

Date : 2025-02-14

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 25B03-PTH03

**Customer Identification :** Indian Sandalwood - Indonesia - SA2108R

**Type :** Essential Oil

**Source :** *Santalum album*

**Customer :** Plant Therapy

Checked and approved by:

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

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

**Date :** 2025-02-11

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.5065 \pm 0.0003$  (20 °C)

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

**Analyst :** Cindy Caron B. Sc.

**Date :** 2025-02-03

## 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	0.02	Normonoterpene
Linalool	0.01	Monoterpenic alcohol
4-Methylacetophenone	0.02	Simple phenolic
Unknown	0.03	Terpene derivative
Teresantalic acid	0.09	Monoterpenic acid
Unknown	0.02	Terpenic aldehyde
Tricycloekasantalal	0.10	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.03	Terpenic aldehyde
Unknown	0.04	Unknown
7-epi-Sesquithujene	0.02	Sesquiterpene
$\gamma$ -4-Dimethylbenzenebutyral	0.01	Simple phenolic
Unknown	0.02	Unknown
$\alpha$ -Cedrene	0.03	Sesquiterpene
$\beta$ -Cedrene	0.02	Sesquiterpene
$\alpha$ -Santalene	0.70	Sesquiterpene
Unknown	0.02	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	0.19	Sesquiterpene
Unknown	0.01	Sesquiterpene
epi- $\beta$ -Santalene	0.82	Sesquiterpene
$\beta$ -Santalene	1.26	Sesquiterpene
$\beta$ -Acoradiene	0.03	Sesquiterpene
Unknown	0.04	Unknown
$\gamma$ -Curcumene	0.12	Sesquiterpene
$\beta$ -Selinene	0.04	Sesquiterpene
Unknown	0.01	Sesquiterpene
$\alpha$ -Curcumene	0.16	Sesquiterpene
Unknown	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
$\alpha$ -Alaskene	0.03	Sesquiterpene
$\beta$ -Bisabolene	0.09	Sesquiterpene
$\beta$ -Curcumene	0.23	Sesquiterpene
Sesquicineole	0.15	Sesquiterpenic ether
Unknown	0.18	Oxygenated sesquiterpene
$\beta$ -Sesquiphellandrene	0.05	Sesquiterpene
Unknown	0.20	Sesquiterpene
( <i>E</i> )- $\alpha$ -Bisabolene	0.04	Sesquiterpene
Unknown	0.10	Sesquiterpene
( <i>E</i> )-Nerolidol	0.06	Sesquiterpenic alcohol
Unknown	0.05	Oxygenated sesquiterpene

Dendrolasin	0.03	Sesquiterpenic ether
Guaiol	0.03	Sesquiterpenic alcohol
Helifolen-12-al B	0.04	Sesquiterpenic aldehyde
Unknown	0.11	Oxygenated sesquiterpene
Rosifoliol	0.07	Sesquiterpenic alcohol
$\alpha$ -Acorenol	0.06	Sesquiterpenic alcohol
$\beta$ -Acorenol	0.21	Sesquiterpenic alcohol
$\beta$ -Eudesmol	0.05	Sesquiterpenic alcohol
Unknown	0.87	Oxygenated sesquiterpene
$\alpha$ -Bisabolol oxide B, epimer 1	0.06	Sesquiterpenic alcohol
$\alpha$ -Bisabolol oxide B, epimer 2	0.33	Sesquiterpenic alcohol
Unknown	0.41	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.47	Oxygenated sesquiterpene
Bulnesol	0.16	Sesquiterpenic alcohol
epi- $\beta$ -Bisabolol	0.49	Sesquiterpenic alcohol
$\beta$ -Bisabolol	0.48	Sesquiterpenic alcohol
epi-Cyclosantalal	0.37	Sesquiterpenic aldehyde
( <i>E</i> )- $\alpha$ -Santalal	1.95	Sesquiterpenic aldehyde
( <i>Z</i> )- $\alpha$ -Santalol	42.85	Sesquiterpenic alcohol
$\alpha$ -Bisabolol	0.16	Sesquiterpenic alcohol
( <i>Z</i> )- $\alpha$ - <i>trans</i> -Bergamotol	6.71	Sesquiterpenic alcohol
( <i>E</i> )- $\alpha$ -Santalol	0.48	Sesquiterpenic alcohol
Unknown	0.19	Oxygenated sesquiterpene
( <i>Z</i> )-epi- $\beta$ -Santalol	3.50	Sesquiterpenic alcohol
( <i>E</i> )- $\alpha$ - <i>trans</i> -Bergamotol	0.47	Sesquiterpenic alcohol
Unknown	0.35	Oxygenated sesquiterpene
( <i>Z</i> )- $\beta$ -Santalol	19.82	Sesquiterpenic alcohol
Unknown	0.06	Oxygenated sesquiterpene
( <i>Z</i> )- $\gamma$ -Curcumen-12-ol	0.96	Sesquiterpenic alcohol
( <i>Z</i> )-Nuciferol	1.68	Sesquiterpenic alcohol
( <i>E</i> )- $\beta$ -Santalol	1.48	Sesquiterpenic alcohol
Unknown	0.99	Oxygenated sesquiterpene
(2 <i>E</i> ,6 <i>E</i> )-Farnesal	0.27	Sesquiterpenic aldehyde
Unknown	0.48	Oxygenated sesquiterpene
Curcumen-12-ol analog	0.39	Sesquiterpenic alcohol
( <i>Z</i> )- $\beta$ -Curcumen-12-ol	1.47	Sesquiterpenic alcohol
( <i>Z</i> )-Lanceol	2.32	Sesquiterpenic alcohol
( <i>Z</i> )- $\alpha$ -Santalyol acetate	0.19	Sesquiterpenic ester
Unknown	0.16	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Bisabola-2,7( <i>Z</i> ),10( <i>Z</i> )-trien-13-ol?	0.23	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.02	Unknown

Unknown	0.01	Unknown
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.03	Unknown
<b>Consolidated total</b>	<b>96.86</b>	

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

Note: no correction factor was applied

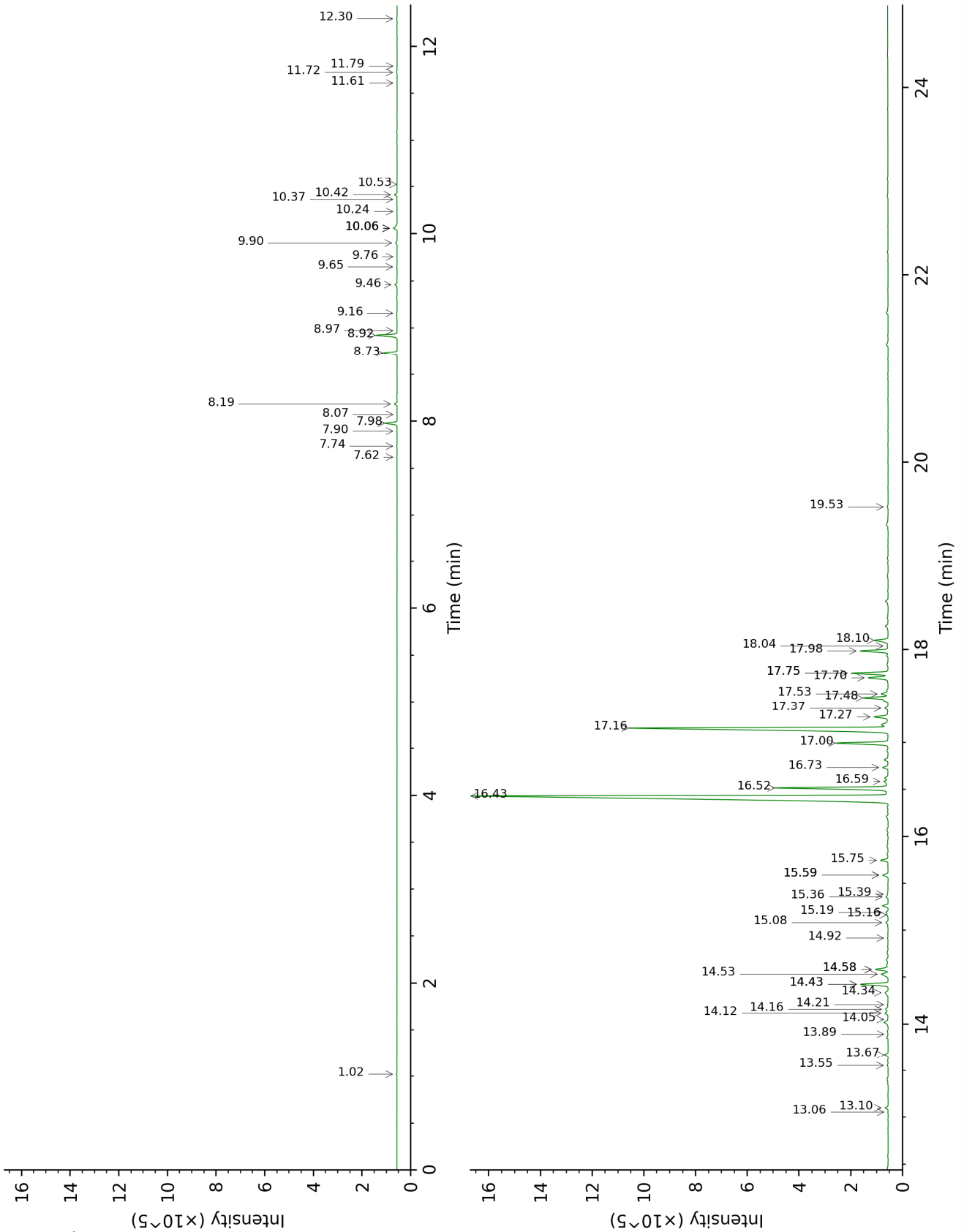
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

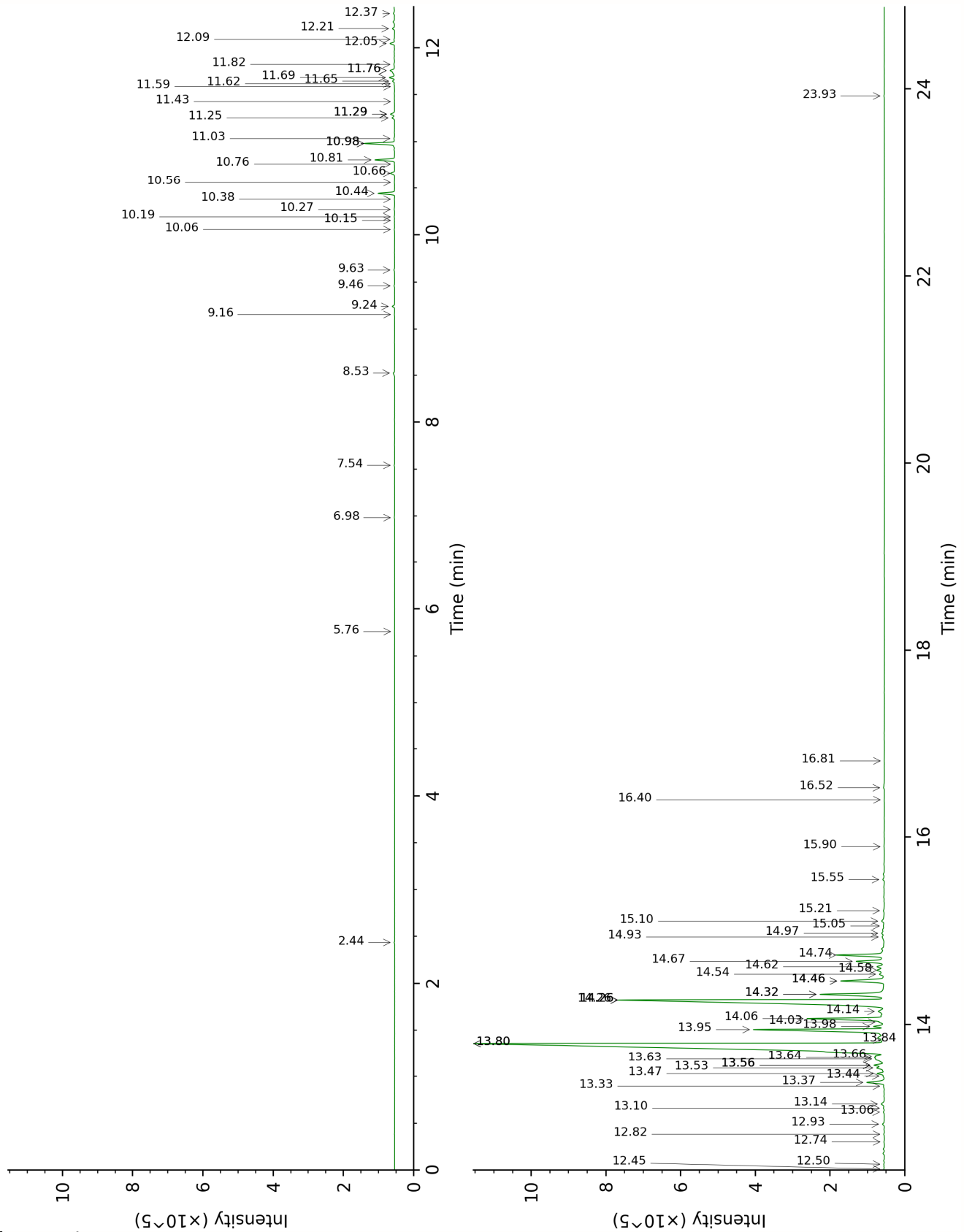
**Bracketed value ([xx]):** A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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		
	1.02	948.3	0.02	2.44	883.7	0.02
Linalool	7.90	1519.5	0.02	5.76	1102.7	0.01
4-Methylacetophenone	10.24	1706.3	0.02	6.98	1180.7	0.02
Unknown SASP II [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	8.97	1603.2	0.02	7.54	1216.8	0.03
Teresantalic acid	15.36	2179.2	0.13	8.53	1282.6	0.09
Unknown SASP III [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]				9.16	1325.8	0.02
Tricycloekasantalal (1S,5S,6R)-2,6-	10.06*	1691.6	[0.31]	9.24	1331.9	0.10
Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	10.06*	1691.6	[0.31]	9.46	1347.3	0.03
Unknown SAAL II [m/z 93, 160 (81), 91 (58), 94 (53), 134 (53)...]				9.63	1359.1	0.04
7-epi-Sesquithujene	7.62	1498.1	0.02	10.06	1389.4	0.02
γ-4-Dimethylbenzenebutyral				10.16	1396.3	0.01
Unknown SAAL XIV [m/z 93, 121 (58), 91 (36), 92 (30), 79 (24)... 180? (11)]				10.19	1399.0	0.02
α-Cedrene	7.74	1507.0	0.02	10.27	1404.5	0.03
β-Cedrene	8.07	1533.2	0.01	10.38	1412.6	0.02
α-Santalene	7.98	1526.0	0.70	10.44	1417.2	0.70
Unknown UNKN XXXI [m/z 68, 67 (79), 134 (57), 93 (48), 119 (44), 79 (43)...202 (1)]				10.56	1425.9	0.02
trans-α-Bergamotene	8.18	1541.9	0.16	10.66	1433.6	0.19
Unknown SASP IV [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]				10.76	1440.9	0.01
epi-β-Santalene	8.73	1584.6	0.80	10.81	1444.3	0.82
β-Santalene	8.92	1599.3	1.26	10.98*	1457.3	[1.30]
β-Acoradiene	9.16	1618.3	0.03	10.98*	1457.3	[1.30]
Unknown SAAL III [m/z 135, 119 (34), 107 (25), 91 (20), 93 (19)...]				11.03	1461.2	0.04
γ-Curcumene	9.46	1642.9	0.14	11.25	1477.6	0.12
β-Selinene	9.65	1658.3	0.04	11.29*	1480.6	[0.20]
Unknown SASP V [m/z 119, 91 (24), 105 (16), 121 (16),				11.29*	1480.6	[0.20]

93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]						
ar-Curcumene	10.42	1721.5	0.16	11.29*	1480.6	[0.20]
Unknown SASP VI [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	11.79	1840.5	tr	11.43	1490.6	0.01
Unknown CULO XII [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	11.61	1824.4	0.01	11.59	1502.4	0.01
α-Alaskene	9.76	1667.0	0.02	11.62	1504.7	0.03
β-Bisabolene	9.90	1678.9	0.10	11.65	1507.0	0.09
β-Curcumene	10.06*	1691.6	[0.31]	11.68	1510.0	0.23
Sesquicineole	10.06*	1691.6	[0.31]	11.76*	1515.8	[0.33]
Unknown CULO LIV [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	13.10	1959.5	0.18	11.76*	1515.8	[0.33]
β-Sesquiphellandrene	10.37	1717.3	0.03	11.82	1521.0	0.05
Unknown SAAL VIII [m/z 121, 93 (91), 79 (57), 91 (25), 43 (23), 77 (18)...202 (8)]	13.67	2013.3	0.21	12.05	1538.4	0.20
(E)-α-Bisabolene	10.53	1730.9	0.01	12.09	1541.9	0.04
Unknown SAAL IX [m/z 121, 93 (79), 79 (51), 91 (21), 77 (16), 43 (15)...202 (5)]				12.21	1550.9	0.10
(E)-Nerolidol	13.56	2001.8	0.05	12.37	1563.6	0.06
Unknown SASP VIII [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	11.72	1834.5	0.05	12.45	1569.9	0.05
Dendrolasin	12.30	1885.3	0.05	12.50	1573.9	0.03
Guaiol	13.89	2034.6	0.02	12.74	1592.8	0.03
Helifolen-12-al B	13.06	1955.3	0.02	12.82	1599.1	0.04
Unknown SASP X [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]				12.93	1607.8	0.11
Rosifoliol	14.12	2056.2	0.23	13.06	1618.4	0.07
α-Acorenol	14.21	2065.1	0.05	13.10	1621.8	0.06
β-Acorenol	14.58*	2101.5	[0.85]	13.14	1625.4	0.21
β-Eudesmol	15.16	2160.0	0.08	13.33	1641.2	0.05
Unknown SASP XI [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]				13.37	1644.5	0.87
α-Bisabolol oxide B, epimer 1	14.16	2060.3	0.22	13.44	1650.1	0.06

α-Bisabolol oxide B, epimer 2	14.34	2077.3	0.31	13.47	1652.3	0.33
Unknown SAAL IV [m/z 93, 121 (97), 91 (30), 92 (27), 79 (26), 94 (21), 105 (19), 122 (18)... 222 (9)]	15.59*	2202.9	[0.38]	13.53	1657.4	0.41
Unknown SAAL V [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	14.05	2049.9	0.02	13.56*	1659.7	[0.50]
Unknown CILI II [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	15.75	2219.3	0.47	13.56*	1659.7	[0.50]
Bulnesol	15.08	2151.7	0.16	13.56*	1659.7	[0.50]
epi-β-Bisabolol	14.58*	2101.5	[0.85]	13.63	1665.3	0.49
β-Bisabolol	14.53	2096.5	0.58	13.64	1666.6	0.48
epi-Cyclosantalal	14.43*	2086.0	[1.69]	13.66	1668.2	0.37
(E)-α-Santalal	14.43*	2086.0	[1.69]	13.80*	1679.3	[44.80]
(Z)-α-Santalol	16.43	2291.1	42.85	13.80*	1679.3	[44.80]
α-Bisabolol	15.19	2162.6	0.15	13.84	1682.5	0.16
(Z)-α-trans-Bergamotol	16.52	2300.3	6.84	13.95	1691.7	6.71
(E)-α-Santalol	16.74	2323.9	0.38	13.98	1694.4	0.48
Unknown SASP XII [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]				14.03	1698.3	0.19
(Z)-epi-β-Santalol	17.00	2352.1	3.24	14.06	1701.4	3.50
(E)-α-trans-Bergamotol	17.53	2410.4	0.44	14.14	1707.9	0.47
Unknown ZIOF XXXIX [m/z 119, 91 (31), 105 (29), 41 (25), 133 (23), 158 (21)...]	16.59	2307.8	0.35	14.26*	1718.4	[20.57]
(Z)-β-Santalol	17.16	2369.5	19.82	14.26*	1718.4	[20.57]
Unknown SASP XIV [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	15.39	2182.2	0.06	14.26*	1718.4	[20.57]
(Z)-γ-Curcumen-12-ol	17.28	2382.5	0.96	14.32*	1723.7	[3.59]
(Z)-Nuciferol	17.98	2462.2	1.68	14.32*	1723.7	[3.59]
(E)-β-Santalol	17.48	2405.7	1.48	14.46*	1736.0	[2.32]
Unknown SAAL X [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	18.10	2475.0	0.99	14.46*	1736.0	[2.32]
(2E,6E)-Farnesal	15.59*	2202.9	[0.38]	14.54	1742.3	0.27
Unknown SAAL XI [m/z 93, 121 (57), 91 (46), 138 (39), 119 (38), 109 (37)...]				14.58	1746.0	0.48
Curcumen-12-ol analog	17.37	2392.7	0.23	14.62	1749.3	0.39

(Z)-β-Curcumen-12-ol	17.70	2429.9	1.31	14.67	1754.3	1.47
(Z)-Lanceol	17.75*	2435.4	[2.17]	14.74	1760.0	2.32
(Z)-α-Santalyl acetate	14.92	2135.1	0.04	14.93	1776.8	0.19
Unknown SASP XVI [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	17.75*	2435.4	[2.17]	14.97	1780.2	0.16
Unknown SASP XVII [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]				15.05	1787.0	0.07
Bisabola-2,7(Z),10(Z)-trien-13-ol?	18.04	2468.2	0.08	15.10	1791.4	0.23
Unknown SASP XIX [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	19.53	2642.5	0.05	15.21	1801.1	0.07
Unknown SASP XXII [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]				15.55	1831.2	0.08
Unknown UNKN CLXII [m/z 93, 91 (51), 121 (45), 94 (39), 79 (36), 107 (34)...]				15.90	1863.1	0.02
Unknown SAAU IV [m/z 43, 94 (97), 109 (86), 67 (47), 95 (44), 122 (42)...]				16.40	1908.9	0.01
Unknown SAAU III [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]				16.52	1921.1	0.08
Unknown SAAU VIII [m/z 93, 94 (86), 91 (48), 121 (42), 79 (42), 107 (37)...218 (2)]				16.81	1948.3	0.01
Unknown MISC LXV [m/z 93, 121 (96), 94 (81), 91 (46), 203 (41), 122 (40)...]				23.93	2739.0	0.03
Total reported		92.75%			97.87%	

\*: 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