisabolol	13.36†	1664	[2.84]	14.84	2097	0.63
epi-Cyclosantalal	13.40†	1668	[2.84]	14.68	2080	0.56
(E)- α -Santalal	13.44†	1671	47.77	14.76	2088	2.35
(Z)- α -Santalol	13.56†	1681	[47.77]	16.76	2292	45.19
(Z)- α -trans-Bergamotol	13.69	1692	4.69	16.83	2300	4.81
(E)- α -Santalol	13.72	1694	0.44	17.05	2324	0.37
Unknown [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]	13.82*	1702	4.40			
(Z)-epi- β -Santalol	13.82*	1702	[4.40]	17.31	2352	4.01
(E)- α -trans-Bergamotol	13.87	1707	0.40	17.85	2411	0.34
(Z)- β -Santalol	14.02*	1720	19.08	17.47	2370	18.64
Unknown [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	14.02*	1720	[19.08]	15.72	2184	0.12
Unknown [m/z 119, 91 (31), 105 (29), 41 (25), 133 (23), 158 (21)...]	14.02*	1720	[19.08]	16.94	2312	0.29
(Z)-Nuciferol	14.07	1725	3.02	18.30	2461	1.40
(E)- β -Santalol	14.21*	1737	2.35	17.80	2406	1.70
Unknown [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	14.21*	1737	[2.35]	18.42*	2475	1.29

(2E,6E)-Farnesal	14.21*	1737	[2.35]	15.90	2203	0.43
Curcumen-12-ol analog	14.32	1746	0.34	17.69	2393	0.22
(Z)- β -Curcumen-12-ol	14.41	1754	0.79	18.01	2429	0.69
(Z)-Lanceol	14.49	1761	2.86	18.06*	2435	2.78
Unknown [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	14.66*	1775	0.19	18.06*	2435	[2.78]
(Z)- α -Santalyl acetate	14.66*	1775	[0.19]	15.24	2137	0.08
Unknown [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]	14.78	1786	0.07			
Bisabola-2,7(Z),10(Z)-trien-13-ol?	14.83	1791	0.35	18.42*	2475	[1.29]
Unknown [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	14.94	1800	0.03			
Unknown [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]	15.26	1830	0.13			
Unknown [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]	16.25	1920	0.03			
Unknown [m/z 218, 176 (91), 146 (37), 161 (30), 133 (27), 147 (20)...]	16.44	1939	tr			
Unknown [m/z 93, 94 (86), 91 (48), 121 (42), 79 (42), 107 (37)...218 (2)]	16.52	1946	0.04			
Unknown [m/z 93, 121 (96), 94 (81), 91 (46), 203 (41), 122 (40)...]	23.63	2735	0.02			
Total identified		92.54%			91.00%	
Total reported		96.17%			92.66%	

*: 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