CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22I27-PTH02
Customer identification : Sandalwood Indian - Australia - SA2105R
Type : Essential oil
Source : *Santalum album*
Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014 ✳ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Alexis St-Gelais, Ph. D., Chimiste 2013-174
Analysis date : October 03, 2022

Checked and approved by :

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

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✳ISO 17025:2017
MÉTHODE CERTIFIÉE
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow 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.

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ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Santene	tr	Normonoterpene
4-Methylacetophenone	0.06	Simple phenolic
Dihydroalbene	0.01	Terpene derivative
Unknown	0.04	Terpene derivative
Teresantalic acid	0.05	Monoterpenic acid
Unknown	0.01	Terpenic aldehyde
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	0.03	Sesquiterpene
γ-4-Dimethylbenzenebutyral	0.03	Simple phenolic
α-Cedrene	0.03	Sesquiterpene
Sesquithujene	0.01	Sesquiterpene
β-Cedrene	0.02	Sesquiterpene
α-Santalene	0.89	Sesquiterpene
trans-α-Bergamotene	0.20	Sesquiterpene
Unknown	0.03	Sesquiterpene
epi-β-Santalene	0.94	Sesquiterpene
α-Acoradiene	0.04	Sesquiterpene
β-Santalene	1.37	Sesquiterpene
(*E*)-β-Farnesene	0.05	Sesquiterpene
Unknown	0.04	Unknown
10-epi-β-Acoradiene	0.02	Sesquiterpene
Unknown	0.02	Sesquiterpene
γ-Curcumene	0.09	Sesquiterpene
β-Selinene	0.05	Sesquiterpene
ar-Curcumene	0.25	Sesquiterpene
Unknown	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
α-Alaskene	0.03	Sesquiterpene
β-Bisabolene	0.10	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.02	Sesquiterpene
β-Curcumene	0.10	Sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Sesquicineole	0.01	Sesquiterpenic ether
β-Sesquiphellandrene	0.04	Sesquiterpene
8,14-Cedranoxide	0.01	Sesquiterpenic ether
Unknown	0.09	Sesquiterpene
(*E*)-α-Bisabolene	0.03	Sesquiterpene
Unknown	0.04	Sesquiterpene
(*E*)-Nerolidol	0.09	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Dendrolasin	0.12	Sesquiterpenic ether

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α-Cedrol	0.08	Sesquiterpenic alcohol
Guaiol	0.05	Sesquiterpenic alcohol
Unknown	0.12	Oxygenated sesquiterpene
Rosifoliol	0.03	Sesquiterpenic alcohol
α-Acorenol	0.04	Sesquiterpenic alcohol
β-Acorenol	0.17	Sesquiterpenic alcohol
10-epi-β-Acorenol?	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.08	Sesquiterpenic alcohol
Unknown	0.63	Oxygenated sesquiterpene
α-Bisabolol oxide B, epimer 1	0.30	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 2	0.16	Sesquiterpenic alcohol
Unknown	0.54	Oxygenated sesquiterpene
Unknown	0.85	Oxygenated sesquiterpene
Bulnesol	0.21	Sesquiterpenic alcohol
β-Bisabolol	0.63	Sesquiterpenic alcohol
epi-Cyclosantalal	0.34	Sesquiterpenic aldehyde
(*E*)-α-Santalal	2.28	Sesquiterpenic aldehyde
(*Z*)-α-Santalol	44.62	Sesquiterpenic alcohol
(*Z*)-α-*trans*-Bergamotol	4.90	Sesquiterpenic alcohol
(*E*)-α-Santalol	0.49	Sesquiterpenic alcohol
Unknown	0.20	Oxygenated sesquiterpene
(*Z*)-epi-β-Santalol	4.17	Sesquiterpenic alcohol
(*E*)-α-*trans*-Bergamotol	0.12	Sesquiterpenic alcohol
(*Z*)-α-Santalyl formate?	0.48	Sesquiterpenic ester
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.32	Oxygenated sesquiterpene
(*Z*)-β-Santalol	18.28	Sesquiterpenic alcohol
(*Z*)-γ-Curcumen-12-ol	0.77	Sesquiterpenic alcohol
(*Z*)-Nuciferol	1.43	Sesquiterpenic alcohol
(*E*)-β-Santalol	1.37	Sesquiterpenic alcohol
Unknown	0.33	Oxygenated sesquiterpene
(2*E*,6*E*)-Farnesal	0.42	Sesquiterpenic aldehyde
Unknown	0.28	Oxygenated sesquiterpene
Curcumen-12-ol analog	0.61	Sesquiterpenic alcohol
(*Z*)-β-Curcumen-12-ol	0.86	Sesquiterpenic alcohol
(*Z*)-Lanceol	2.85	Sesquiterpenic alcohol
(*Z*)-α-Santalyl acetate	0.19	Sesquiterpenic ester
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Bisabola-2,7(*Z*),10(*Z*)-trien-13-ol?	0.39	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Consolidated total	**95.46%**	

tr: The compound has been detected below 0.005% of total signal.
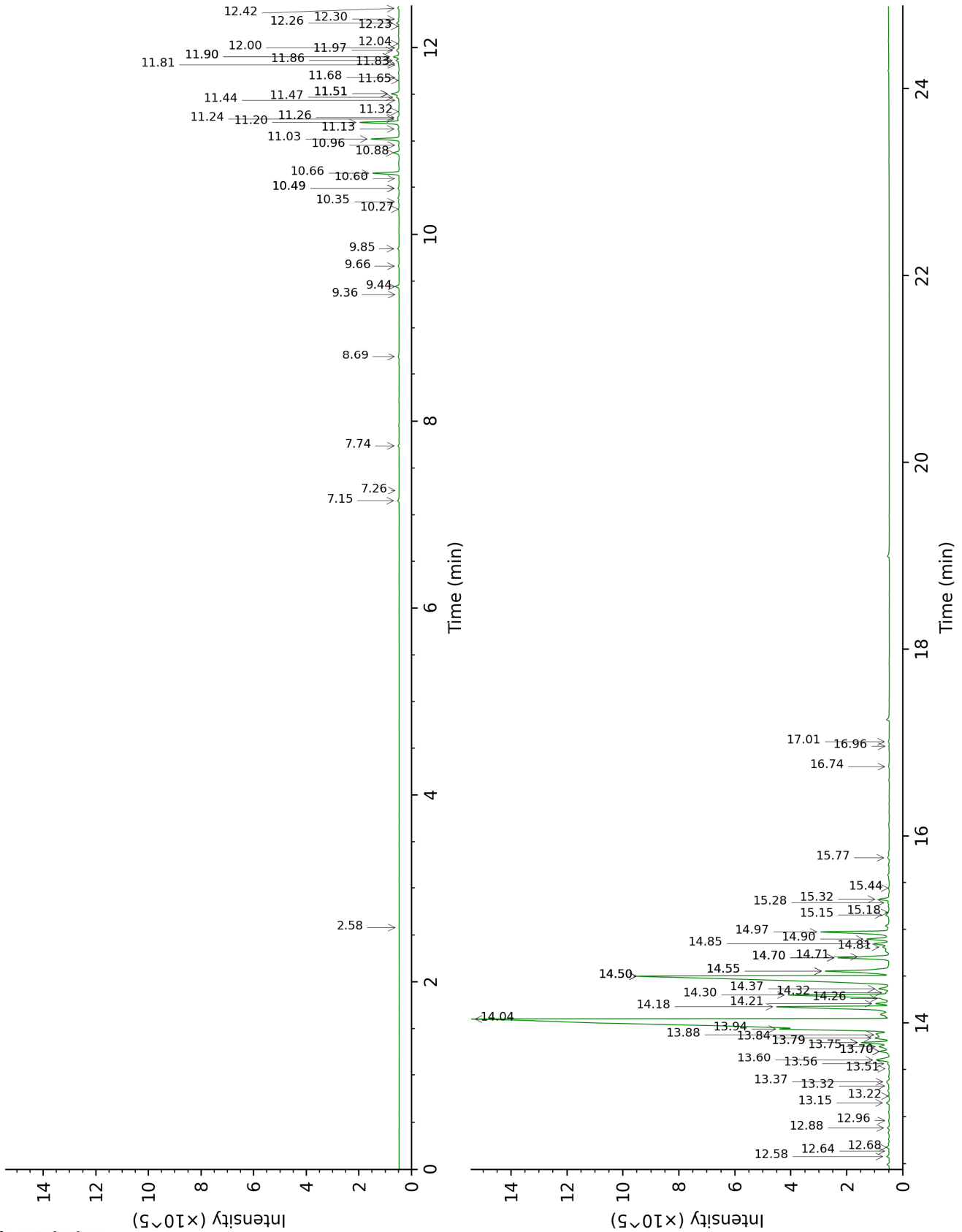
Note: no correction factor was applied

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

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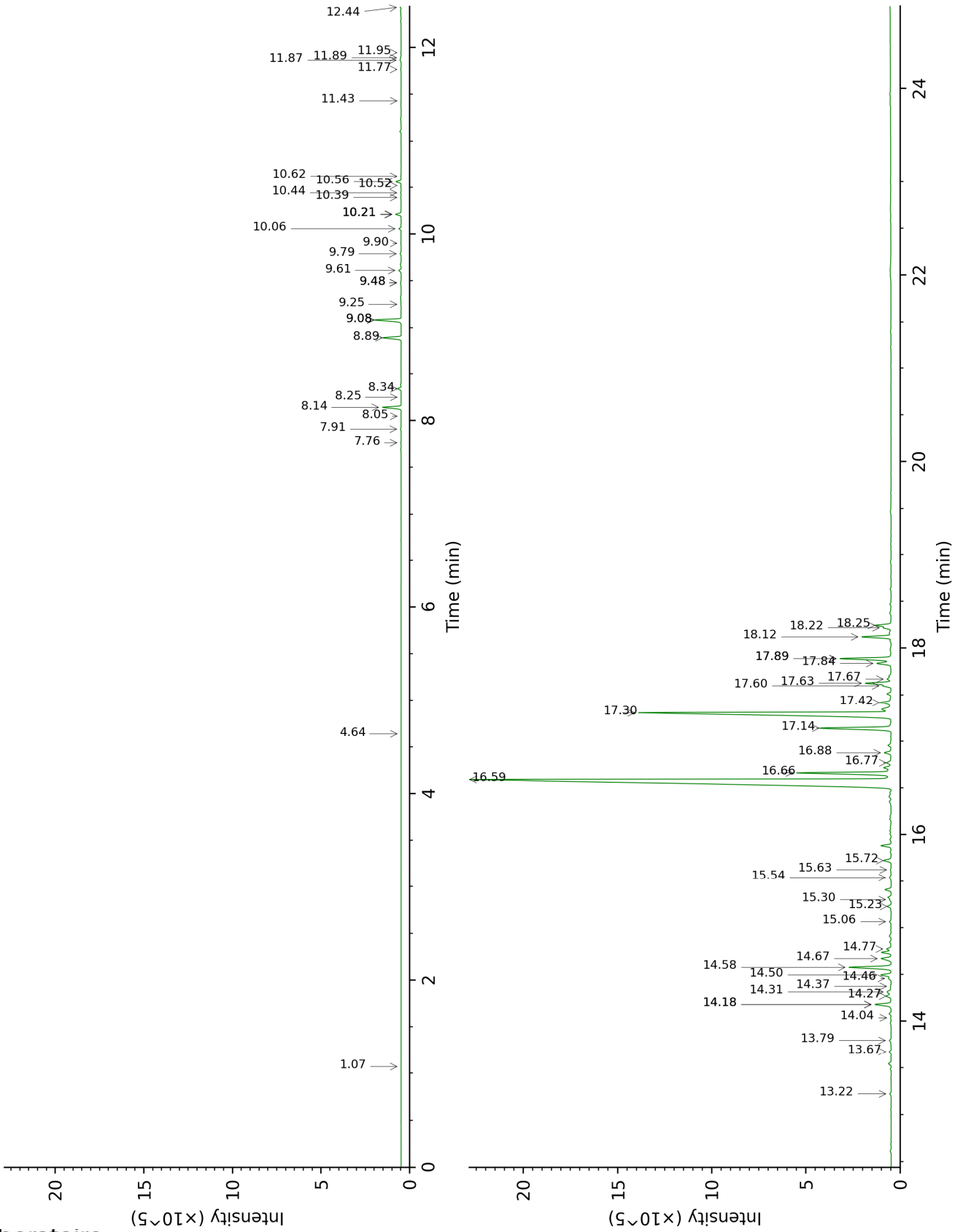
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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DB-5

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DB-WAX

Time (min)

Time (min)

Intensity (×10^5)

Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Santene	2.58	883	tr	1.07	948	tr
4-Methylacetophenone	7.15	1180	0.06	10.39	1709	0.02
Dihydroalbene	7.26	1187	0.01	4.64	1270	tr
Unknown [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	7.74	1218	0.04	9.08*	1602	1.38
Teresantalic acid	8.69	1282	0.05	15.63	2191	0.04
Unknown [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]	9.36	1325	0.01			
Tricycloekasantalal	9.44	1331	0.13	10.21*	1694	0.28
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	9.66	1347	0.03	10.21*	1694	[0.28]
Unknown [m/z 93, 160 (81), 91 (58), 94 (53), 134 (53)...]	9.85	1360	0.05			
7-epi-Sesquithujene	10.27	1390	0.03	7.76	1500	0.02
γ-4-Dimethylbenzenebutyral	10.35	1395	0.03			
α-Cedrene	10.49*	1405	0.05	7.91	1511	0.03
Sesquithujene	10.49*	1405	[0.05]	8.05	1522	0.01
β-Cedrene	10.60	1413	0.02	8.25	1538	0.01
α-Santalene	10.66	1418	0.89	8.14	1529	0.90
trans-α-Bergamotene	10.88	1434	0.20	8.34	1544	0.16
Unknown [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]	10.96	1440	0.03			
epi-β-Santalene	11.02	1445	0.94	8.89	1587	0.93
α-Acoradiene	11.13	1453	0.04	9.25	1616	0.02
β-Santalene	11.20	1458	1.37	9.08*	1602	[1.38]
(*E*)-β-Farnesene	11.24	1461	0.05	9.48*	1635	0.05
Unknown [m/z 135, 119 (34), 107 (25), 91 (20), 93 (19)...]	11.26	1462	0.04			
10-epi-β-Acoradiene	11.32	1467	0.02	9.48*	1635	[0.05]
Unknown [m/z 119, 91 (24), 105 (16), 121 (16), 93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]	11.44	1476	0.02			
γ-Curcumene	11.47	1478	0.09	9.61	1646	0.13
β-Selinene	11.51*	1481	0.31	9.79	1660	0.05
ar-Curcumene	11.51*	1481	[0.31]	10.56	1724	0.25
Unknown [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	11.65	1492	0.01	11.95	1844	0.02
Unknown [m/z 119, 93 (52), 105 (38), 91 (33), 41 (31), 79 (25)... 204 (2)]	11.68	1494	0.01	11.89	1839	0.03

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Unknown [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	11.82	1504	0.01	11.77	1828	0.03
α-Alaskene	11.83	1506	0.03	9.90	1669	0.02
β-Bisabolene	11.86	1508	0.10	10.06	1682	0.11
(3*E*,6*E*)-α-Farnesene	11.90*	1511	0.19	10.44	1714	0.02
β-Curcumene	11.90*	1511	[0.19]	10.21*	1694	[0.28]
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.97	1516	0.12	13.22	1960	0.08
Sesquicineole	12.00	1518	0.01	10.21*	1694	[0.28]
β-Sesquiphellandrene	12.04	1522	0.04	10.52	1720	0.02
8,14-Cedranoxide	12.23	1536	0.01	11.43	1798	0.01
Unknown [m/z 121, 93 (91), 79 (57), 91 (25), 43 (23), 77 (18)...202 (8)]	12.26	1539	0.09	13.80	2012	0.10
(*E*)-α-Bisabolene	12.30	1542	0.03	10.62	1729	0.03
Unknown [m/z 121, 93 (79), 79 (51), 91 (21), 77 (16), 43 (15)...202 (5)]	12.42	1551	0.04			
(*E*)-Nerolidol	12.58	1564	0.09	13.67	2001	0.10
Unknown [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.64	1568	0.03	11.87	1836	0.06
Dendrolasin	12.68	1572	0.12	12.44	1887	0.05
α-Cedrol	12.88	1588	0.08	14.18*	2049	0.95
Guaiol	12.96	1594	0.05	14.04	2036	0.04
Unknown [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]	13.15	1609	0.12			
Rosifoliol	13.22	1615	0.03	14.27	2058	0.32
α-Acorenol	13.32	1623	0.04	14.37	2067	0.04
β-Acorenol	13.37	1627	0.17	14.77	2106	0.25
10-epi-β-Acorenol?	13.51	1638	0.03			
β-Eudesmol	13.56	1643	0.08	15.30	2158	0.08
Unknown [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]	13.60	1646	0.63			
α-Bisabolol oxide B, epimer 1	13.70*	1654	0.38	14.31	2062	0.30
α-Bisabolol oxide B, epimer 2	13.70*	1654	[0.38]	14.46	2076	0.16
Unknown [m/z 93, 121 (97), 91 (30), 92 (27), 79 (26), 94 (21), 105 (19), 122 (18)... 222 (9)]	13.75	1658	0.54			
Unknown [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	13.79*	1662	1.05	14.18*	2049	[0.95]
Bulnesol	13.79*	1662	[1.05]	15.23	2151	0.21
β-Bisabolol	13.84	1666	0.63	14.67	2096	0.64
epi-Cyclosantalal	13.88	1669	0.34	14.50	2079	0.57
(*E*)-α-Santalal	13.94†	1674	47.25	14.58	2087	2.28

Compound						
(Z)-α-Santalol	14.04†	1683	[47.25]	16.59	2290	44.62
(Z)-α-*trans*-Bergamotol	14.18	1693	4.90	16.66	2298	4.93
(E)-α-Santalol	14.21	1696	0.49	16.88	2321	0.40
Unknown [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]	14.26	1701	0.20			
(Z)-epi-β-Santalol	14.30	1704	4.17	17.14	2349	3.95
(E)-α-*trans*-Bergamotol	14.32	1706	0.12	17.67	2407	0.24
(Z)-α-Santalyl formate?	14.37	1710	0.48			
Unknown [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	14.50*	1721	18.77	15.54	2182	0.13
Unknown [m/z 119, 91 (31), 105 (29), 41 (25), 133 (23), 158 (21)...]	14.50*	1721	[18.77]	16.77	2310	0.32
(Z)-β-Santalol	14.50*	1721	[18.77]	17.30	2367	18.28
(Z)-γ-Curcumen-12-ol	14.56*	1726	2.78	17.42	2379	0.77
(Z)-Nuciferol	14.56*	1726	[2.78]	18.12	2458	1.43
(E)-β-Santalol	14.70*	1738	1.73	17.63	2402	1.37
Unknown [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	14.70*	1738	[1.73]	18.22	2469	0.33
(2E,6E)-Farnesal	14.71	1739	0.42	15.72	2201	0.44
Unknown [m/z 93, 121 (57), 91 (46), 138 (39), 119 (38), 109 (37)...]	14.81	1748	0.28			
Curcumen-12-ol analog	14.85	1751	0.61	17.60	2399	0.34
(Z)-β-Curcumen-12-ol	14.90	1755	0.86	17.84	2426	0.85
(Z)-Lanceol	14.97	1762	2.85	17.89*	2432	2.68
(Z)-α-Santalyl acetate	15.15	1777	0.19	15.06	2135	0.09
Unknown [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	15.18	1780	0.04	17.89*	2432	[2.68]
Unknown [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]	15.28	1789	0.07			
Bisabola-2,7(Z),10(Z)-trien-13-ol?	15.32	1792	0.39	18.24	2471	0.90
Unknown [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	15.44	1802	0.06			
Unknown [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]	15.77	1832	0.09			
Unknown [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]	16.74	1921	0.04			
Unknown [m/z 43, 107 (24), 93 (23), 125 (23), 95 (23), 119 (23)...220 (1)]	16.96	1941	0.02			

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Unknown [m/z 93, 94 (86), 91 (48), 121 (42), 79 (42), 107 (37)...218 (2)]	17.01	1946	0.04	
Total identified	**93.82%**			**91.77%**
Total reported	**96.44%**			**92.86%**

*: 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

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