

Date : avril 27, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING & CARRIER OIL DETERMINATION

SAMPLE IDENTIFICATION

Internal code : 21D20-PTH04

Customer identification : Ylang Complete - Madagascar/ Nosy Be - Y10110912R

Type : Essential oil

Source : *Cananga odorata* var. *genuina* (Ylang-ylang)

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. Carrier oil determination by PC-MAT-010 – GC-FID quantitation of fatty acid methyl esters after derivatization, against an internal standard of tridecanoic acid.

Analyst : Sylvain Mercier, M. Sc., Chimiste

Analysis date : avril 21, 2021

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.5027 ± 0.0003 (20 °C; method PC-MAT-016)

CARRIER OIL DETERMINATION

After derivatization, 0.1% of fatty acids were observed.

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. It is not diluted with a carrier oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Class
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Toluene	tr	Simple phenolic
Octane	tr	Alkane
Isoamyl acetate	tr	Aliphatic ester
2-Methylbutyl acetate	tr	Aliphatic ester
3-Methyl-3-butenyl acetate	0.02	Aliphatic ester
Prenyl acetate	0.06	Aliphatic ester
α -Pinene	0.16	Monoterpene
Camphene	0.01	Monoterpene
Benzaldehyde	0.01	Simple phenolic
Sabinene	tr	Monoterpene
β -Pinene	0.05	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.09	Monoterpene
(3Z)-Hexenyl acetate	0.03	Aliphatic ester
Hexyl acetate	0.04	Aliphatic ester
para-Methylanisole	1.73	Simple phenolic
Limonene	0.03	Monoterpene
1,8-Cineole	0.09	Monoterpenic ether
Benzyl alcohol	0.03	Simple phenolic
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Methyl benzoate	0.84	Phenolic ester
Linalool	4.42	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
ortho-Dimethoxybenzene	0.02	Simple phenolic
Benzyl acetate	0.80	Phenolic ester
para-Cresyl acetate	0.02	Phenolic ester
Ethyl benzoate	0.03	Phenolic ester
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.13	Monoterpenic alcohol
Methylchavicol	0.10	Phenylpropanoid
Neral	0.02	Monoterpenic aldehyde
Phenylethyl acetate	0.02	Phenolic ester
Geraniol	1.22	Monoterpenic alcohol
Geranial	0.04	Monoterpenic aldehyde
(E)-Anethole	0.01	Phenylpropanoid
1-Nitro-2-phenylethane	0.04	Simple phenolic
(E)-Cinnamyl alcohol	0.03	Phenylpropanoid
Bicycloelemene	0.05	Sesquiterpene
Benzyl butyrate	0.11	Phenolic ester
α -Cubebene	0.20	Sesquiterpene
Eugenol	0.57	Phenylpropanoid

α -Ylangene	0.19	Sesquiterpene
Neryl acetate	0.03	Monoterpenic ester
α -Copaene	0.02	Sesquiterpene
β -Bourbonene	0.01	Sesquiterpene
β -Cubebene	0.14	Sesquiterpene
Geranyl acetate	6.42	Monoterpenic ester
β -Elemene	0.59	Sesquiterpene
Cyperene	0.05	Sesquiterpene
Vanillin	0.01	Simple phenolic
Sibirene	0.01	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	14.81	Sesquiterpene
β -Ylangene	0.46	Sesquiterpene
β -Copaene	0.50	Sesquiterpene
Aromadendrene	0.07	Sesquiterpene
Isogermacrene D	0.06	Sesquiterpene
(<i>E</i>)-Cinnamyl acetate	0.45	Phenylpropanoid ester
9-epi-Isocaryophyllene	0.01	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.15	Phenylpropanoid
α -Humulene	4.27	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.14	Sesquiterpene
<i>cis</i> -Cadina-1(6),4-diene	0.10	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.34	Sesquiterpene
Germacrene D	15.60	Sesquiterpene
γ -Muurolole	2.58	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.05	Sesquiterpene
γ -Amorphene	0.47	Sesquiterpene
Prenyl benzoate	0.01	Phenolic ester
epi-Cubebol	0.06	Sesquiterpenic alcohol
Bicyclogermacrene	0.50	Sesquiterpene
Viridiflorene	0.09	Sesquiterpene
α -Muurolole	1.22	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.04	Sesquiterpene
δ -Guaiene	0.68	Sesquiterpene
Unknown	1.17	Sesquiterpene
δ -Amorphene	0.62	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	8.77	Sesquiterpene
γ -Cadinene	1.12	Sesquiterpene
<i>trans</i> -Calamenene	0.05	Sesquiterpene
Zonarene	0.23	Sesquiterpene
δ -Cadinene	3.88	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.26	Sesquiterpene
α -Cadinene	0.32	Sesquiterpene
α -Calacorene	0.04	Sesquiterpene
<i>cis</i> -Dracunculifolol	0.02	Sesquiterpenic alcohol
α -Elemol	0.09	Sesquiterpenic alcohol
β -Calacorene	0.03	Sesquiterpene
(<i>E</i>)-Nerolidol	0.12	Sesquiterpenic alcohol
Germacrene D-4-ol	0.09	Sesquiterpenic alcohol
Spathulenol	0.02	Sesquiterpenic alcohol

10-epi-Junenol	0.07	Sesquiterpenic alcohol
Caryophyllene oxide	0.07	Sesquiterpenic ether
Globulol	0.09	Sesquiterpenic alcohol
Unknown	0.06	Sesquiterpenic alcohol
Unknown	0.11	Oxygenated sesquiterpene
Viridiflorol	0.04	Sesquiterpenic alcohol
Guaiol	0.08	Sesquiterpenic alcohol
Copaborneol	0.07	Sesquiterpenic alcohol
Humulene epoxide II	0.02	Sesquiterpenic ether
10-epi-Cubenol	0.14	Sesquiterpenic alcohol
Junenol	0.33	Sesquiterpenic alcohol
(E)-Isoeugenyl acetate	0.01	Phenylpropanoid ester
1-epi-Cubenol	0.27	Sesquiterpenic alcohol
γ -Eudesmol	0.17	Sesquiterpenic alcohol
Cubenol	0.13	Sesquiterpenic alcohol
τ -Muurolol	0.92	Sesquiterpenic alcohol
τ -Cadinol	0.40	Sesquiterpenic alcohol
α -Muurolol	0.44	Sesquiterpenic alcohol
Unknown	0.29	Sesquiterpenic alcohol
α -Cadinol	1.73	Sesquiterpenic alcohol
Bulnesol	0.04	Sesquiterpenic alcohol
Unknown	0.19	Oxygenated sesquiterpene
(2E,6Z)-Farnesol	0.03	Sesquiterpenic alcohol
(2E,6E)-Farnesol	1.94	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.03	Sesquiterpenic aldehyde
Benzyl benzoate	6.67	Phenolic ester
(2E,6E)-Farnesyl acetate	1.66	Sesquiterpenic ester
Benzyl salicylate	1.71	Phenolic ester
Unknown	0.01	Unknown
Geranyl benzoate	0.18	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.07	Unknown
Unknown	0.01	Unknown
Unknown	0.04	Unknown
Consolidated total	96.23%	

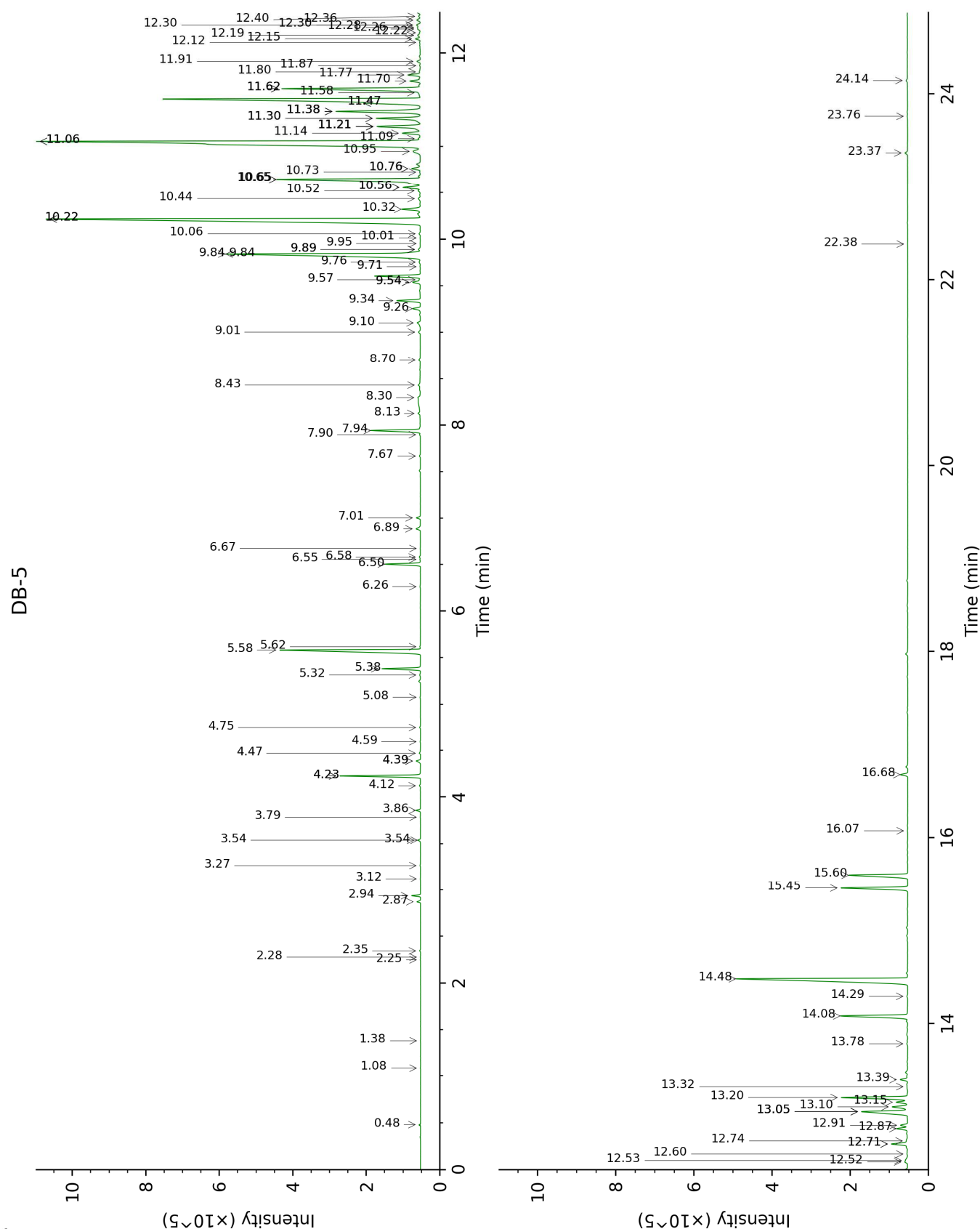
tr: The compound has been detected below 0.005% of total signal.

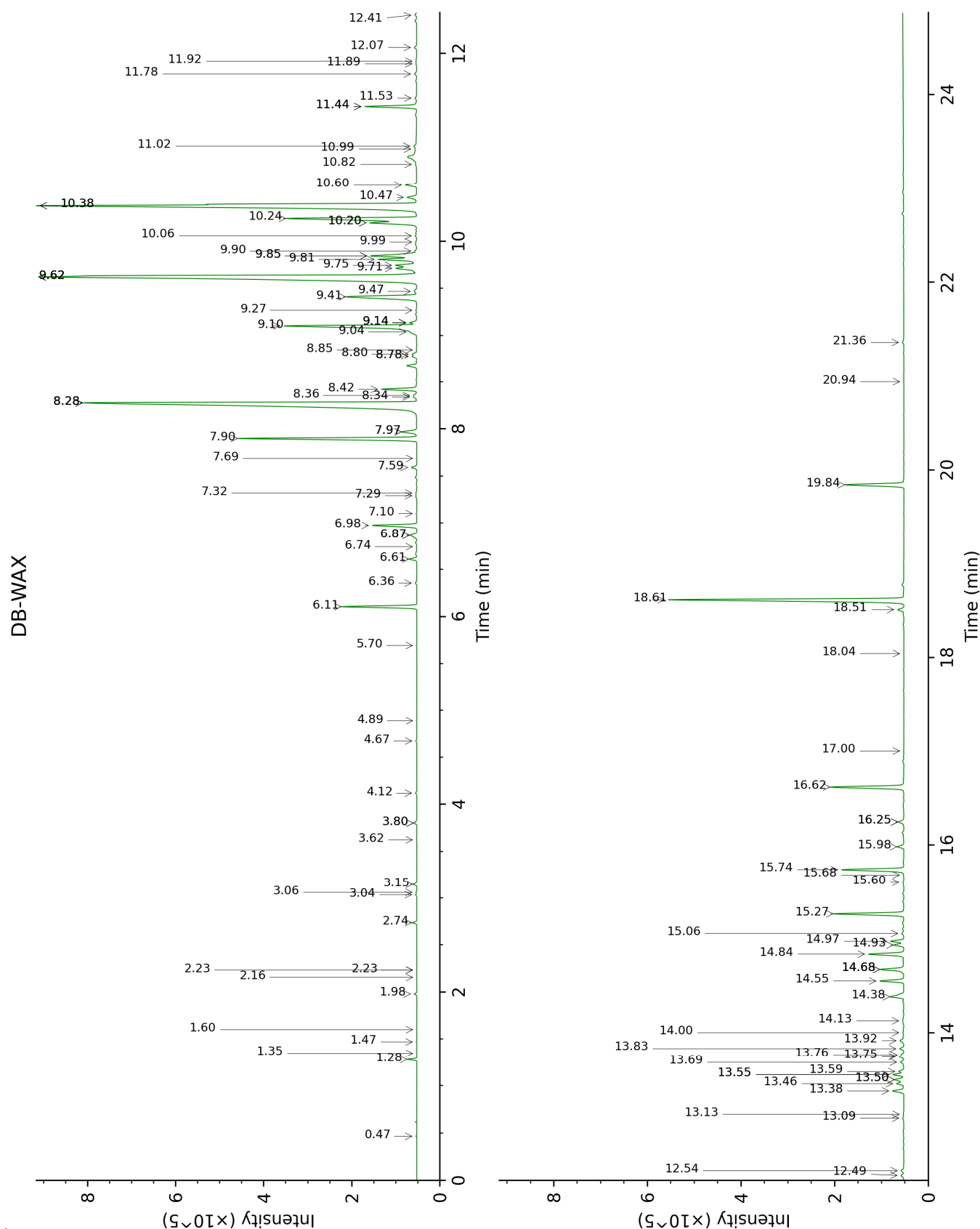
Note: no correction factor was applied

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	%
2-Methyl-3-buten-2-ol	0.48	606	0.01	1.47	1014	0.01
Toluene	1.08	758	tr	1.35	1002	tr
Octane	1.38	804	tr	0.47	784	0.01
Isoamyl acetate	2.25	880	tr	2.23*	1091	0.01
2-Methylbutyl acetate	2.28	882	tr	2.23*	1091	[0.01]
3-Methyl-3-butenyl acetate	2.34	888	0.02	3.06	1159	0.02
Prenyl acetate	2.87	927	0.06	3.80*	1217	0.09
α -Pinene	2.94	932	0.16	1.28	991	0.16
Camphene	3.12	944	0.01	1.60	1027	0.01
Benzaldehyde	3.27	954	0.01	7.10	1458	0.02
Sabinene	3.54*	972	0.06	2.16	1083	tr
β -Pinene	3.54*	972	[0.06]	1.98	1066	0.05
6-Methyl-5-hepten-2-one	3.78	989	0.01	4.89	1298	0.01
Myrcene	3.86	994	0.09	2.74	1133	0.09
(3Z)-Hexenyl acetate	4.12	1011	0.03	4.67	1282	0.03
Hexyl acetate	4.23*	1018	1.71	4.12	1241	0.04
para-Methylanisole	4.23*	1018	[1.71]	6.11	1384	1.73
Limonene	4.39*	1028	0.11	3.04	1157	0.03
1,8-Cineole	4.39*	1028	[0.11]	3.15	1166	0.09
Benzyl alcohol	4.47	1033	0.03	11.53	1816	0.05
(Z)- β -Ocimene	4.59	1041	0.01	3.62	1204	0.01
(E)- β -Ocimene	4.75	1051	0.02	3.80*	1217	[0.09]
cis-Linalool oxide (fur.)	5.08	1072	0.01	6.36	1402	0.04
trans-Linalool oxide (fur.)	5.32	1087	0.02	6.74	1431	0.01
Methyl benzoate	5.38	1091	0.84	8.42	1559	0.88
Linalool	5.58	1104	4.42	7.90	1518	4.49
Nonanal	5.62	1106	0.01	5.70	1354	0.01
ortho-Dimethoxybenzene	6.26	1148	0.02			
Benzyl acetate	6.50	1163	0.80	9.81†	1670	2.53
para-Cresyl acetate	6.55	1166	0.02			
Ethyl benzoate	6.58	1168	0.03	9.14*†	1615	[4.53]
Terpinen-4-ol	6.67	1174	0.01	8.36	1554	0.08
α -Terpineol	6.89	1188	0.13	9.62*	1655	18.06
Methylchavicol	7.01	1195	0.10	9.14*†	1615	[4.53]
Neral	7.67	1239	0.02	9.27	1626	0.03
Phenylethyl acetate	7.90	1255	0.02	10.82	1756	0.01
Geraniol	7.94	1258	1.22	11.44*	1808	1.26
Geranial	8.13	1270	0.04	9.90	1678	0.04
(E)-Anethole	8.30	1282	0.01	10.99	1770	0.01

1-Nitro-2-phenylethane	8.43	1291	0.04	14.00	2045	0.03
(E)-Cinnamyl alcohol	8.70	1309	0.03	15.68	2212	0.01
Bicycloelemene	9.00	1330	0.05	6.87*	1440	0.25
Benzyl butyrate	9.10	1338	0.11	11.44*	1808	[1.26]
α-Cubebene	9.26	1348	0.20	6.61	1421	0.19
Eugenol	9.34	1354	0.57	14.55	2098	0.57
α-Ylangene	9.54*	1368	0.22	6.87*	1440	[0.25]
Neryl acetate	9.54*	1368	[0.22]	9.99	1685	0.03
α-Copaene	9.57	1370	0.02	6.98	1448	1.15
β-Bourbonene	9.71	1380	0.01	7.32	1474	0.03
β-Cubebene	9.76†	1384	7.15	7.59	1494	0.14
Geranyl acetate	9.84*†	1390	[7.15]	10.38*	1717	15.47
β-Elementene	9.84*†	1390	[7.15]	8.28*	1548	15.90
Cyperene	9.89*	1393	0.06	7.29	1472	0.05
Vanillin	9.89*	1393	[0.06]	18.04	2467	0.01
Sibirene	9.95	1398	0.01	7.69	1502	0.01
Isocaryophyllene	10.01	1402	0.01	7.97*	1524	0.47
Methyleugenol	10.06	1405	0.04	13.09	1958	0.04
β-Caryophyllene	10.22*	1417	15.27	8.28*	1548	[15.90]
β-Ylangene	10.22*	1417	[15.27]	7.97*	1524	[0.47]
β-Copaene	10.32	1425	0.50	8.28*	1548	[15.90]
Aromadendrene	10.44	1433	0.07	8.34	1552	0.09
Isogermacrene D	10.52	1440	0.06	8.80	1588	0.12
(E)-Cinnamyl acetate	10.56*	1442	0.47	14.38	2082	0.45
9-epi-Isocaryophyllene	10.56*	1442	[0.47]	8.85	1592	0.01
(E)-Isoeugenol	10.65*	1449	4.47	16.25*	2271	0.18
α-Humulene	10.65*	1449	[4.47]	9.10†	1612	4.53
allo-Aromadendrene	10.73	1455	0.02	8.78*	1587	0.12
cis-Murola-4(15),5-diene	10.76*	1458	0.24	9.14*†	1615	[4.53]
cis-Cadina-1(6),4-diene	10.76*	1458	[0.24]	8.78*	1587	[0.12]
trans-Cadina-1(6),4-diene	10.95	1472	0.34	9.04	1607	0.17
Germacrene D	11.06*	1480	18.18	9.62*	1655	[18.06]
γ-Murolene	11.06*	1480	[18.18]	9.41	1638	2.58
trans-Murola-4(15),5-diene	11.08	1482	0.05	9.62*	1655	[18.06]
γ-Amorphene	11.14	1486	0.47	9.62*	1655	[18.06]
Prenyl benzoate	11.22*	1492	1.36	13.55*	2001	0.28
epi-Cubebol	11.22*	1492	[1.36]	11.78	1839	0.06
Bicyclgermacrene	11.22*	1492	[1.36]	9.85*†	1673	[2.53]
Viridiflorene	11.22*	1492	[1.36]	9.47	1642	0.09
α-Murolene	11.30*	1498	1.26	9.85*†	1673	[2.53]
(3Z,6E)-α-Farnesene	11.30*	1498	[1.26]	10.06	1691	0.04
δ-Guaiene	11.38*	1504	2.47	9.71	1662	0.68

Unknown [m/z 119, 41 (95), 123 (53), 80 (49), 161 (44), 105 (42)... 204 (2)]	11.38*	1504	[2.47]			
δ-Amorphene	11.38*	1504	[2.47]	9.75	1665	0.62
(3E,6E)-α-Farnesene	11.47*†	1510	9.89	10.38*	1717	[15.47]
γ-Cadinene	11.47*†	1510	[9.89]	10.20*	1702	1.35
trans-Calamenene	11.58	1519	0.05	11.02	1772	0.05
Zonarene	11.62*	1523	4.11	10.20*	1702	[1.35]
δ-Cadinene	11.62*	1523	[4.11]	10.24	1706	3.88
trans-Cadina-1,4-diene	11.70	1529	0.26	10.47	1725	0.31
α-Cadinene	11.77	1534	0.32	10.60	1736	0.30
α-Calacorene	11.80	1537	0.04	11.92	1851	0.03
cis-Dracunculifolol	11.87	1542	0.02	11.89	1849	0.02
α-Elemol	11.91	1546	0.09	13.83	2028	0.11
β-Calacorene	12.12	1562	0.03	12.41	1895	0.05
(E)-Nerolidol	12.15	1565	0.12	13.59	2004	0.12
Germacrene D-4-ol	12.19	1568	0.09	13.46	1992	0.20
Spathulenol	12.22	1570	0.02	14.13	2057	0.07
10-epi-Junenol	12.26	1573	0.07	12.49	1902	0.09
Caryophyllene oxide	12.28	1574	0.07	12.54	1907	0.08
Globulol	12.30*	1576	0.11	13.69	2014	0.09
Unknown cadinol or muurolol analog [m/z 161, 119 (77), 120 (76), 105 (73), 93 (57)... 204 (36)]	12.30*	1576	[0.11]	12.07	1864	0.06
Unknown [m/z 161, 105 (84), 43 (80), 119 (72), 93 (62), 121 (54)... 204 (38), 222 (2)]	12.36	1580	0.11	13.75	2020	0.13
Viridiflorol	12.40	1584	0.04	13.76	2022	0.04
Guaiol	12.52	1593	0.08	13.92	2036	0.12
Copaborneol	12.53	1595	0.07	14.68*	2110	0.65
Humulene epoxide II	12.60	1600	0.02	13.13	1962	0.02
10-epi-Cubenol	12.71*†	1609	0.48	13.50*	1996	0.27
Junenol	12.71*†	1609	[0.48]	13.38	1985	0.33
(E)-Isoeugenyl acetate	12.74†	1611	[0.48]	17.00	2352	0.01
1-epi-Cubenol	12.87	1622	0.27	13.55*	2001	[0.28]
γ-Eudesmol	12.91	1625	0.17	14.68*	2110	[0.65]
Cubenol	13.05*	1637	1.61	13.50*	1996	[0.27]
τ-Muurolol	13.05*	1637	[1.61]	14.84	2126	0.92
τ-Cadinol	13.05*	1637	[1.61]	14.68*	2110	[0.65]
α-Muurolol	13.10	1641	0.44	14.97	2140	0.34
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79	13.15	1645	0.29	14.93	2136	0.25

(43), 161 (43), 109)40)... 204 (35), 222 (2)]						
α -Cadinol	13.20	1649	1.73	15.27	2170	1.75
Bulnesol	13.32	1659	0.04	15.06	2149	0.06
Unknown [m/z 123, 95 (31), 81 (29), 105 (27)... 222 (5)]	13.39	1665	0.19	15.98	2244	0.18
(2E,6Z)-Farnesol	13.78	1698	0.03	16.25*	2271	[0.18]
(2E,6E)-Farnesol	14.08	1723	1.94	16.62	2310	1.98
(2E,6E)-Farnesal	14.29	1741	0.03	15.60	2204	0.02
Benzyl benzoate	14.48	1758	6.67	18.62	2533	6.53
(2E,6E)-Farnesyl acetate	15.45	1844	1.66	15.74	2218	1.65
Benzyl salicylate	15.60	1857	1.71	19.84	2678	1.63
Unknown [m/z 123, 81 (47), 43 (35), 91 (30), 41 (27), 79 (24)...]	16.07	1900	0.01	20.94	2814	0.01
Geranyl benzoate	16.68	1958	0.18	18.51	2520	0.17
Unknown [m/z 326, 311 (47), 327 (22), 202 (16), 137 (15)...]	22.38	2574	0.01			
Unknown [m/z 69, 83 (59), 81 (56), 137 (48), 41 (29), 139 (28)...]	23.37	2696	0.07	21.36	2868	0.05
Unknown [m/z 69, 81 (44), 147 (31), 41 (26), 119 (26), 93 (24)...]	23.76	2747	0.01			
Unknown [m/z 69, 81 (42), 147 (26), 119 (25), 93 (25), 41 (24)...]	24.14	2796	0.04			
Total identified		96.32%			97.52%	
Total reported		97.05%			98.18%	

*: 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