

Date : February 10, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19B07-HBN04-1-SCC

Customer identification : Copaiba Balsam - 190136864

Type : Resin

Source : *Copaifera reticulata*

Customer : Health & Beauty Natural Oils

ANALYSIS

Method: PC-PA-014-17J19 - 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

Analysis date : February 07, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow viscous liquid

Refractive index: 1.5070 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
(2E,4E)-3,7-Dimethylocta-2,4-diene?	0.01	0.01	Monoterpene
(Z)-β-Ocimene	0.10	0.10	Monoterpene
(E)-β-Ocimene	0.01	0.01	Monoterpene
allo-Ocimene	0.02	0.01	Monoterpene
δ-Elemene isomer	0.02	0.02	Sesquiterpene
δ-Elemene	0.49	0.49	Sesquiterpene
α-Cubebene	0.64	0.65	Sesquiterpene
Cyclosativene I	0.02	0.02	Sesquiterpene
Cyclosativene II	0.02	0.02	Sesquiterpene
α-Ylangene	0.12	0.13	Sesquiterpene
α-Copaene	4.63	4.77	Sesquiterpene
cis-β-Elemene	0.03	0.14	Sesquiterpene
β-Cubebene	0.51	0.54	Sesquiterpene
7-epi-Sesquithujene	0.89*	0.06	Sesquiterpene
β-Elemene	[0.89]*	41.39*	Sesquiterpene
Cyperene	0.23	0.23	Sesquiterpene
α-Gurjunene	0.06	0.04	Sesquiterpene
Sesquithujene	0.01	0.01	Sesquiterpene
β-Caryophyllene	35.69*	[41.39]*	Sesquiterpene
β-Ylangene	[35.69]*	0.05	Sesquiterpene
cis-α-Bergamotene	[35.69]*	0.09	Sesquiterpene
β-Copaene	0.18	[41.39]*	Sesquiterpene
γ-Elemene	0.28	0.24	Sesquiterpene
Aromadendrene	3.84*	[41.39]*	Sesquiterpene
trans-α-Bergamotene	[3.84]*	[41.39]*	Sesquiterpene
Sesquisabinene A	0.25*	0.21	Sesquiterpene
epi-β-Santalene	[0.25]*	0.02	Sesquiterpene
α-Humulene	4.89	5.20*	Sesquiterpene
allo-Aromadendrene	0.44	0.50	Sesquiterpene
cis-Muurolo-4(15),5-diene	0.33*	[5.20]*	Sesquiterpene
(E)-β-Farnesene	[0.33]*	0.23	Sesquiterpene
trans-Cadina-1(6),4-diene	0.22	0.05	Sesquiterpene
γ-Muurolole	9.93	1.96*	Sesquiterpene
Germacrene D	[9.93]	7.91*	Sesquiterpene
β-Selinene	[9.93]*	0.27	Sesquiterpene
ar-Curcumene	[9.93]*	0.13	Sesquiterpene
γ-Amorphene	0.12	[7.91]*	Sesquiterpene
α-Selinene	1.13*	0.36	Sesquiterpene
Bicyclogermacrene	[1.13]*	0.45	Sesquiterpene
epi-Cubebol	[1.13]*	0.06	Sesquiterpenic alcohol
Viridiflorene	[1.13]*	[1.96]*	Sesquiterpene
Caparratriene	0.11	0.14	Sesquiterpene
α-Muurolole	0.51	0.65	Sesquiterpene
γ-Cadinene	3.55*	0.67*	Sesquiterpene
β-Bisabolene	[3.55]*	2.82	Sesquiterpene
Cubebol	[3.55]*	0.06	Sesquiterpenic alcohol
β-Curcumene	[3.55]*	0.15	Sesquiterpene
(3E,6E)-α-Farnesene	[3.55]*	0.07	Sesquiterpene

<i>trans</i> -Calamenene	3.02*	0.02	Sesquiterpene
δ -Cadinene	[3.02]*	2.71	Sesquiterpene
Zonarene	[3.02]*	[0.67]*	Sesquiterpene
β -Sesquiphellandrene	[3.02]*	0.09	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.22	0.30	Sesquiterpene
α -Cadinene	0.17*	0.14	Sesquiterpene
(<i>E</i>)- γ -Bisabolene	[0.17]*	0.09	Sesquiterpene
α -Calacorene	0.13	0.12	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.32	0.30	Sesquiterpene
Germacrene B	1.47	1.50	Sesquiterpene
Maaliol	0.11	0.11	Sesquiterpenic alcohol
β -Calacorene	0.34*	0.02	Sesquiterpene
Caryophyllenyl alcohol	[0.34]*	0.99*	Sesquiterpenic alcohol
Caryophyllene oxide	0.13*	0.11	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.13]*	0.03	Sesquiterpenic ether
Globulol	0.08	0.07	Sesquiterpenic alcohol
Viridiflorol	0.09	0.09	Sesquiterpenic alcohol
Ledol	0.14	0.08	Sesquiterpenic alcohol
Junenol	0.88*	[0.99]*	Sesquiterpenic alcohol
Unknown	[0.88]*	0.07	Oxygenated sesquiterpene
Rosifoliol	0.04	0.04	Sesquiterpenic alcohol
1- <i>epi</i> -Cubenol	0.17	0.14	Sesquiterpenic alcohol
Caryophylladienol II	0.03	0.26*	Sesquiterpenic alcohol
τ -Cadinol	0.62*	0.22	Sesquiterpenic alcohol
τ -Muurolol	[0.62]*	0.35	Sesquiterpenic alcohol
α -Muurolol	0.42	0.38	Sesquiterpenic alcohol
Unknown	0.11	0.12	Oxygenated sesquiterpene
α -Cadinol	0.54*	0.48	Sesquiterpenic alcohol
Unknown	[0.54]*	0.09	Sesquiterpenic alcohol
Cadalene	0.07*	0.03	Sesquiterpene
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	[0.07]*	0.04	Sesquiterpenic alcohol
α -Bisabolol	0.03	0.05	Sesquiterpenic alcohol
Juniper camphor	0.22	[0.26]*	Sesquiterpenic alcohol
Methyl (<i>E,E</i>)-farnesate?	0.01		Sesquiterpenic ester
Unknown	0.04	0.08	Oxygenated diterpene
Unknown	0.10	0.07	Diterpene
Unknown	0.07	0.09	Oxygenated diterpene
Palmitic acid	0.13	0.17	Aliphatic acid
Unknown	0.01	[0.26]*	Oxygenated diterpene
<i>cis</i> -3,14-Clerodadien-13-ol	0.06	0.07	Diterpenic alcohol
Manool	0.15	0.19	Diterpenic alcohol
Kolavelool	0.40	0.43	Diterpenic alcohol
Linoleic acid	0.05		Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.02		Aliphatic acid
3 α -Hydroxymanool	0.01		Diterpenic alcohol
Copalol	0.98		Diterpenic alcohol
Kolavenol	0.37		Diterpenic alcohol
Methyl copalate?	0.12		Diterpenic ester
Copaifera diterpenic acid I	4.28	3.96	Diterpenic acid
Methyl kolavenate	0.37		Diterpenic ester
Copaifera diterpenic acid II	0.81		Diterpenic acid
Kolavenyl acetate?	0.12		Diterpenic ester

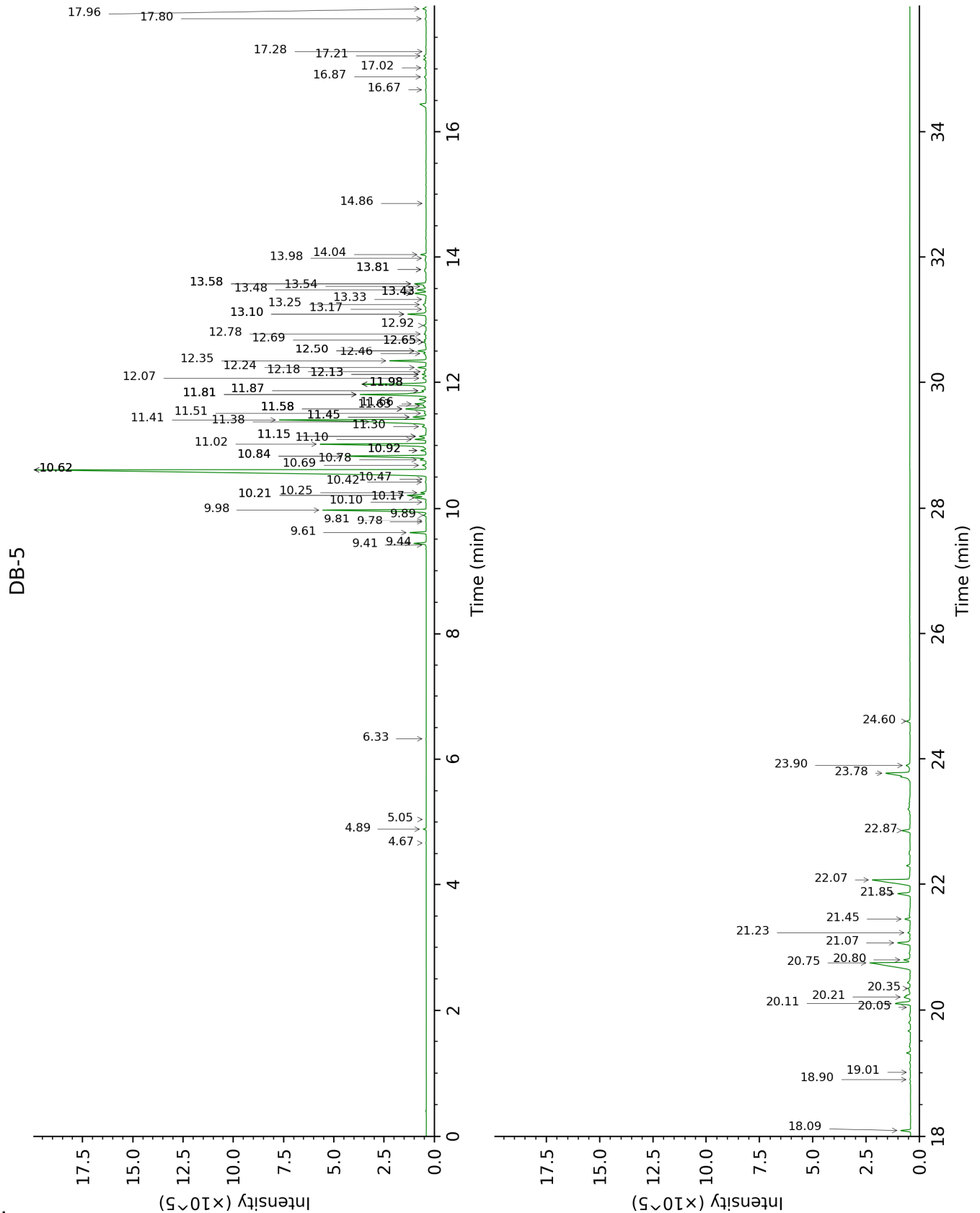
Methyl hardwickiiate?	0.25		Diterpenic ester
Copaifera diterpenic acid III	0.75		Diterpenic acid
Copaifera diterpenic acid IV	3.67		Diterpenic acid
Copaifera diterpenic acid V	0.44		Diterpenic acid
Copaifera diterpenic acid VI	1.82		Diterpenic acid
Copaifera diterpenic acid VII	0.25		Diterpenic acid
Copaifera diterpenic acid VIII	0.19		Diterpenic acid
Total identified	93.80%	84.51%	

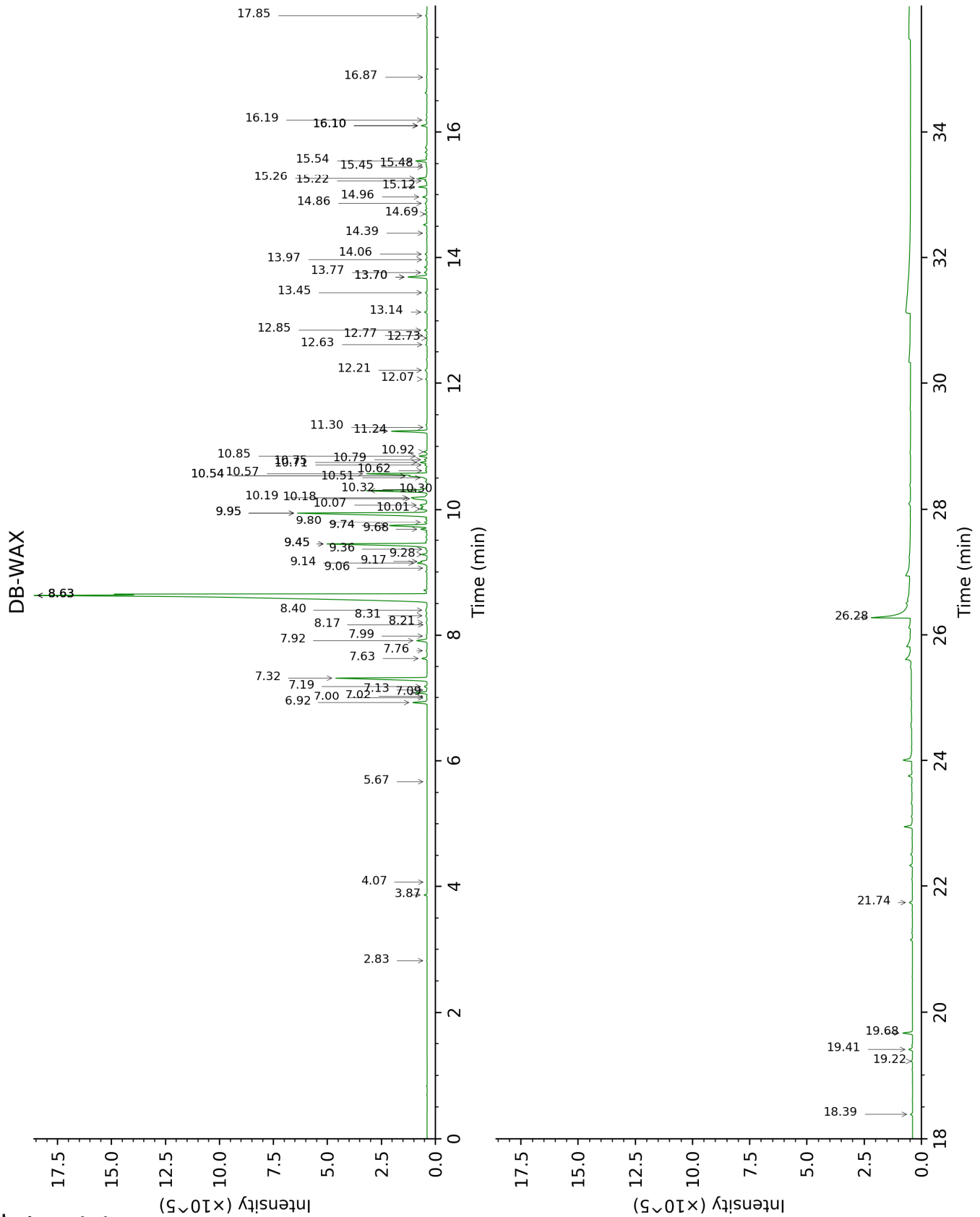
*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

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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?	4.67	1023	0.01	2.82	1124	0.01
(Z)-β-Ocimene	4.89	1037	0.10	3.86	1207	0.10
(E)-β-Ocimene	5.05	1047	0.01	4.07	1222	0.01
allo-Ocimene	6.32	1127	0.02	5.67	1329	0.01
δ-Elemene isomer	9.41	1330	0.02	7.00	1427	0.02
δ-Elemene	9.44	1332	0.49	7.09	1434	0.49
α-Cubebene	9.61	1344	0.64	6.92	1422	0.65
Cyclosativene I	9.78	1356	0.02	7.02	1429	0.02
Cyclosativene II	9.81	1358	0.02	7.13	1438	0.02
α-Ylangene	9.90	1364	0.12	7.19	1442	0.13
α-Copaene	9.98	1370	4.63	7.32	1452	4.77
cis-β-Elemene	10.10	1379	0.03	8.40	1535	0.14
β-Cubebene	10.17	1384	0.51	7.92	1497	0.54
7-epi-Sesquithujene	10.21*	1386	0.89	7.99	1503	0.06
β-Elemene	10.21*	1386	[0.89]	8.63*	1554	41.39
Cyperene	10.25	1389	0.23	7.63	1476	0.23
α-Gurjunene	10.42	1401	0.06	7.76	1485	0.04
Sesquithujene	10.47	1405	0.01	8.17	1517	0.01
β-Caryophyllene	10.62*	1416	35.69	8.63*	1554	[41.39]
β-Ylangene	10.62*	1416	[35.69]	8.21	1520	0.05
cis-α-Bergamotene	10.62*	1416	[35.69]	8.31	1528	0.09
β-Copaene	10.69	1421	0.18	8.63*	1554	[41.39]
γ-Elemene	10.78	1428	0.28	9.17	1596	0.24
Aromadendrene	10.84*	1432	3.84	8.63*	1554	[41.39]
trans-α-Bergamotene	10.84*	1432	[3.84]	8.63*	1554	[41.39]
Sesquisabinene A	10.92*	1438	0.25	9.28	1605	0.21
epi-β-Santalene	10.92*	1438	[0.25]	9.06	1588	0.02
α-Humulene	11.02	1446	4.89	9.45*	1619	5.20
allo-Aromadendrene	11.10	1452	0.44	9.14	1594	0.50
cis-Muurolo-4(15),5-diene	11.15*	1455	0.33	9.45*	1619	[5.20]
(E)-β-Farnesene	11.15*	1455	[0.33]	9.68	1638	0.23
trans-Cadina-1(6),4-diene	11.30	1466	0.22	9.36	1612	0.05
γ-Muurolole	11.38†	1472	9.93	9.74*	1642	1.96
Germacrene D	11.41†	1474	[9.93]	9.95*	1660	7.91
β-Selinene	11.45*†	1478	[9.93]	10.01	1665	0.27
ar-Curcumene	11.45*†	1478	[9.93]	10.79	1731	0.13
γ-Amorphene	11.51	1482	0.12	9.95*	1660	[7.91]
α-Selinene	11.58*	1487	1.13	10.07	1670	0.36
Bicyclogermacrene	11.58*	1487	[1.13]	10.18	1679	0.45
epi-Cubebol	11.58*	1487	[1.13]	12.07	1842	0.06
Viridiflorene	11.58*	1487	[1.13]	9.74*	1642	[1.96]

Caparratriene	11.63	1491	0.11	9.80	1648	0.14
α -Muurolene	11.66	1493	0.51	10.19	1680	0.65
γ -Cadinene	11.81*†	1505	3.55	10.54*	1709	0.67
β -Bisabolene	11.81*†	1505	[3.55]	10.30	1689	2.82
Cubebol	11.81*†	1505	[3.55]	12.63	1892	0.06
β -Curcumene	11.87*†	1509	[3.55]	10.32	1690	0.15
(3E,6E)- α -Farnesene	11.87*†	1509	[3.55]	10.62	1716	0.07
<i>trans</i> -Calamenene	11.98*	1518	3.02	11.30	1775	0.02
δ -Cadinene	11.98*	1518	[3.02]	10.57	1712	2.71
Zonarene	11.98*	1518	[3.02]	10.54*	1709	[0.67]
β - Sesquiphellandrene	11.98*	1518	[3.02]	10.71	1724	0.09
<i>trans</i> -Cadina-1,4- diene	12.07	1525	0.22	10.75	1727	0.30
α -Cadinene	12.13*	1530	0.17	10.92	1741	0.14
(E)- γ -Bisabolene	12.13*	1530	[0.17]	10.51	1706	0.09
α -Calacorene	12.18	1533	0.13	12.21	1854	0.12
(E)- α -Bisabolene	12.24	1538	0.32	10.85	1736	0.30
Germacrene B	12.35	1547	1.47	11.24	1769	1.50
Maaliol	12.46	1556	0.11	13.14	1939	0.11
β -Calacorene	12.50*	1559	0.34	12.73	1901	0.02
Caryophyllenyl alcohol	12.50*	1559	[0.34]	13.70*	1991	0.99
Caryophyllene oxide	12.65*	1571	0.13	12.85	1913	0.11
Caryophyllene oxide isomer	12.65*	1571	[0.13]	12.77	1905	0.03
Globulol	12.69	1573	0.08	13.97	2017	0.07
Viridiflorol	12.78	1581	0.09	14.06	2026	0.09
Ledol	12.92	1591	0.14	13.45	1968	0.08
Junenol	13.10*	1606	0.88	13.70*	1991	[0.99]
Unknown [m/z 179, 161 (66), 119 (44), 95 (38), 105 (35)... 204 (24), 222 (1)]	13.10*	1606	[0.88]	14.69	2087	0.07
Rosifoliol	13.17	1612	0.04	14.39	2058	0.04
1-epi-Cubenol	13.25	1618	0.17	13.77	1998	0.14
Caryophylladienol II	13.33	1625	0.03	16.10*	2229	0.26
τ -Cadinol	13.43*	1633	0.62	14.96	2114	0.22
τ -Muurolol	13.43*	1633	[0.62]	15.12	2130	0.35
α -Muurolol	13.48	1638	0.42	15.26	2143	0.38
Unknown [m/z 121, 95 (50), 59 (46), 93 (41), 81 (36), 67 (36)... 206 (18), 220? (1)]	13.54	1642	0.11	14.86	2103	0.12
α -Cadinol	13.58*	1646	0.54	15.54	2172	0.48
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222	13.58*	1646	[0.54]	15.22	2139	0.09

(2)]						
Cadalene	13.81*	1664	0.07	15.45	2162	0.03
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.81*	1664	[0.07]	16.87	2309	0.04
α-Bisabolol	13.98	1679	0.03	15.48	2166	0.05
Juniper camphor	14.04	1684	0.22	16.10*	2229	[0.26]
Methyl (E,E)-farnesate?	14.86	1753	0.01			
Unknown [m/z 43, 95 (66), 81 (63), 137 (61), 41 (53), 107 (47)... 262 (6)...]	16.67	1916	0.04	17.85	2414	0.08
Unknown [m/z 95, 105 (79), 107 (75), 189 (68), 41 (64), 81 (61)... 257 (12), 272 (2)]	16.87	1936	0.10	16.19	2238	0.07
Unknown [m/z 43, 95 (98), 107 (84), 93 (55), 121 (53)... 262 (7)...]	17.02	1949	0.07	18.38	2474	0.09
Palmitic acid	17.21	1967	0.13	21.74	2875	0.17
Unknown [m/z 95, 107 (27), 81 (19), 191 (17), 55 (16)... 275 (1)...]	17.28	1974	0.01	16.10*	2229	[0.26]
cis-3,14-Clerodadien-13-ol	17.80	2024	0.06	19.22	2569	0.07
Manool	17.96	2040	0.15	19.40	2591	0.19
Kolavelool	18.09	2054	0.40	19.68	2623	0.43
Linoleic acid	18.90	2134	0.05			
cis-Vaccenic acid?	19.01	2146	0.02			
3α-Hydroxymanool	20.05	2256	0.01			
Copalol	20.11	2262	0.98			
Kolavenol	20.21	2273	0.37			
Methyl copalate?	20.35	2288	0.12			
Copaifera diterpenic acid I	20.75	2333	4.28	26.28	3498	3.96
Methyl kolavenate	20.80	2338	0.37			
Copaifera diterpenic acid II	21.07	2369	0.81			
Kolavenyl acetate?	21.23	2386	0.12			
Methyl hardwickiite?	21.45	2411	0.25			
Copaifera diterpenic acid III	21.85	2458	0.75			
Copaifera diterpenic acid IV	22.07	2483	3.67			
Copaifera diterpenic acid V	22.87	2578	0.44			
Copaifera diterpenic acid VI	23.78	2691	1.82			

Copaifera diterpenic acid VII	23.90	2707	0.25	
Copaifera diterpenic acid VIII	24.60	2797	0.19	
Total identified		93.80%		84.51%
Total reported		94.13%		85.04%

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified 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