

Date : November 05, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21J22-PTH05

Customer identification : Sandalwood Australian - Australia - S201082129R

Type : Essential oil

Source : *Santalum spicatum*

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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : November 04, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., Chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow viscous liquid

Refractive index: 1.5054 ± 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
Furfural	0.03	Furan
Santene	0.08	Normonoterpene
Unknown	0.01	Normonoterpene
Tricyclene	tr	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Limonene	tr	Monoterpene
meta-Cresol	tr	Simple phenolic
para-Cresol	0.01	Simple phenolic
Limona ketone	0.01	Normonoterpenic ketone
4-Methylacetophenone	0.01	Simple phenolic
Dihydroalbene	0.01	Terpene derivative
Unknown	0.03	Terpene derivative
Teresantallic acid	0.23	Monoterpenic acid
Unknown	0.06	Terpenic aldehyde
Tricycloekasantalal	0.10	Terpenic aldehyde
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	0.04	Terpenic aldehyde
7-epi-Sesquithujene	0.01	Sesquiterpene
γ-4-Dimethylbenzenebutyral	0.05	Simple phenolic
α-Cedrene	0.14	Sesquiterpene
Sesquithujene	0.05	Sesquiterpene
β-Cedrene	0.03	Sesquiterpene
α-Santalene	0.41	Sesquiterpene
cis-α-Bergamotene	0.01	Sesquiterpene
trans-α-Bergamotene	0.15	Sesquiterpene
Unknown	0.01	Sesquiterpene
epi-β-Santalene	0.26	Sesquiterpene
Geranylacetone	0.04	Monoterpenic ketone
α-Acoradiene	0.12	Sesquiterpene
β-Santalene	0.39	Sesquiterpene
(E)-β-Farnesene	0.03	Sesquiterpene
β-Acoradiene	0.02	Sesquiterpene
10-epi-β-Acoradiene	0.06	Sesquiterpene
γ-Curcumene	0.19	Sesquiterpene
β-Selinene	0.02	Sesquiterpene
Unknown	0.31	Sesquiterpene
ar-Curcumene	0.31	Sesquiterpene
α-Selinene	0.04	Sesquiterpene
Unknown	0.05	Sesquiterpene
Unknown	0.16	Sesquiterpene
Unknown	0.07	Sesquiterpene
α-Alaskene	0.01	Sesquiterpene
β-Bisabolene	0.14	Sesquiterpene
(3E,6E)-α-Farnesene	0.10	Sesquiterpene
β-Curcumene	0.28	Sesquiterpene

β-Sesquiphellandrene	0.01	Sesquiterpene
Sesquicineole	0.11	Sesquiterpenic ether
8,14-Cedranoxide	0.04	Sesquiterpenic ether
(E)-α-Bisabolene	0.07	Sesquiterpene
(E)-Nerolidol	2.40	Sesquiterpenic alcohol
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Dendrolasin	1.21	Sesquiterpenic ether
Helifolen-12-al A	0.13	Sesquiterpenic aldehyde
α-Cedrol	0.31	Sesquiterpenic alcohol
Helifolen-12-al B	0.07	Sesquiterpenic aldehyde
Unknown	0.10	Oxygenated sesquiterpene
Rosifoliol	0.19	Sesquiterpenic alcohol
α-Acorenol	0.18	Sesquiterpenic alcohol
γ-Eudesmol	0.14	Sesquiterpenic alcohol
10-epi-β-Acorenol?	0.11	Sesquiterpenic alcohol
β-Eudesmol	0.14	Sesquiterpenic alcohol
Unknown	0.31	Oxygenated sesquiterpene
α-Bisabolol oxide B, epimer 1	0.19	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 2	0.65	Sesquiterpenic alcohol
Unknown	0.59	Oxygenated sesquiterpene
Bulnesol	0.41	Sesquiterpenic alcohol
epi-β-Bisabolol	0.47	Sesquiterpenic alcohol
β-Bisabolol	2.58	Sesquiterpenic alcohol
(Z)-α-Santalol	14.93	Sesquiterpenic alcohol
(E)-α-Santalal	0.67	Sesquiterpenic aldehyde
Cedr-8-en-13-ol	0.05	Sesquiterpenic alcohol
α-Bisabolol	0.22	Sesquiterpenic alcohol
epi-α-Bisabolol	6.42	Sesquiterpenic alcohol
(Z)-α-trans-Bergamotol	3.16	Sesquiterpenic alcohol
Unknown	0.37	Oxygenated sesquiterpene
(E)-α-Santalol	0.36	Sesquiterpenic alcohol
(Z)-epi-β-Santalol	1.24	Sesquiterpenic alcohol
Lanceoloxide	0.28	Sesquiterpenic ether
(E)-α-trans-Bergamotol	0.91	Sesquiterpenic alcohol
(Z)-β-Santalol	5.32	Sesquiterpenic alcohol
Unknown	0.15	Oxygenated sesquiterpene
(Z)-Nuciferol	9.71	Sesquiterpenic alcohol
(Z)-γ-Curcumen-12-ol	5.09	Sesquiterpenic alcohol
(2E,6E)-Farnesol	14.69	Sesquiterpenic alcohol
(E)-β-Santalol	1.30	Sesquiterpenic alcohol
Unknown	0.79	Oxygenated sesquiterpene
(2E,6E)-Farnesal	0.27	Sesquiterpenic aldehyde
Unknown	2.06	Oxygenated sesquiterpene
Curcumen-12-ol analog	0.23	Sesquiterpenic alcohol
Unknown	0.90	Oxygenated sesquiterpene
(Z)-β-Curcumen-12-ol	5.56	Sesquiterpenic alcohol
(Z)-Lanceol	3.07	Sesquiterpenic alcohol
12-Hydroxy-(Z)-sesquicineole	0.04	Sesquiterpenic alcohol
Unknown	0.94	Oxygenated sesquiterpene
Unknown	0.67	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene

Bisabola-2,7(Z),10(Z)-trien-13-ol?	0.77	Oxygenated sesquiterpene
Unknown	0.50	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.14	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
(2E,6E)-Farnesyl acetate	0.10	Sesquiterpenic ester
Unknown	0.19	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Consolidated total	96.21%	

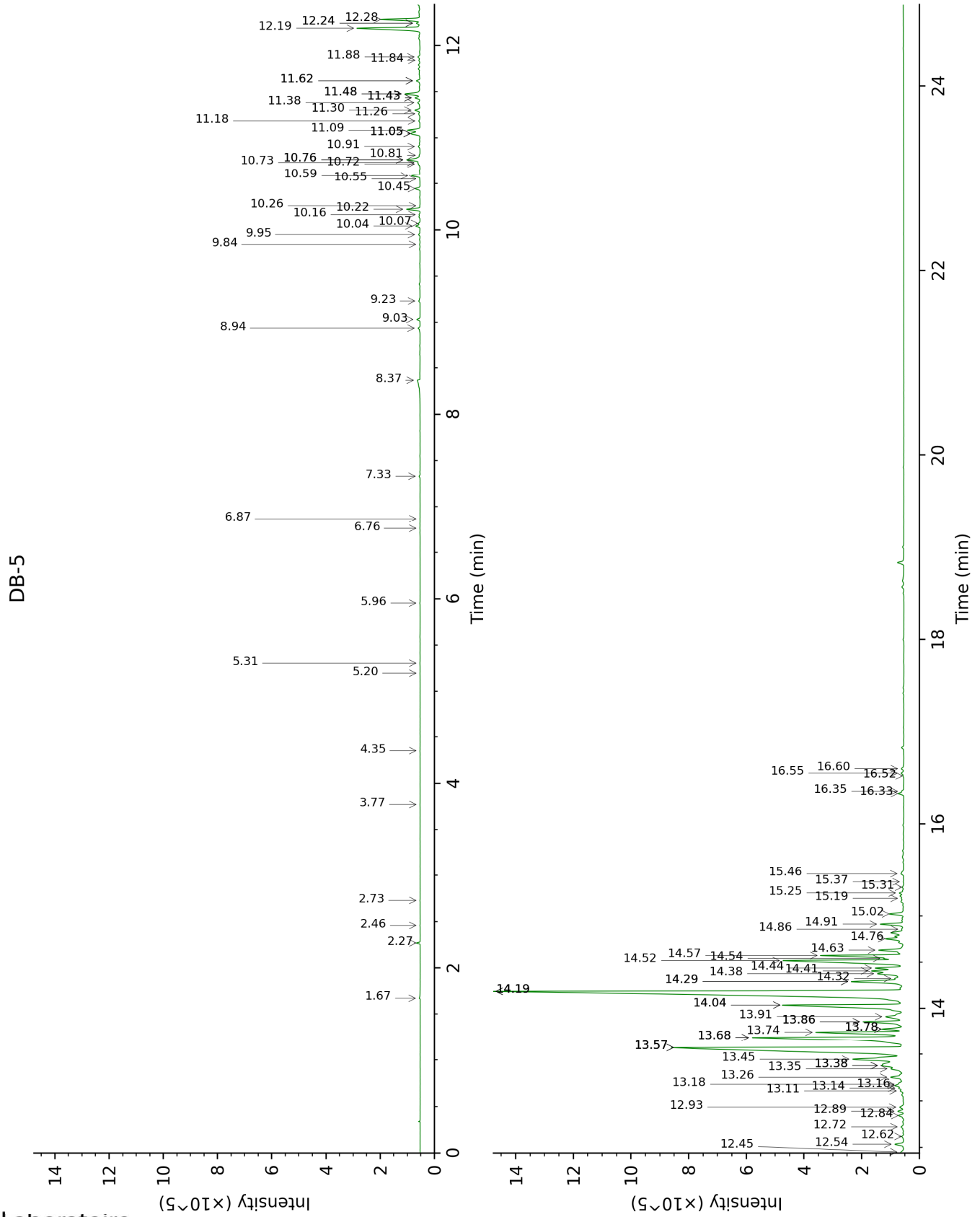
tr: The compound has been detected below 0.005% of total signal.

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.



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Furfural	1.67	830	0.03	6.81	1415	0.06
Santene	2.27	882	0.08	1.14	947	0.08
Unknown [m/z 79, 93 (66), 94 (52), 91 (39), 77 (37), 122 (31)]	2.46	898	0.01	1.46	996	tr
Tricyclene	2.73	918	tr	1.28	971	tr
6-Methyl-5-hepten-2-one	3.77	988	0.01	5.18	1300	tr
Limonene	4.35	1026	tr	3.27	1159	tr
meta-Cresol	5.20	1079	tr	14.28	2035	0.25
para-Cresol	5.31	1086	0.01	14.15	2022	0.02
Limona ketone	5.96	1128	0.01	7.93	1498	0.02
4-Methylacetophenone	6.76	1179	0.01	10.57	1706	0.01
Dihydroalbene	6.87	1186	0.01			
Unknown [m/z 93, 91 (89), 94 (85), 105 (60)... 176? (10)]	7.33	1216	0.03	9.30	1604	0.09
Teresantalic acid	8.37	1286	0.23	15.77*	2180	0.38
Unknown [m/z 121, 93 (77), 79 (43), 91 (43), 145 (35)... 178 (8)]	8.94	1325	0.06			
Tricycloekasantalal	9.03	1332	0.10	10.45*	1696	0.21
(1S,5S,6R)-2,6-Dimethylbicyclo[3.1.1]hept-2-ene-6-propanal?	9.23	1346	0.04	10.43*	1693	0.32
7-epi-Sesquithujene	9.84	1389	0.01	7.88	1494	0.02
γ-4-Dimethylbenzenebutyral	9.95	1396	0.05			
α-Cedrene	10.04	1403	0.14	8.10	1511	0.13
Sesquithujene	10.07	1405	0.05	8.22	1520	0.06
β-Cedrene	10.16	1412	0.03	8.45	1537	0.02
α-Santalene	10.22	1416	0.41	8.32*	1528	0.43
cis-α-Bergamotene	10.26	1419	0.01	8.32*	1528	[0.43]
trans-α-Bergamotene	10.45	1433	0.15	8.53	1544	0.14
Unknown [m/z 93, 91 (80), 79 (68), 123 (68), 121 (56)... 204 (3)]	10.55	1441	0.01			
epi-β-Santalene	10.59	1443	0.26	9.09	1586	0.25
Geranylacetone	10.72	1453	0.04	11.76	1806	0.05
α-Acoradiene	10.73†	1454	0.61	9.45	1616	0.12
β-Santalene	10.76*†	1456	[0.61]	9.28	1601	0.39
(E)-β-Farnesene	10.76*†	1456	[0.61]	9.69	1634	0.03
β-Acoradiene	10.81	1460	0.02	9.53	1622	0.05
10-epi-β-Acoradiene	10.91	1467	0.06	9.66	1632	0.11
γ-Curcumene	11.05*†	1478	0.83	9.82	1645	0.19
β-Selinene	11.05*†	1478	[0.83]	10.05*	1663	0.07
Unknown [m/z 119, 91 (24), 105 (16), 121 (16), 93 (15), 117 (15), 41 (14), 132 (14)... 204 (4)]	11.05*†	1478	[0.83]			

ar-Curcumene	11.08†	1480	[0.83]	10.78*	1724	0.31
α-Selinene	11.18	1488	0.04	10.05*	1663	[0.07]
Unknown [m/z 119, 105 (51), 91 (31), 132 (30), 121 (26), 145 (23), 134 (20)... 204 (2)]	11.26	1494	0.05	12.14	1840	0.05
Unknown [m/z 119, 93 (52), 105 (38), 91 (33), 41 (31), 79 (25)... 204 (2)]	11.30	1496	0.16	12.12*	1837	0.27
Unknown [m/z 119, 91 (14), 120 (10), 117 (9)... 200? (2)]	11.38	1502	0.07	12.02	1829	0.03
α-Alaskene	11.43*	1506	0.15	10.05*	1663	[0.07]
β-Bisabolene	11.43*	1506	[0.15]	10.27	1680	0.14
(3E,6E)-α-Farnesene	11.48*	1510	0.57	10.74	1719	0.10
β-Curcumene	11.48*	1510	[0.57]	10.43*	1693	[0.32]
β-Sesquiphellandrene	11.62*	1521	0.12	10.78*	1724	[0.31]
Sesquicineole	11.62*	1521	[0.12]	10.45*	1696	[0.21]
8,14-Cedranoxide	11.84	1538	0.04	11.68	1799	0.05
(E)-α-Bisabolene	11.88	1541	0.07	10.83	1728	0.05
(E)-Nerolidol	12.19	1566	2.40	13.93	2001	2.25
Unknown [m/z 43, 125 (78), 107 (43), 132 (34), 67 (31)... 220 (3)]	12.24*	1570	0.11	12.12*	1837	[0.27]
Unknown [m/z 43, 125 (91), 107 (39), 41 (24), 67 (24), 93 (21)... 220 (4)]	12.24*	1570	[0.11]	12.23	1847	0.01
Dendrolasin	12.28	1573	1.21	12.68	1886	1.17
Helifolen-12-al A	12.45	1586	0.13	12.99	1915	0.09
α-Cedrol	12.54	1593	0.31	14.41	2047	0.22
Helifolen-12-al B	12.62	1600	0.07	13.46	1958	0.07
Unknown [m/z 81, 41 (40), 69 (36), 138 (27), 43 (26), 110 (25)... 222 (1)]	12.72	1608	0.10			
Rosifoliol	12.84	1618	0.19	14.53	2059	0.14
α-Acorenol	12.89	1622	0.18	14.61†	2066	[0.40]
γ-Eudesmol	12.93	1625	0.14	15.08	2112	0.09
10-epi-β-Acorenol?	13.11	1640	0.11			
β-Eudesmol	13.14	1642	0.14	15.47	2151	0.28
Unknown [m/z 91, 43 (89), 93 (84), 81 (81), 105 (79), 79 (70), 67 (68), 41 (68)...]	13.16	1644	0.31			
α-Bisabolol oxide B, epimer 1	13.18	1646	0.19	14.58†	2064	0.40
α-Bisabolol oxide B, epimer 2	13.26	1652	0.65	14.76	2081	0.39
Unknown [m/z 121, 93 (96), 95 (96), 41 (65), 82 (63), 69 (62), 67 (59)... 222 (8)]	13.35	1659	0.59	14.44	2050	0.46
Bulnesol	13.38*	1662	1.62	15.44	2148	0.41
epi-β-Bisabolol	13.38*	1662	[1.62]	15.01	2105	0.47
β-Bisabolol	13.45	1668	2.58	14.92	2096	2.02
(Z)-α-Santalol	13.57*	1678	15.52	16.82	2289	14.93

(E)- α -Santalal	13.57*	1678	[15.52]	14.85	2089	0.67
Cedr-8-en-13-ol	13.57*	1678	[15.52]	17.09	2319	0.05
α -Bisabolol	13.68*	1687	7.38	15.51	2155	0.22
epi- α -Bisabolol	13.68*	1687	[7.38]	15.60	2164	6.42
(Z)- α -trans-Bergamotol	13.74	1692	3.16	16.92	2300	3.16
Unknown [m/z 43, 93 (68), 41 (61), 69 (58), 125 (54), 107 (50)...]	13.78*	1695	0.73			
(E)- α -Santalol	13.78*	1695	[0.73]	17.15	2326	0.36
(Z)-epi- β -Santalol	13.86*	1702	1.52	17.41	2353	1.24
Lanceoloxide	13.86*	1702	[1.52]			
(E)- α -trans-Bergamotol	13.91	1706	0.91	17.95	2412	0.99
(Z)- β -Santalol	14.04*	1717	5.88	17.55	2368	5.32
Unknown [m/z 43, 189 (94), 81 (65), 93 (62), 95 (53), 119 (49)... 207 (43)...]	14.04*	1717	[5.88]	15.77*	2180	[0.38]
(Z)-Nuciferol	14.19*	1730	26.80	18.42	2464	9.71
(Z)- γ -Curcumen-12-ol	14.19*	1730	[26.80]	17.70	2384	5.09
(2E,6E)-Farnesol	14.19*	1730	[26.80]	17.01	2310	14.69
(E)- β -Santalol	14.29*	1739	2.20	17.88	2404	1.30
Unknown [m/z 91, 93 (65), 79 (57), 105 (49), 119 (47), 121 (44)...218 (1)]	14.29*	1739	[2.20]	18.50	2473	0.79
(2E,6E)-Farnesal	14.32	1742	0.27	15.97	2202	0.30
Unknown [m/z 119, 93 (73), 110 (64), 111 (62), 95 (50), 81 (45), 109 943), 105 (43)... 220 (17), 238 (20)]	14.38†	1747	2.28			
Curcumen-12-ol analog	14.41†	1749	[2.28]	17.79	2395	0.23
Unknown [m/z 119, 93 (70), 111 (61), 110 (60), 109 (45), 95 (43)... 220 (17), 238 (16)]	14.44	1752	0.90			
(Z)- β -Curcumen-12-ol	14.52	1759	5.56	18.13*†	2432	9.30
(Z)-Lanceol	14.54†	1761	3.11	18.17†	2437	[9.30]
12-Hydroxy-(Z)-sesquicineole	14.57†	1764	[3.11]			
Unknown [m/z 93, 107 (80), 43 (74), 91 (55), 41 (49), 79 (48), 119 (48)... 236 (3)]	14.63	1769	0.94			
Unknown [m/z 93, 119 (89), 91 (63), 79 (63), 132 (53), 41 (52)... 236 (3)]	14.76	1779	0.67	18.13*†	2432	[9.30]
Unknown [m/z 107, 93 (96), 79 (90), 55 (78), 41 (76)... 236 (6)]	14.86	1788	0.07			
Bisabola-2,7(Z),10(Z)-trien-13-ol?	14.91	1793	0.77	18.54	2477	0.72
Unknown [m/z 119, 105 (78), 145 (60), 91 (50), 121 (44), 93 (38)... 216 (7)]	15.02	1802	0.50			

Unknown [m/z 119, 145 (62), 105 (52), 91 (52), 121 (38)...]	15.19	1818	0.07			
Unknown [m/z 43, 81 (61), 41 (49), 93 (47), 119 (39), 141 (35)...]	15.25	1823	0.14			
Unknown [m/z 119, 43 (61), 132 (49), 105 (35), 141 (32)...]	15.31	1829	0.06			
Unknown [m/z 141, 43 (87), 123 (55), 81 (37)... 236 (t)]	15.37	1834	0.01			
(2E,6E)-Farnesyl acetate	15.46	1842	0.10	16.09	2214	0.17
Unknown [m/z 93, 43 (99), 109 (95), 68 (80), 95 (77), 81 (69), 110 (68)...220 (7)]	16.33	1922	0.19			
Unknown [m/z 93, 109 (98), 43 (97), 68 (83), 95 (74), 110 (72), 81 (71)...220 (8)]	16.35	1924	0.06			
Unknown [m/z 43, 107 (24), 93 (23), 125 (23), 95 (23), 119 (23)...220 (1)]	16.52	1940	0.02			
Unknown [m/z 43, 107 (23), 119 (23), 93 (22), 125 (22), 132 (22)...220 (1)]	16.55	1943	0.10			
Unknown [m/z 93, 94 (86), 91 (48), 121 (42), 79 (42), 107 (37)...218 (2)]	16.60	1948	0.09			
Total identified		88.17%		87.23%		
Total reported		95.66%		88.67%		

*: 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