

Date : 2023-09-06

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23H29-PTH01

Customer Identification : Indian Sandalwood Essential Oil, Bulk - Australia - SA2106R

Type : Essential Oil

Source : *Santalum album*

Customer : Plant Therapy

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

***ISO**

Results : See analysis summary (next page)

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

Date : 2023-09-05

PHYSICOCHEMICAL DATA

Refractive index : 1.507 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2023-08-30

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
Santene	tr	Normonoterpene
Tricyclene	tr	Monoterpene
4-Methylacetophenone	0.05	Simple phenolic
Dihydroalbene	0.01	Terpene derivative
Unknown	0.03	Terpene derivative
Teresantalic acid	0.02	Monoterpenic acid
Unknown	0.01	Terpenic aldehyde
Tricycloekasantalal	0.12	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.03	Terpenic aldehyde
Unknown	0.01	Unknown
7-epi-Sesquithujene	0.02	Sesquiterpene
γ -4-Dimethylbenzenebutyral	0.01	Simple phenolic
α -Cedrene	0.05	Sesquiterpene
β -Cedrene	0.02	Sesquiterpene
α -Santalene	0.83	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.20	Sesquiterpene
Unknown	0.03	Sesquiterpene
epi- β -Santalene	0.87	Sesquiterpene
Geranylacetone	0.04	Monoterpenic ketone
α -Acoradiene	0.03	Sesquiterpene
β -Santalene	1.27	Sesquiterpene
β -Acoradiene	0.05	Sesquiterpene
10-epi- β -Acoradiene	0.02	Sesquiterpene
γ -Curcumene	0.09	Sesquiterpene
Unknown	0.16	Sesquiterpene
α -Curcumene	0.14	Sesquiterpene
Unknown	0.01	Sesquiterpene
Unknown	0.03	Sesquiterpene
Unknown	0.01	Sesquiterpene
α -Alaskene	0.02	Sesquiterpene
β -Bisabolene	0.13	Sesquiterpene
β -Curcumene	0.20	Sesquiterpene
(3E,6E)- α -Farnesene	0.02	Sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
β -Sesquiphellandrene	0.09	Sesquiterpene
Unknown	0.08	Sesquiterpene
Unknown	0.04	Sesquiterpene
(E)-Nerolidol	0.11	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene

Dendrolasin	0.06	Sesquiterpenic ether
α -Cedrol	0.06	Sesquiterpenic alcohol
Guaiol	0.04	Sesquiterpenic alcohol
Helifolen-12-al B	0.05	Sesquiterpenic aldehyde
Unknown	0.11	Oxygenated sesquiterpene
Rosifoliol	0.02	Sesquiterpenic alcohol
α -Acorenol	0.04	Sesquiterpenic alcohol
β -Acorenol	0.17	Sesquiterpenic alcohol
10-epi- β -Acorenol?	0.06	Sesquiterpenic alcohol
Unknown	0.42	Oxygenated sesquiterpene
β -Eudesmol	0.21	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 2	0.04	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 1	0.29	Sesquiterpenic alcohol
Unknown	0.32	Oxygenated sesquiterpene
Bulnesol	0.02	Sesquiterpenic alcohol
Unknown	1.06	Oxygenated sesquiterpene
Unknown	0.63	Oxygenated sesquiterpene
β -Bisabolol	0.55	Sesquiterpenic alcohol
epi-Cyclosantalal	0.50	Sesquiterpenic aldehyde
(<i>E</i>)- α -Santalal	1.91	Sesquiterpenic aldehyde
(<i>Z</i>)- α -Santalol	44.09	Sesquiterpenic alcohol
(<i>Z</i>)- α - <i>trans</i> -Bergamotol	4.94	Sesquiterpenic alcohol
(<i>E</i>)- α -Santalol	0.49	Sesquiterpenic alcohol
Unknown	0.23	Oxygenated sesquiterpene
(<i>Z</i>)-epi- β -Santalol	4.04	Sesquiterpenic alcohol
(<i>E</i>)- α - <i>trans</i> -Bergamotol	0.46	Sesquiterpenic alcohol
Unknown	0.28	Oxygenated sesquiterpene
(<i>Z</i>)- β -Santalol	18.17	Sesquiterpenic alcohol
Unknown	0.12	Oxygenated sesquiterpene
(<i>Z</i>)- γ -Curcumen-12-ol	0.68	Sesquiterpenic alcohol
(<i>Z</i>)-Nuciferol	1.66	Sesquiterpenic alcohol
(<i>E</i>)- β -Santalol	1.34	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>E</i>)-Farnesal	0.43	Sesquiterpenic aldehyde
Unknown	0.87	Oxygenated sesquiterpene
Unknown	0.34	Oxygenated sesquiterpene
Curcumen-12-ol analog	0.59	Sesquiterpenic alcohol
(<i>Z</i>)- β -Curcumen-12-ol	0.91	Sesquiterpenic alcohol
(<i>Z</i>)-Lanceol	3.33	Sesquiterpenic alcohol
(<i>Z</i>)- α -Santalyol acetate	0.13	Sesquiterpenic ester
Unknown	0.15	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Bisabola-2,7(<i>Z</i>),10(<i>Z</i>)-trien-13-ol?	0.42	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Consolidated total	N/A	

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

Note: no correction factor was applied

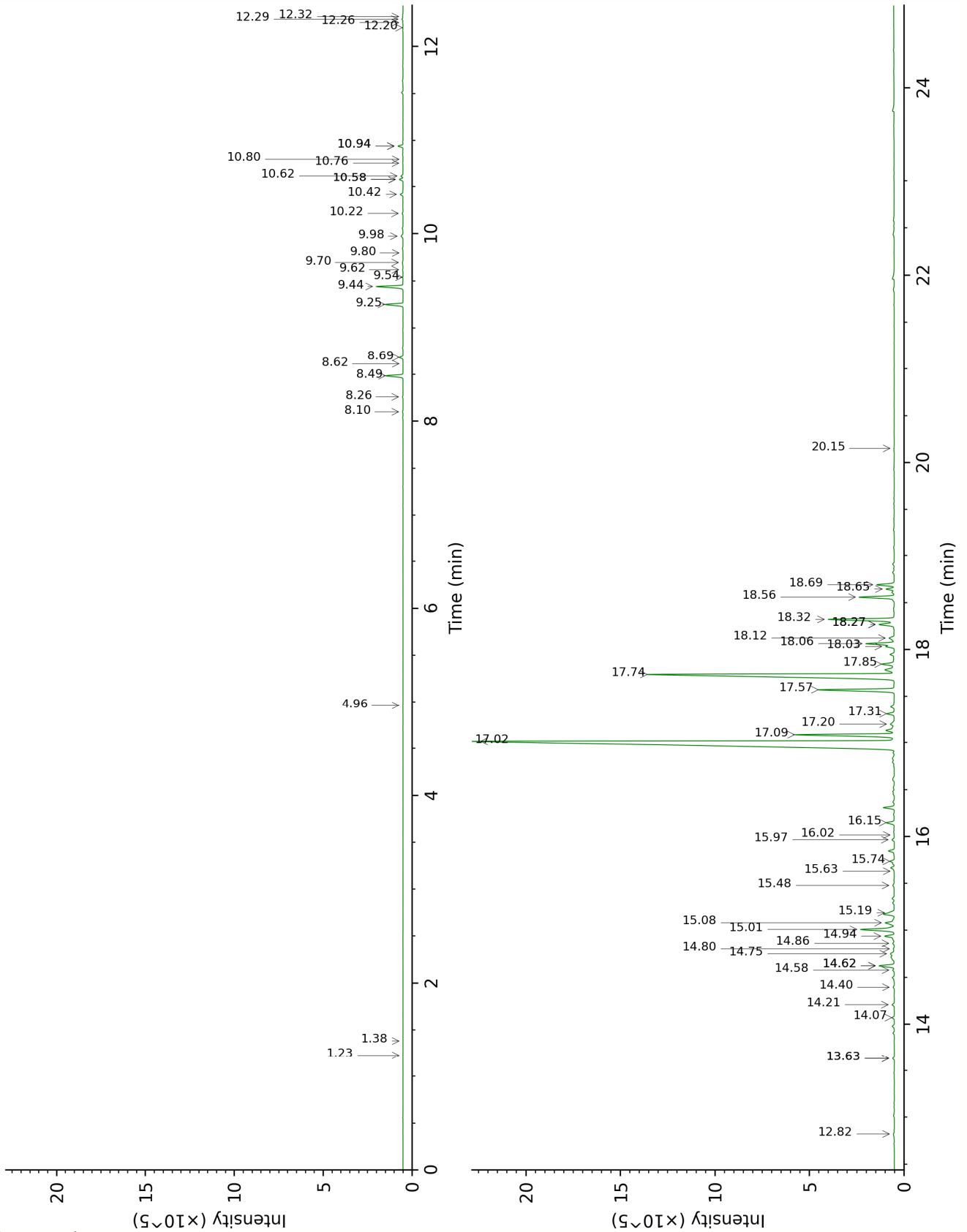
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

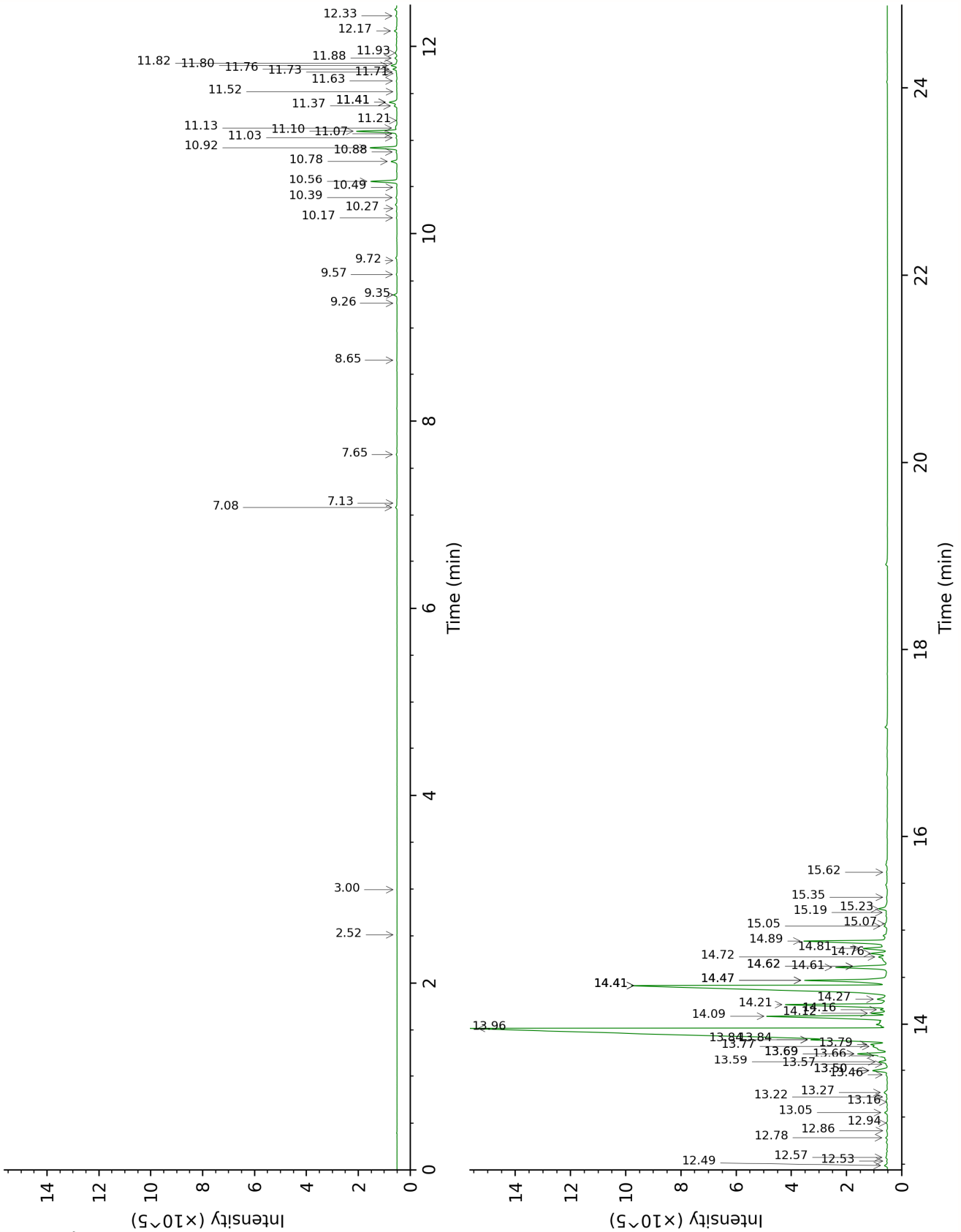
Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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

DB-WAX



DB-5



FULL ANALYSIS DATA

Santene	Column DB-WAX			Column DB-5		
	1.23	948.7	tr	2.52	883.6	tr
Tricyclene	1.38	971.8	tr	3.00	919.4	tr
4-Methylacetophenone	10.76	1707.6	0.02	7.08	1179.9	0.05
Dihydroalbene	4.96	1272.4	0.01	7.13	1182.9	0.01
Unknown SASP II [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	9.54	1609.0	0.02	7.65	1216.4	0.03
Teresantalic acid	16.02	2187.8	0.02	8.65	1283.3	0.02
Unknown SASP III [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]				9.26	1325.3	0.01
Tricycloekasantalal	10.62	1696.1	0.11	9.35	1331.5	0.12
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	10.58*	1692.4	[0.17]	9.57	1346.8	0.03
Unknown SAAL II [m/z 93, 160 (81), 91 (58), 94 (53), 134 (53)...]				9.72	1357.2	0.01
7-epi-Sesquithujene	8.10	1497.7	0.02	10.17	1389.1	0.02
γ -4-Dimethylbenzenebutyral				10.27	1396.0	0.01
α -Cedrene	8.26	1509.9	0.03	10.39	1404.2	0.05
β -Cedrene	8.62	1537.1	0.01	10.49	1412.3	0.02
α -Santalene	8.49	1527.3	0.82	10.56	1417.0	0.83
<i>trans</i> - α -Bergamotene	8.68	1542.5	0.16	10.78	1433.3	0.20
Unknown SASP IV [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]				10.88	1440.8	0.03
epi- β -Santalene	9.25	1586.1	0.84	10.92	1444.1	0.87
Geranylacetone				11.03	1452.0	0.04
α -Acoradiene	9.62	1615.4	0.02	11.07	1455.2	0.03
β -Santalene	9.44	1601.1	1.27	11.10	1457.2	1.27
β -Acoradiene	9.70	1621.5	0.04	11.13	1459.7	0.05
10-epi- β -Acoradiene	9.80	1629.7	0.01	11.21	1465.7	0.02
γ -Curcumene	9.98	1643.9	0.12	11.37	1477.2	0.09
Unknown SASP V [m/z 119, 91 (24), 105 (16), 121 (16), 93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]				11.41*	1480.1	[0.30]
ar-Curcumene	10.94*	1722.8	[0.23]	11.41*	1480.1	[0.30]
Unknown SASP VI [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)...]	12.32	1840.8	0.02	11.52	1488.4	0.01

204 (2)]						
Unknown SASP VII [m/z 119, 93 (52), 105 (38), 91 (33), 41 (31), 79 (25)... 204 (2)]	12.26	1835.1	0.02	11.64	1497.0	0.03
Unknown CULO XII [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	12.20	1830.4	0.01	11.71	1502.7	0.01
α -Alaskene	10.22	1663.4	0.04	11.73	1504.1	0.02
β -Bisabolene	10.42	1679.6	0.13	11.76	1506.5	0.13
β -Curcumene	10.58*	1692.4	[0.17]	11.80	1509.5	0.20
(3E,6E)- α -Farnesene	10.80	1711.0	0.01	11.82	1511.4	0.02
Unknown CULO LIV [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	13.63*	1958.4	[0.08]	11.88	1515.7	0.07
β -Sesquiphellandrene	10.94*	1722.8	[0.23]	11.93	1520.0	0.09
Unknown SAAL VIII [m/z 121, 93 (91), 79 (57), 91 (25), 43 (23), 77 (18)...202 (8)]	14.21	2012.1	0.12	12.17	1538.3	0.08
Unknown SAAL IX [m/z 121, 93 (79), 79 (51), 91 (21), 77 (16), 43 (15)...202 (5)]				12.33	1550.8	0.04
(E)-Nerolidol	14.07	1999.0	0.12	12.49	1563.3	0.11
Unknown SASP VIII [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.29	1838.3	0.06	12.53	1567.0	0.03
Dendrolasin	12.82	1884.7	0.07	12.57	1570.1	0.06
α -Cedrol	14.58	2047.0	0.09	12.78	1586.5	0.06
Guaiol	14.40	2029.7	0.06	12.86	1592.4	0.04
Helifolen-12-al B	13.63*	1958.4	[0.08]	12.94	1598.8	0.05
Unknown SASP X [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]				13.05	1607.8	0.11
Rosifoliol	14.62*	2051.4	[0.80]	13.16	1617.0	0.02
α -Acorenol	14.80	2068.5	0.05	13.22	1621.6	0.04
β -Acorenol	15.19	2105.8	0.20	13.27	1625.4	0.17
10-epi- β -Acorenol?				13.46	1641.0	0.06
Unknown SASP XI [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]				13.50*	1644.7	[0.63]
β -Eudesmol	15.74	2160.0	0.21	13.50*	1644.7	[0.63]
α -Bisabolol oxide B, epimer 2	14.86	2074.1	0.09	13.57	1650.3	0.04
α -Bisabolol oxide B, epimer	14.75	2063.6	0.28	13.59	1652.4	0.29

1						
Unknown SAAL IV [m/z 93, 121 (97), 91 (30), 92 (27), 79 (26), 94 (21), 105 (19), 122 (18)... 222 (9)]				13.66	1658.3	0.32
Bulnesol	15.63	2149.5	0.02	13.69*	1660.1	[1.08]
Unknown SAAL V [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	14.62*	2051.4	[0.80]	13.69*	1660.1	[1.08]
Unknown SAAL VI [m/z 67, 119 (70), 82 (42), 91 (37), 95 (36), 121 (34), 93 (32)...]				13.76	1666.6	0.63
β -Bisabolol	15.08	2095.3	0.58	13.79	1668.4	0.55
epi-Cyclosantalal	14.94	2081.3	0.50	13.84*	1672.5	[2.53]
(E)- α -Santalal	15.01	2088.3	1.91	13.84*	1672.5	[2.53]
(Z)- α -Santalol	17.02	2290.4	44.19	13.96	1682.4	44.09
(Z)- α -trans-Bergamotol	17.09	2297.8	4.94	14.09	1693.1	4.94
(E)- α -Santalol	17.31	2321.6	0.38	14.12	1695.7	0.49
Unknown SASP XII [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]				14.16	1698.9	0.23
(Z)-epi- β -Santalol	17.57	2349.5	3.78	14.21	1703.3	4.04
(E)- α -trans-Bergamotol	18.12	2409.1	0.32	14.27	1708.3	0.46
Unknown ZIOF XXXIX [m/z 119, 91 (31), 105 (29), 41 (25), 133 (23), 158 (21)...]	17.20	2309.9	0.28	14.41*	1720.9	[18.69]
(Z)- β -Santalol	17.74	2366.8	18.17	14.41*	1720.9	[18.69]
Unknown SASP XIV [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	15.97	2182.7	0.12	14.41*	1720.9	[18.69]
(Z)- γ -Curcumen-12-ol	17.85	2378.5	0.68	14.47*	1725.7	[3.50]
(Z)-Nuciferol	18.56	2457.0	1.66	14.47*	1725.7	[3.50]
(E)- β -Santalol	18.06	2402.6	1.34	14.61*†	1737.7	[1.76]
(2E,6E)-Farnesal	16.15	2201.3	0.43	14.62*†	1738.7	[0.45]
Unknown SAAL X [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	18.69	2471.5	0.87	14.62*†	1738.7	[0.45]
Unknown SAAL XI [m/z 93, 121 (57), 91 (46), 138 (39), 119 (38), 109 (37)...]				14.72	1747.3	0.34
Curcumen-12-ol analog	18.03	2399.2	0.38	14.76	1750.5	0.59
(Z)- β -Curcumen-12-ol	18.27*	2425.0	[0.85]	14.81	1755.2	0.91
(Z)-Lanceol	18.32	2430.9	3.31	14.89	1761.9	3.33
(Z)- α -Santalyl acetate	15.48	2134.6	0.11	15.05	1775.8	0.13

Unknown SASP XVI [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	18.27*	2425.0	[0.85]	15.07	1777.9	0.15
Unknown SASP XVII [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]				15.19	1788.3	0.05
Bisabola-2,7(Z),10(Z)-trien-13-ol?	18.65	2466.5	0.39	15.23	1791.8	0.42
Unknown SASP XIX [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	20.15	2639.4	0.02	15.35	1802.4	0.06
Unknown SASP XXII [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]				15.62	1826.5	0.03
Total reported		91.60%			96.28%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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