

Date : 2023-09-06

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23H29-PTH02

Customer Identification : Australian Sandalwood, Bulk - Australia - S20110R

Type : Essential Oil

Source : *Santalum spicatum*

Customer : Plant Therapy

Checked and approved by:

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

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

Date : 2023-09-06

PHYSICOCHEMICAL DATA

Refractive index : 1.5063 ± 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	0.02	Normonoterpene
Tricyclene	0.01	Monoterpene
Limonene	tr	Monoterpene
Terpinolene	tr	Monoterpene
<i>para</i> -Cymenene	tr	Monoterpene
Limona ketone	0.01	Normonoterpene ketone
4-Methylacetophenone	0.01	Simple phenolic
Unknown	0.04	Terpene derivative
Teresantalic acid	0.23	Monoterpenic acid
Unknown	0.07	Terpenic aldehyde
Tricycloekasantalal	0.15	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.02	Terpenic aldehyde
7-epi-Sesquithujene	0.03	Sesquiterpene
γ -4-Dimethylbenzenebutyral	0.03	Simple phenolic
α -Cedrene	0.22	Sesquiterpene
Sesquithujene	0.10	Sesquiterpene
β -Cedrene	0.03	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.08	Sesquiterpene
α -Santalene	0.81	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.28	Sesquiterpene
Unknown	0.02	Sesquiterpene
epi- β -Santalene	0.55	Sesquiterpene
Geranylacetone	0.06	Monoterpenic ketone
α -Acoradiene	0.14	Sesquiterpene
β -Santalene	0.74	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.08	Sesquiterpene
β -Acoradiene	0.06	Sesquiterpene
10-epi- β -Acoradiene	0.01	Sesquiterpene
γ -Curcumene	0.40	Sesquiterpene
Unknown	0.22	Sesquiterpene
β -Selinene	0.03	Sesquiterpene
α -Curcumene	0.60	Sesquiterpene
Unknown	0.08	Sesquiterpene
Unknown	0.08	Sesquiterpene
Unknown	0.05	Sesquiterpene
β -Bisabolene	0.24	Sesquiterpene
α -Alaskene	0.09	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.10	Sesquiterpene
β -Curcumene	0.61	Sesquiterpene

β-Sesquiphellandrene	0.19	Sesquiterpene
8,14-Cedranoxide	0.04	Sesquiterpenic ether
(E)-α-Bisabolene	0.12	Sesquiterpene
(E)-Nerolidol	3.23	Sesquiterpenic alcohol
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.13	Oxygenated sesquiterpene
Dendrolasin	1.72	Sesquiterpenic ether
Helifolen-12-al A	0.16	Sesquiterpenic aldehyde
Guaiol	0.27	Sesquiterpenic alcohol
α-Cedrol	0.25	Sesquiterpenic alcohol
Helifolen-12-al B	0.07	Sesquiterpenic aldehyde
Unknown	0.10	Oxygenated sesquiterpene
Rosifoliol	0.22	Sesquiterpenic alcohol
α-Acorenol	0.16	Sesquiterpenic alcohol
γ-Eudesmol	0.08	Sesquiterpenic alcohol
β-Acorenol	0.09	Sesquiterpenic alcohol
Unknown	0.29	Oxygenated sesquiterpene
α-Bisabolol oxide B, epimer 1	0.21	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 2	0.10	Sesquiterpenic alcohol
Bulnesol	0.79	Sesquiterpenic alcohol
epi-β-Bisabolol	0.12	Sesquiterpenic alcohol
Unknown	0.37	Oxygenated sesquiterpene
β-Bisabolol	1.94	Sesquiterpenic alcohol
(E)-α-Santalal	0.35	Sesquiterpenic aldehyde
epi-Cyclosantalal	0.33	Sesquiterpenic aldehyde
(Z)-α-Santalol	15.59	Sesquiterpenic alcohol
Cedr-8-en-13-ol	0.71	Sesquiterpenic alcohol
epi-α-Bisabolol	5.19	Sesquiterpenic alcohol
α-Bisabolol	0.30	Sesquiterpenic alcohol
(Z)-α-trans-Bergamotol	2.78	Sesquiterpenic alcohol
(E)-α-Santalol	0.59	Sesquiterpenic alcohol
Unknown	0.21	Oxygenated sesquiterpene
Lanceoloxide isomer I	0.18	Sesquiterpenic ether
(Z)-epi-β-Santalol	1.55	Sesquiterpenic alcohol
(E)-α-trans-Bergamotol	0.98	Sesquiterpenic alcohol
Unknown	0.09	Oxygenated sesquiterpene
(Z)-β-Santalol	5.36	Sesquiterpenic alcohol
(Z)-Nuciferol	8.25	Sesquiterpenic alcohol
(2E,6E)-Farnesol	9.18	Sesquiterpenic alcohol
(Z)-γ-Curcumen-12-ol	5.00	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.23	Sesquiterpenic aldehyde
(E)-β-Santalol	0.35	Sesquiterpenic alcohol
Unknown	0.73	Oxygenated sesquiterpene
Unknown	1.20	Oxygenated sesquiterpene
Curcumen-12-ol analog	1.06	Sesquiterpenic alcohol

Unknown	1.04	Oxygenated sesquiterpene
(Z)- β -Curcumen-12-ol	5.62	Sesquiterpenic alcohol
(Z)-Lanceol	2.53	Sesquiterpenic alcohol
12-Hydroxy-(Z)-sesquicineole	0.17	Sesquiterpenic alcohol
Unknown	1.04	Oxygenated sesquiterpene
Unknown	0.61	Oxygenated sesquiterpene
Unknown	0.44	Oxygenated sesquiterpene
Bisabola-2,7(Z),10(Z)-trien-13-ol?	0.94	Oxygenated sesquiterpene
Unknown	0.33	Oxygenated sesquiterpene
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.22	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
(2E,6E)-Farnesyl acetate	0.06	Sesquiterpenic ester
Unknown	0.11	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.23	Unknown
Consolidated total	90.97	

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

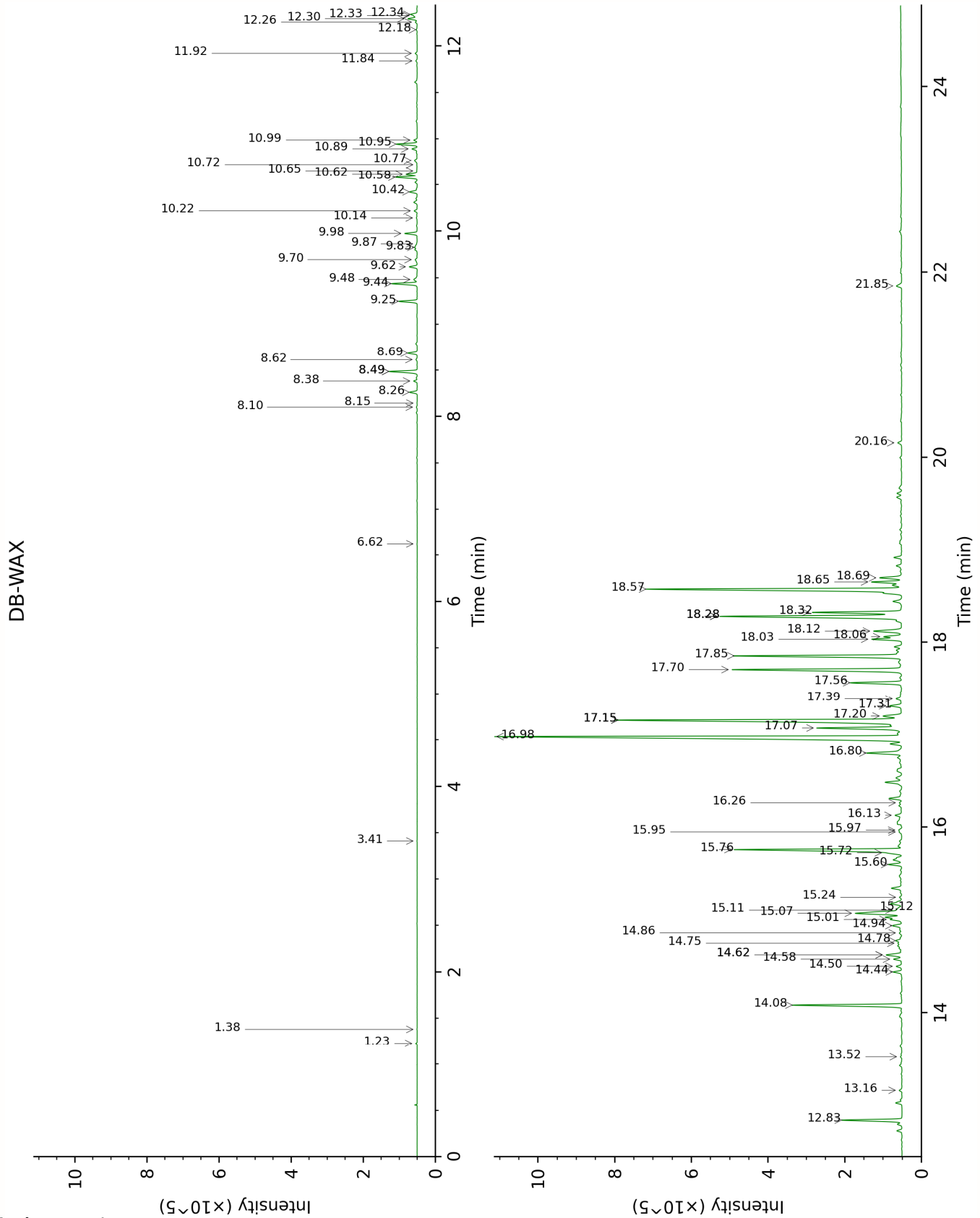
Note: no correction factor was applied

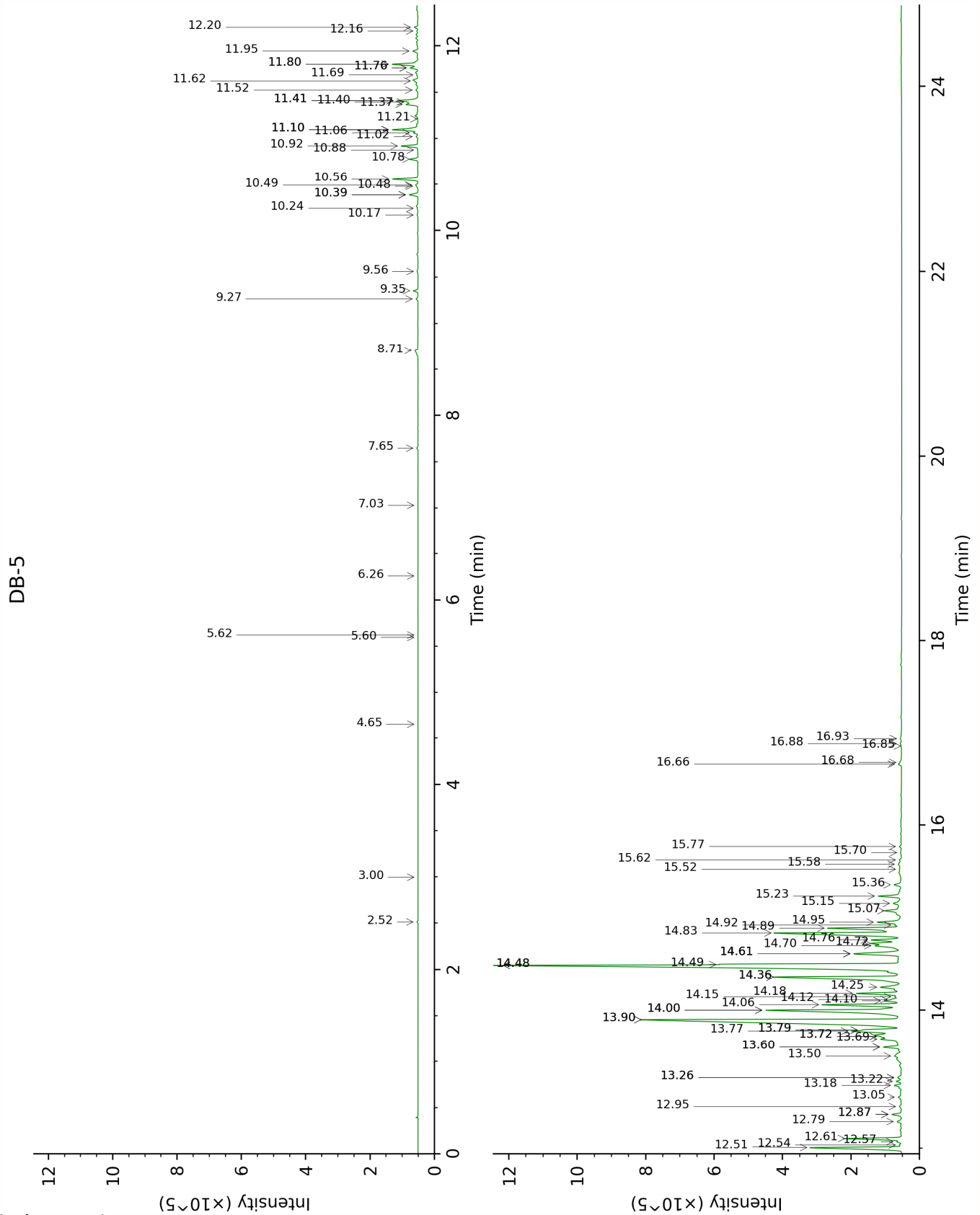
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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





FULL ANALYSIS DATA

Santene	Column DB-WAX			Column DB-5		
	1.23	948.8	0.02	2.52	883.5	0.02
Tricyclene	1.38	971.6	tr	3.00	919.5	0.01
Limonene	3.41	1157.1	0.01	4.65	1026.7	tr
Terpinolene				5.60	1085.7	tr
<i>para</i> -Cymenene	6.62	1388.4	0.01	5.62	1087.3	tr
Limona ketone	8.15	1501.0	0.01	6.26	1127.6	0.01
4-Methylacetophenone	10.72	1704.5	0.01	7.03	1176.6	0.01
Unknown SASP II [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	9.48	1604.3	0.15	7.65	1216.4	0.04
Teresantalic acid	15.97	2182.7	0.11	8.71	1287.0	0.23
Unknown SASP III [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]				9.27	1325.4	0.07
Tricycloekasantalal (1S,5S,6R)-2,6-	10.62	1695.9	0.33	9.35	1331.6	0.15
Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	10.66	1698.9	0.02	9.56	1346.2	0.02
7-epi-Sesquithujene	8.10	1497.7	0.02	10.17	1388.9	0.03
γ -4-Dimethylbenzenebutyral				10.24	1394.0	0.03
α -Cedrene	8.26	1510.1	0.22	10.39*	1404.3	[0.33]
Sesquithujene	8.38	1519.3	0.10	10.39*	1404.3	[0.33]
β -Cedrene	8.62	1537.1	0.04	10.48	1411.1	0.03
<i>cis</i> - α -Bergamotene	8.49*	1527.3	[0.82]	10.49	1412.1	0.08
α -Santalene	8.49*	1527.3	[0.82]	10.56	1416.9	0.81
<i>trans</i> - α -Bergamotene	8.69	1542.6	0.26	10.78	1433.4	0.28
Unknown SASP IV [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]				10.88	1440.6	0.02
epi- β -Santalene	9.25	1585.8	0.51	10.92	1443.9	0.55
Geranylacetone	11.92	1805.9	0.06	11.02	1451.4	0.06
α -Acoradiene	9.62	1615.3	0.23	11.06	1454.5	0.14
β -Santalene	9.44	1600.7	0.74	11.10*	1457.0	[1.01]
(<i>E</i>)- β -Farnesene	9.83	1632.0	0.08	11.10*	1457.0	[1.01]
β -Acoradiene	9.70	1621.4	0.06	11.10*	1457.0	[1.01]
10-epi- β -Acoradiene	9.86	1635.0	0.01	11.21	1465.7	0.01
γ -Curcumene	9.98	1644.0	0.36	11.37	1477.4	0.40
Unknown SASP V [m/z 119, 91 (24), 105 (16), 121 (16), 93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]				11.40	1479.2	0.22
β -Selinene	10.14	1657.4	0.03	11.41*	1480.3	[0.76]

ar-Curcumene	10.94	1723.2	0.60	11.41*	1480.3	[0.76]
Unknown SASP VI [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	12.33	1841.6	0.07	11.52	1488.7	0.08
Unknown SASP VII [m/z 119, 93 (52), 105 (38), 91 (33), 41 (31), 79 (25)... 204 (2)]	12.26	1835.4	0.05	11.62	1496.1	0.08
Unknown CULO XII [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	12.18	1828.2	0.02	11.69	1500.9	0.05
β-Bisabolene	10.42	1679.9	0.24	11.76*	1506.7	[0.28]
α-Alaskene	10.22	1663.5	0.09	11.76*	1506.7	[0.28]
(3E,6E)-α-Farnesene	10.77	1708.4	0.10	11.80*	1509.8	[0.92]
β-Curcumene	10.58	1692.8	0.61	11.80*	1509.8	[0.92]
β-Sesquiphellandrene	10.89	1718.9	0.16	11.95	1521.0	0.19
8,14-Cedranoxide	11.84	1798.8	0.04	12.16	1537.9	0.04
(E)-α-Bisabolene	10.99	1726.8	0.09	12.20	1541.1	0.12
(E)-Nerolidol	14.08	2000.0	3.10	12.51	1564.9	3.23
Unknown SASP VIII [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.30	1838.6	0.28	12.54	1567.1	0.07
Unknown SASP IX [m/z 43, 125 (91), 107 (39), 41 (24), 67 (24), 93 (21)... 220 (4)]	12.34	1842.6	0.19	12.57	1569.9	0.13
Dendrolasin	12.83	1885.7	1.68	12.60	1572.6	1.72
Helifolen-12-al A	13.16	1914.9	0.09	12.79	1586.9	0.16
Guaiol	14.44	2033.9	0.27	12.87*	1593.0	[0.32]
α-Cedrol	14.58	2047.0	0.25	12.87*	1593.0	[0.32]
Helifolen-12-al B	13.52	1948.0	0.05	12.95	1599.7	0.07
Unknown SASP X [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]				13.05	1607.8	0.10
Rosifoliol	14.62*	2051.3	[0.57]	13.18	1618.4	0.22
α-Acorenol	14.75	2063.2	0.12	13.22	1621.9	0.16
γ-Eudesmol	15.24	2111.3	0.08	13.26*	1625.2	[0.14]
β-Acorenol	15.12	2099.4	0.09	13.26*	1625.2	[0.14]
Unknown SASP XI [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]				13.50	1644.6	0.29
α-Bisabolol oxide B, epimer 1	14.78	2065.9	0.21	13.60*	1652.6	[0.61]
α-Bisabolol oxide B, epimer	14.86	2073.8	0.10	13.60*	1652.6	[0.61]

2						
Bulnesol	15.60	2146.2	0.41	13.69	1660.2	0.79
epi-β-Bisabolol	15.11	2097.6	0.12	13.72*	1662.6	[0.49]
Unknown SAAL V [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	14.62*	2051.3	[0.57]	13.72*	1662.6	[0.49]
β-Bisabolol	15.07	2094.2	1.91	13.77	1667.3	1.94
(E)-α-Santalal	15.00	2087.6	0.35	13.78*	1668.2	[0.79]
epi-Cyclosantalal	14.94	2081.2	0.33	13.78*	1668.2	[0.79]
(Z)-α-Santalol	16.98	2286.1	15.59	13.90*	1677.5	[16.87]
Cedr-8-en-13-ol	17.20	2309.7	0.71	13.90*	1677.5	[16.87]
epi-α-Bisabolol	15.76	2162.0	5.19	14.00*	1685.9	[6.75]
α-Bisabolol	15.72	2158.7	0.30	14.00*	1685.9	[6.75]
(Z)-α-trans-Bergamotol	17.07	2296.0	2.53	14.06	1690.9	2.78
(E)-α-Santalol	17.31	2321.4	0.45	14.10	1694.3	0.59
Unknown SASP XII [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]				14.12	1695.5	0.21
Lanceoloxide isomer I	14.50	2039.6	0.20	14.15	1698.0	0.18
(Z)-epi-β-Santalol	17.56	2348.5	1.50	14.18	1701.0	1.55
(E)-α-trans-Bergamotol	18.12	2408.7	1.03	14.25	1706.6	0.98
Unknown SASP XIV [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	15.95	2180.7	0.09	14.36*	1716.1	[5.52]
(Z)-β-Santalol	17.70	2363.6	5.36	14.36*	1716.1	[5.52]
(Z)-Nuciferol	18.57	2458.4	8.25	14.48*†	1727.1	[19.27]
(2E,6E)-Farnesol	17.15*	2305.1	[10.38]	14.48*†	1727.1	[19.27]
(Z)-γ-Curcumen-12-ol	17.85	2379.4	5.00	14.49*†	1727.8	[2.74]
(2E,6E)-Farnesal	16.13	2199.1	0.23	14.61*	1737.9	[2.26]
(E)-β-Santalol	18.06*†	2402.1	[0.53]	14.61*	1737.9	[2.26]
Unknown SAAL X [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	18.69	2471.8	0.73	14.61*	1737.9	[2.26]
Unknown SAUN VII [m/z 119, 93 (73), 110 (64), 111 (62), 95 (50), 81 (45), 109 (943), 105 (43)... 220 (17), 238 (20)]	17.15*	2305.1	[10.38]	14.70	1745.5	1.20
Curcumen-12-ol analog	18.03*†	2399.1	[0.89]	14.72	1747.6	1.06
Unknown SAUN VIII [m/z 119, 93 (70), 111 (61), 110 (60), 109 (45), 95 (43)... 220 (17), 238 (16)]	16.80	2267.8	1.25	14.76	1750.9	1.04
(Z)-β-Curcumen-12-ol	18.28*	2426.2	[6.12]	14.83	1757.3	5.62

(Z)-Lanceol	18.32	2430.9	2.51	14.89	1761.9	2.53
12-Hydroxy-(Z)-sesquicineole				14.92	1764.8	0.17
Unknown SASP XV [m/z 93, 107 (80), 43 (74), 91 (55), 41 (49), 79 (48), 119 (48)... 236 (3)]				14.95	1767.4	1.04
Unknown SASP XVI [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	18.28*	2426.2	[6.12]	15.08	1778.2	0.61
Unknown SASP XVII [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]				15.15	1785.0	0.44
Bisabola-2,7(Z),10(Z)-trien-13-ol?	18.65	2466.9	0.85	15.23	1791.9	0.94
Unknown SASP XIX [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	20.16	2640.0	0.15	15.36	1802.4	0.33
Unknown SASP XX [m/z 119, 145 (62), 105 (52), 91 (52), 121 (38)...]				15.52	1817.7	0.08
Unknown SASP XXI [m/z 43, 81 (61), 41 (49), 93 (47), 119 (39), 141 (35)...]				15.58	1822.5	0.22
Unknown SASP XXII [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]				15.62	1826.8	0.07
Unknown SASP XXIII [m/z 141, 43 (87), 123 (55), 81 (37)... 236 (t)]				15.70	1834.0	0.03
(2E,6E)-Farnesyl acetate	16.26	2212.9	0.08	15.77	1840.0	0.06
Unknown SAAU III [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]				16.66	1921.6	0.11
Unknown SAAU II [m/z 93, 109 (98), 43 (97), 68 (83), 95 (74), 110 (72), 81 (71)...220 (8)]	21.85	2846.5	0.21	16.68	1923.4	0.07
Unknown SAAU VI [m/z 43, 107 (24), 93 (23), 125 (23), 95 (23), 119 (23)...220 (1)]				16.85	1940.2	0.02
Unknown SAAU VII [m/z 43, 107 (23), 119 (23), 93 (22),				16.88	1942.7	0.06

125 (22), 132 (22)...220 (1)]					
Unknown SAAU VIII [m/z 93, 94 (86), 91 (48), 121 (42), 79 (42), 107 (37)...218 (2)]				16.93	1947.8 0.07
Unknown SASP XXX [m/z 93, 119 (74), 91 (36), 79 (28), 132 (29), 55 (27)...]	17.38	2329.6	0.23		
Total reported		86.86%			93.80%

*: 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