

Date : October 28, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22J21-PTH01

Customer identification : Copaiba Balsam (Resin) - Brazil - CJ0114R

Type : Resin

Source : *Copaifera officinalis*

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

Analysis date : October 26, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4946 ± 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
(2E,4E)-3,7-Dimethylocta-2,4-diene?	0.03	Monoterpene
(Z)- β -Ocimene	0.11	Monoterpene
(E)- β -Ocimene	0.01	Monoterpene
allo-Ocimene	0.02	Monoterpene
δ -Elemene isomer	0.02	Sesquiterpene
δ -Elemene	0.47	Sesquiterpene
α -Cubebene	0.49	Sesquiterpene
Cyclosativene I	0.03	Sesquiterpene
Cyclosativene II	0.01	Sesquiterpene
α -Ylangene	0.06	Sesquiterpene
α -Copaene	3.83	Sesquiterpene
<i>cis</i> - β -Elemene	0.03	Sesquiterpene
β -Cubebene	0.41	Sesquiterpene
β -Elemene	0.92	Sesquiterpene
Cyperene	0.28	Sesquiterpene
α -Gurjunene	0.01	Sesquiterpene
Sesquithujene	0.05	Sesquiterpene
β -Caryophyllene	42.63	Sesquiterpene
β -Ylangene	0.08	Sesquiterpene
β -Copaene	0.13	Sesquiterpene
γ -Elemene	0.33	Sesquiterpene
Aromadendrene	0.09	Sesquiterpene
<i>trans</i> - α -Bergamotene	4.52	Sesquiterpene
β -Humulene	0.07	Sesquiterpene
Sesquisabinene A	0.27	Sesquiterpene
α -Humulene	5.82	Sesquiterpene
allo-Aromadendrene	0.35	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.14	Sesquiterpene
(E)- β -Farnesene	0.25	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.18	Sesquiterpene
γ -Muurolole	1.25	Sesquiterpene
Germacrene D	5.58	Sesquiterpene
β -Selinene	0.86	Sesquiterpene
δ -Selinene	0.11	Sesquiterpene
α -Selinene	0.46	Sesquiterpene
Bicyclogermacrene	0.40	Sesquiterpene
epi-Cubebol	0.05	Sesquiterpenic alcohol
Caparratriene	0.10	Sesquiterpene
α -Muurolole	0.38	Sesquiterpene
δ -Guaiene	0.27	Sesquiterpene
β -Curcumene	0.02	Sesquiterpene
β -Bisabolene	2.12	Sesquiterpene
Cubebol	0.05	Sesquiterpenic alcohol
γ -Cadinene	0.15	Sesquiterpene
(3E,6E)- α -Farnesene	0.06	Sesquiterpene

Zonarene	0.08	Sesquiterpene
β -Sesquiphellandrene	0.31	Sesquiterpene
δ -Cadinene	2.00	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.19	Sesquiterpene
α -Cadinene	0.11	Sesquiterpene
α -Calacorene	0.10	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.25	Sesquiterpene
Germacrene B	1.18	Sesquiterpene
Maaliol	0.06	Sesquiterpenic alcohol
β -Calacorene	0.07	Sesquiterpene
Caryophyllenyl alcohol	0.13	Sesquiterpenic alcohol
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide	0.25	Sesquiterpenic ether
Globulol	0.06	Sesquiterpenic alcohol
Viridiflorol	0.07	Sesquiterpenic alcohol
Ledol	0.12	Sesquiterpenic alcohol
Junenol	0.66	Sesquiterpenic alcohol
Rosifoliol	0.03	Sesquiterpenic alcohol
1- <i>epi</i> -Cubenol	0.14	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ -Cadinol	0.21	Sesquiterpenic alcohol
τ -Muurolol	0.27	Sesquiterpenic alcohol
α -Muurolol	0.41	Sesquiterpenic alcohol
Unknown	0.07	Oxygenated sesquiterpene
α -Cadinol	0.39	Sesquiterpenic alcohol
Selin-11-en-4 α -ol	0.06	Sesquiterpenic alcohol
<i>trans</i> -Calamenen-10-ol	0.02	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.07	Sesquiterpenic alcohol
Cadalene	0.07	Sesquiterpene
Germacra-4(15),5,10(14)-trien-1 α -ol	0.05	Sesquiterpenic alcohol
α -Bisabolol	0.04	Sesquiterpenic alcohol
Juniper camphor	0.16	Sesquiterpenic alcohol
Unknown	0.05	Oxygenated diterpene
Unknown	0.11	Diterpene
Unknown	0.07	Oxygenated diterpene
Unknown	0.12	Oxygenated diterpene
Palmitic acid	0.29	Aliphatic acid
Unknown	0.04	Oxygenated diterpene
<i>cis</i> -3,14-Clerodadien-13-ol	0.09	Diterpenic alcohol
Unknown	0.04	Oxygenated diterpene
Manool	0.26	Diterpenic alcohol
Kolavelool	0.39	Diterpenic alcohol
Linoleic acid	0.65	Aliphatic acid
Oleic acid	0.51	Aliphatic acid
Stearic acid	0.31	Aliphatic acid
3 α -Hydroxymanool	0.13	Diterpenic alcohol
Copalol	0.60	Diterpenic alcohol
Kolavenol	0.71	Diterpenic alcohol
Methyl copalate?	0.24	Diterpenic ester
Copaifera diterpenic acid I	3.83	Diterpenic acid
Methyl kolavenate	0.43	Diterpenic ester
Copaifera diterpenic acid II	0.94	Diterpenic acid

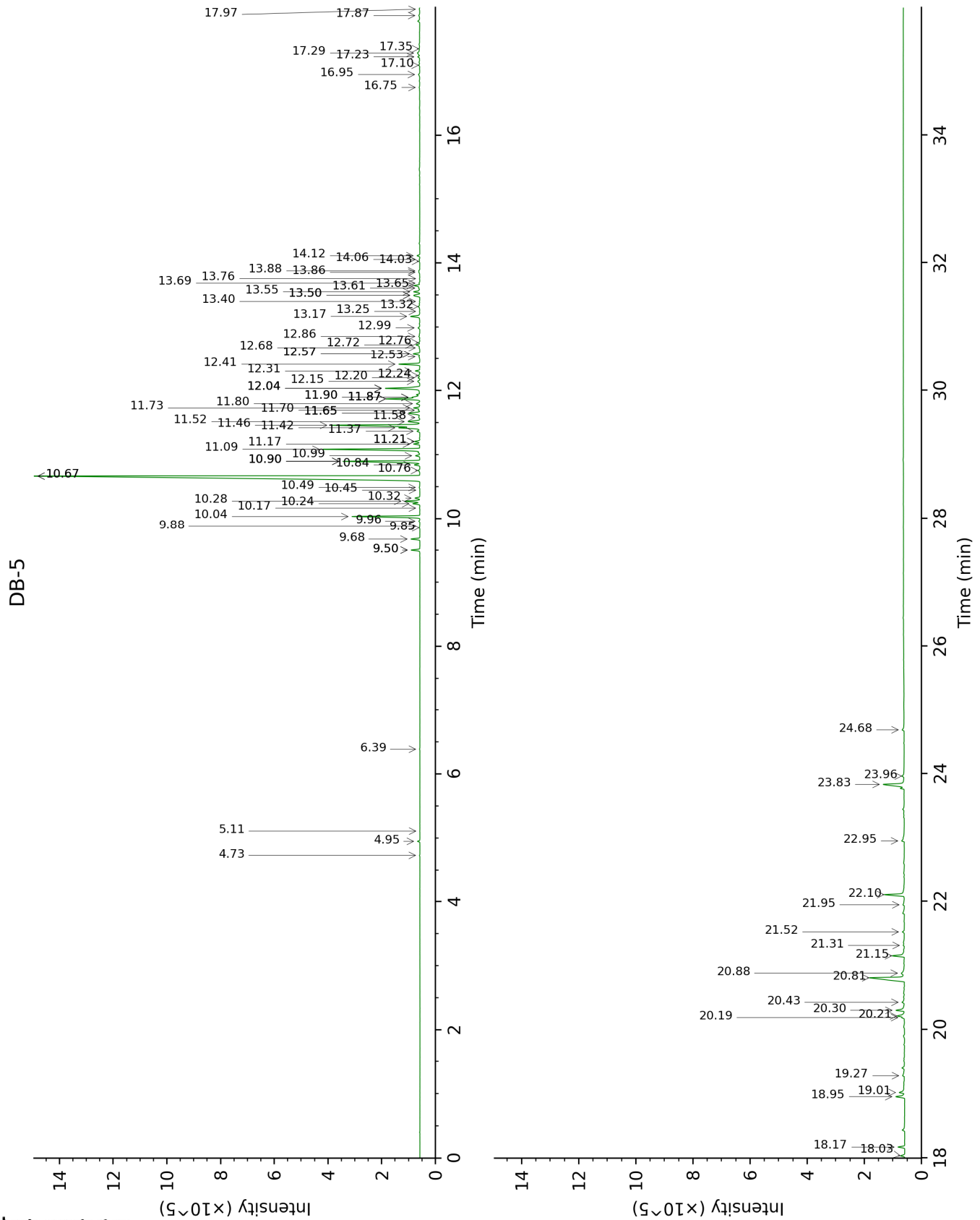
Kolavenyl acetate?	0.07	Diterpenic ester
Methyl hardwickiiate?	0.10	Diterpenic ester
Copaifera diterpenic acid III	0.15	Diterpenic acid
Copaifera diterpenic acid IV	1.57	Diterpenic acid
Copaifera diterpenic acid V	0.22	Diterpenic acid
Copaifera diterpenic acid VI	1.97	Diterpenic acid
Copaifera diterpenic acid VII	0.23	Diterpenic acid
Copaifera diterpenic acid VIII	0.20	Diterpenic acid
Consolidated total	95.54%	

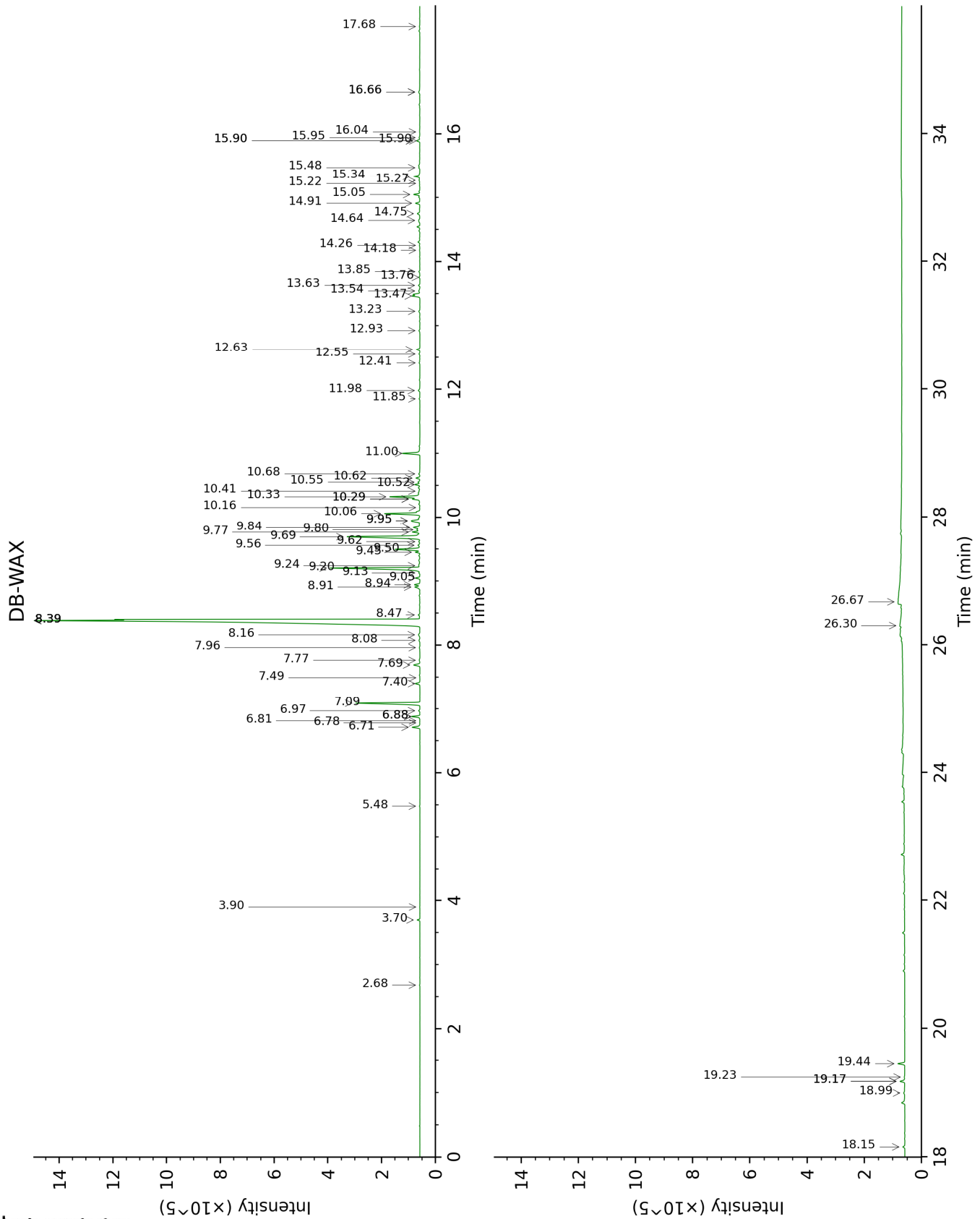
Note: no correction factor was applied

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	%
(2E,4E)-3,7-Dimethylocta-2,4-diene?	4.73	1027	0.03	2.68	1124	0.02
(Z)- β -Ocimene	4.95	1041	0.11	3.70	1206	0.14
(E)- β -Ocimene	5.11	1051	0.01	3.90	1222	0.01
allo-Ocimene	6.39	1131	0.02	5.48	1334	0.03
δ -Elemene isomer	9.50*	1337	0.48	6.78	1429	0.02
δ -Elemene	9.50*	1337	[0.48]	6.88*	1436	0.52
α -Cubebene	9.68	1349	0.49	6.71	1424	0.53
Cyclosativene I	9.85	1362	0.03	6.81	1431	0.01
Cyclosativene II	9.88	1364	0.01	6.88*	1436	[0.52]
α -Ylangene	9.96	1370	0.06	6.97	1443	0.08
α -Copaene	10.04	1375	3.83	7.09	1452	4.11
<i>cis</i> - β -Elemene	10.17	1384	0.03	8.16	1534	0.14
β -Cubebene	10.24	1389	0.41	7.69	1497	0.46
β -Elemene	10.28	1392	0.92	8.39*	1551	51.41
Cyperene	10.32	1395	0.28	7.40	1475	0.30
α -Gurjunene	10.45	1404	0.01	7.49	1482	0.01
Sesquithujene	10.49	1407	0.05	7.96	1518	0.05
β -Caryophyllene	10.67*	1420	42.71	8.39*	1551	[51.41]
β -Ylangene	10.67*	1420	[42.71]	8.08	1527	0.08
β -Copaene	10.76	1426	0.13	8.39*	1551	[51.41]
γ -Elemene	10.84	1433	0.33	8.94	1594	0.34
Aromadendrene	10.90*	1437	4.68	8.47	1558	0.09
<i>trans</i> - α -Bergamotene	10.90*	1437	[4.68]	8.39*	1551	[51.41]
β -Humulene	10.90*	1437	[4.68]	7.77	1503	0.07
Sesquisabinene A	10.99	1444	0.27	9.05	1603	0.26
α -Humulene	11.09	1451	5.82	9.20	1615	6.21
allo-Aromadendrene	11.17	1457	0.35	8.91	1591	0.37
<i>cis</i> -Muurolo-4(15),5-diene	11.21*	1460	0.31	9.24	1618	0.14
(E)- β -Farnesene	11.21*	1460	[0.31]	9.45	1635	0.25
<i>trans</i> -Cadina-1(6),4-diene	11.37	1472	0.18	9.13	1609	0.07
γ -Muurolole	11.42	1476	1.25	9.50	1639	1.74
Germacrene D	11.46	1479	5.58	9.69	1655	5.71
β -Selinene	11.52	1483	0.86	9.77	1661	0.47
δ -Selinene	11.58	1488	0.11	9.56	1644	0.15
α -Selinene	11.65*	1493	0.93	9.84	1667	0.46
Bicyclogermacrene	11.65*	1493	[0.93]	9.95*	1676	0.78
epi-Cubebol	11.65*	1493	[0.93]	11.85	1839	0.05
Caparratriene	11.70	1496	0.10	9.62	1649	0.08
α -Muurolole	11.73	1499	0.38	9.95*	1676	[0.78]
δ -Guaiene	11.80	1504	0.27	9.80	1664	0.22
β -Curcumene	11.87*†	1510	2.41	10.16	1693	0.02
β -Bisabolene	11.87*†	1510	[2.41]	10.06	1685	2.12

Cubebol	11.87*†	1510	[2.41]	12.41	1888	0.05
γ-Cadinene	11.90*†	1512	[2.41]	10.29*	1704	0.47
(3E,6E)-α-Farnesene	11.90*†	1512	[2.41]	10.41	1715	0.06
Zonarene	12.04*	1522	2.38	10.29*	1704	[0.47]
β-Sesquiphellandrene	12.04*	1522	[2.38]	10.52	1723	0.31
δ-Cadinene	12.04*	1522	[2.38]	10.33	1707	2.00
trans-Cadina-1,4-diene	12.15	1531	0.19	10.55	1726	0.13
α-Cadinene	12.20	1535	0.11	10.68	1738	0.08
α-Calacorene	12.24	1538	0.10	11.98	1850	0.14
(E)-α-Bisabolene	12.31	1544	0.25	10.62	1732	0.23
Germacrene B	12.41	1552	1.18	11.00	1765	1.19
Maaliol	12.53	1561	0.06	12.93	1936	0.07
β-Calacorene	12.57*	1564	0.40	12.55	1901	0.07
Caryophyllenyl alcohol	12.57*	1564	[0.40]	13.54	1993	0.13
Spathulenol	12.68	1573	0.05	14.26	2061	0.04
Caryophyllene oxide	12.72	1576	0.25	12.63	1908	0.23
Globulol	12.76	1579	0.06	13.76	2013	0.05
Viridiflorol	12.86	1587	0.07	13.85	2022	0.07
Ledol	12.99	1597	0.12	13.23	1964	0.09
Junenol	13.17	1611	0.66	13.47	1986	0.48
Rosifoliol	13.25	1618	0.03	14.18	2054	0.03
1-epi-Cubenol	13.32	1624	0.14	13.63	2001	0.09
Caryophylladienol II	13.40	1630	0.03	15.90*	2226	0.21
τ-Cadinol	13.50*	1638	0.53	14.75	2109	0.21
τ-Muurolol	13.50*	1638	[0.53]	14.91	2126	0.27
α-Muurolol	13.55	1643	0.41	15.05	2139	0.38
Unknown [m/z 121, 95 (50), 59 (46), 93 (41), 81 (36), 67 (36)... 206 (18), 220? (1)]	13.61	1648	0.07	14.64	2099	0.10
α-Cadinol	13.65	1651	0.39	15.34	2168	0.47
Selin-11-en-4α-ol	13.69	1654	0.06	15.48	2182	0.06
trans-Calamenen-10-ol	13.76	1660	0.02	16.66*	2305	0.12
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.86	1668	0.07	16.66*	2305	[0.12]
Cadalene	13.88	1670	0.07	15.22	2157	0.03
Germacrene-4(15),5,10(14)-trien-1α-ol	14.03	1682	0.05	15.90*	2226	[0.21]
α-Bisabolol	14.06	1684	0.04	15.27	2162	0.06
Juniper camphor	14.12	1689	0.16	15.90*	2226	[0.21]
Unknown [m/z 43, 95 (66), 81 (63), 137 (61), 41 (53), 107 (47)... 262 (6)...]	16.75	1922	0.05	17.68	2416	0.03

Unknown [m/z 95, 105 (79), 107 (75), 189 (68), 41 (64), 81 (61)... 257 (12), 272 (2)]	16.95	1940	0.11	16.04	2240	0.02
Unknown [m/z 43, 95 (98), 107 (84), 93 (55), 121 (53)... 262 (7)...]	17.10	1954	0.07	18.15	2469	0.13
Unknown [m/z 95, 107 (61), 191 (46), 121 (45)...]	17.23	1966	0.12	19.24	2594	0.04
Palmitic acid	17.29	1972	0.29			
Unknown [m/z 95, 107 (27), 81 (19), 191 (17), 55 (16)... 275 (1)...]	17.35	1978	0.04	15.95	2231	0.06
<i>cis</i> -3,14-Clerodadien-13-ol	17.87	2028	0.09	18.99	2565	0.09
Unknown [m/z 95, 191 (43), 71 (27), 55 (27)...]	17.97	2038	0.04	19.17*	2586	0.32
Manool	18.03	2044	0.26	19.17*	2586	[0.32]
Kolavelool	18.17	2058	0.39	19.44	2618	0.40
Linoleic acid	18.95	2136	0.65			
Oleic acid	19.01	2142	0.51			
Stearic acid	19.27	2169	0.31			
3 α -Hydroxymanool	20.19	2265	0.13			
Copalol	20.21	2268	0.60			
Kolavenol	20.30	2277	0.71			
Methyl copalate?	20.42	2291	0.24			
Copaifera diterpenic acid I	20.81	2333	3.83	26.67	3597	3.94
Methyl kolavenate	20.88	2341	0.43			
Copaifera diterpenic acid II	21.15	2371	0.94	26.30	3548	0.94
Kolavenyl acetate?	21.31	2389	0.07			
Methyl hardwickiiate?	21.52	2412	0.10			
Copaifera diterpenic acid III	21.94	2461	0.15			
Copaifera diterpenic acid IV	22.10	2479	1.57			
Copaifera diterpenic acid V	22.95	2580	0.22			
Copaifera diterpenic acid VI	23.83	2688	1.97			
Copaifera diterpenic acid VII	23.96	2704	0.23			
Copaifera diterpenic acid VIII	24.68	2796	0.20			
Total identified		95.24%			91.05%	

Total reported	95.74%	91.44%
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*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index