

Date : April 12, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22D07-PTH07

Customer identification : Rhododendron - Nepal - RJ0104R

Type : Essential oil

Source : *Rhododendron anthopogon*

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 : Seydou Ka, Ph. D.

Analysis date : April 12, 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: 1.4827 ± 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
2-Ethylfuran	tr	Furan
2-Methyl-3-pentanone	tr	Aliphatic ketone
Toluene	0.01	Simple phenolic
Octane	0.02	Alkane
5-Methyl-3-hexanone	0.03	Aliphatic ketone
4-Methyl-3-hexanone	0.02	Aliphatic ketone
Ethyl 2-methylbutyrate	tr	Aliphatic ester
Bornylene	0.01	Monoterpene
Tricyclene	0.05	Monoterpene
α -Thujene	0.23	Monoterpene
α -Pinene	29.90	Monoterpene
α -Fenchene	0.08	Monoterpene
Camphene	0.32	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
Sabinene	0.13	Monoterpene
β -Pinene	12.73	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
Myrcene	1.58	Monoterpene
Pseudolimonene	0.01	Monoterpene
α -Phellandrene	0.05	Monoterpene
Δ^3 -Carene	0.12	Monoterpene
α -Terpinene	0.19	Monoterpene
para-Cymene	0.65	Monoterpene
β -Phellandrene	0.19*	Monoterpene
1,8-Cineole	0.19*	Monoterpenic ether
Limonene	8.94	Monoterpene
(Z)- β -Ocimene	3.78	Monoterpene
2-Heptyl acetate	0.03	Aliphatic ester
(E)- β -Ocimene	0.77	Monoterpene
γ -Terpinene	2.46	Monoterpene
Terpinolene	0.43	Monoterpene
para-Cymenene	0.02	Monoterpene
α -Pinene oxide	0.02	Monoterpenic ether
Linalool	0.29	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
allo-Ocimene	0.12	Monoterpene
trans-Pinocarveol	0.03	Monoterpenic alcohol
Camphene hydrate	0.04	Monoterpenic alcohol
Borneol	0.05	Monoterpenic alcohol
Terpinen-4-ol	0.24	Monoterpenic alcohol
α -Terpineol	0.42	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
2-Nonyl acetate	tr	Aliphatic ester

Unknown	0.04	Unknown
Geraniol	0.03	Monoterpenic alcohol
<i>trans</i> -Ascaridole glycol	0.02	Monoterpenic alcohol
Bornyl acetate	0.16	Monoterpenic ester
2-Undecanone	0.01	Aliphatic ketone
Bicycloelemene	0.02	Sesquiterpene
α -Cubebene	0.33	Sesquiterpene
Citronellyl acetate	0.23	Monoterpenic ester
Cyclosativene I	0.02	Sesquiterpene
α -Ylangene	0.14	Sesquiterpene
α -Copaene	0.75	Sesquiterpene
β -Bourbonene	0.22	Sesquiterpene
β -Cubebene	0.05	Sesquiterpene
β -Elemene	0.23	Sesquiterpene
7- <i>epi</i> -Sesquithujene	0.03	Sesquiterpene
α -Funebrene	0.05	Sesquiterpene
α -Gurjunene	0.22	Sesquiterpene
α -Cedrene	0.02	Sesquiterpene
β -Caryophyllene	3.01	Sesquiterpene
β -Copaene	0.27	Sesquiterpene
β -Gurjunene	0.04	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.04	Sesquiterpene
Aromadendrene	0.44	Sesquiterpene
Selina-5,11-diene	0.11	Sesquiterpene
<i>cis</i> -Muuroala-3,5-diene	0.26	Sesquiterpene
Unknown	0.05	Sesquiterpene
α -Humulene	0.50	Sesquiterpene
allo-Aromadendrene	0.54	Sesquiterpene
<i>cis</i> -Muuroala-4(15),5-diene	0.33	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.49	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.78	Sesquiterpene
γ -Muurolole	1.76	Sesquiterpene
α -Amorphene	0.29	Sesquiterpene
β -Selinene	0.95	Sesquiterpene
α -Curcumene	0.20	Sesquiterpene
γ -Amorphene	0.27	Sesquiterpene
α -Selinene	1.00	Sesquiterpene
Valencene	0.38	Sesquiterpene
α -Muurolole	2.57	Sesquiterpene
Unknown	0.33	Sesquiterpene
γ -Cadinene	3.38	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.29	Sesquiterpene
β -Curcumene	0.01	Sesquiterpene
δ -Cadinene	7.05	Sesquiterpene
Zonarene	1.26	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.34	Sesquiterpene
α -Cadinene	0.54	Sesquiterpene
α -Calacorene	0.11	Sesquiterpene
Isocaryophyllene epoxide B	0.06	Sesquiterpenic ether
Palustrol	0.05	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.12	Sesquiterpenic alcohol
Germacrene D-4-ol	0.16	Sesquiterpenic alcohol

Spathulenol	0.13	Sesquiterpenic alcohol
Caryophyllene oxide	0.06	Sesquiterpenic ether
Unknown	0.03	Oxygenated sesquiterpene
Viridiflorol	0.01	Sesquiterpenic alcohol
Ledol	0.11	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
10-epi-Cubenol	0.16	Sesquiterpenic alcohol
1-epi-Cubenol	0.23	Sesquiterpenic alcohol
τ-Muurolol	0.53	Sesquiterpenic alcohol
τ-Cadinol	0.60	Sesquiterpenic alcohol
α-Muurolol	0.31	Sesquiterpenic alcohol
α-Eudesmol	0.11	Sesquiterpenic alcohol
α-Cadinol	0.68	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.02	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.01	Sesquiterpenic alcohol
Cadalene	0.14	Sesquiterpene
Shyobunol	0.04	Sesquiterpenic alcohol
α-Bisabolol	0.10	Sesquiterpenic alcohol
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Consolidated total	98.07%	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered [xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

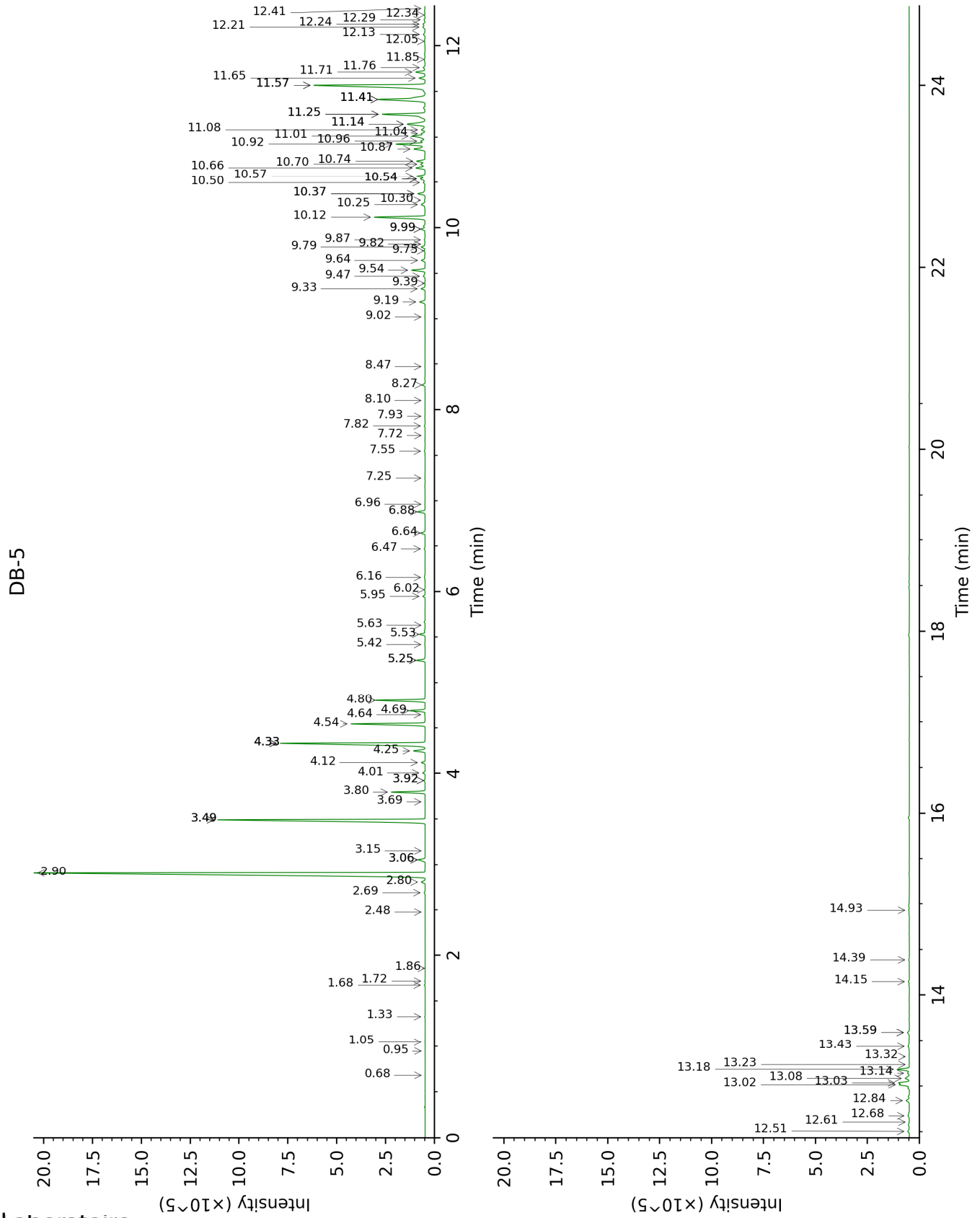
tr: The compound has been detected below 0.005% of total signal.

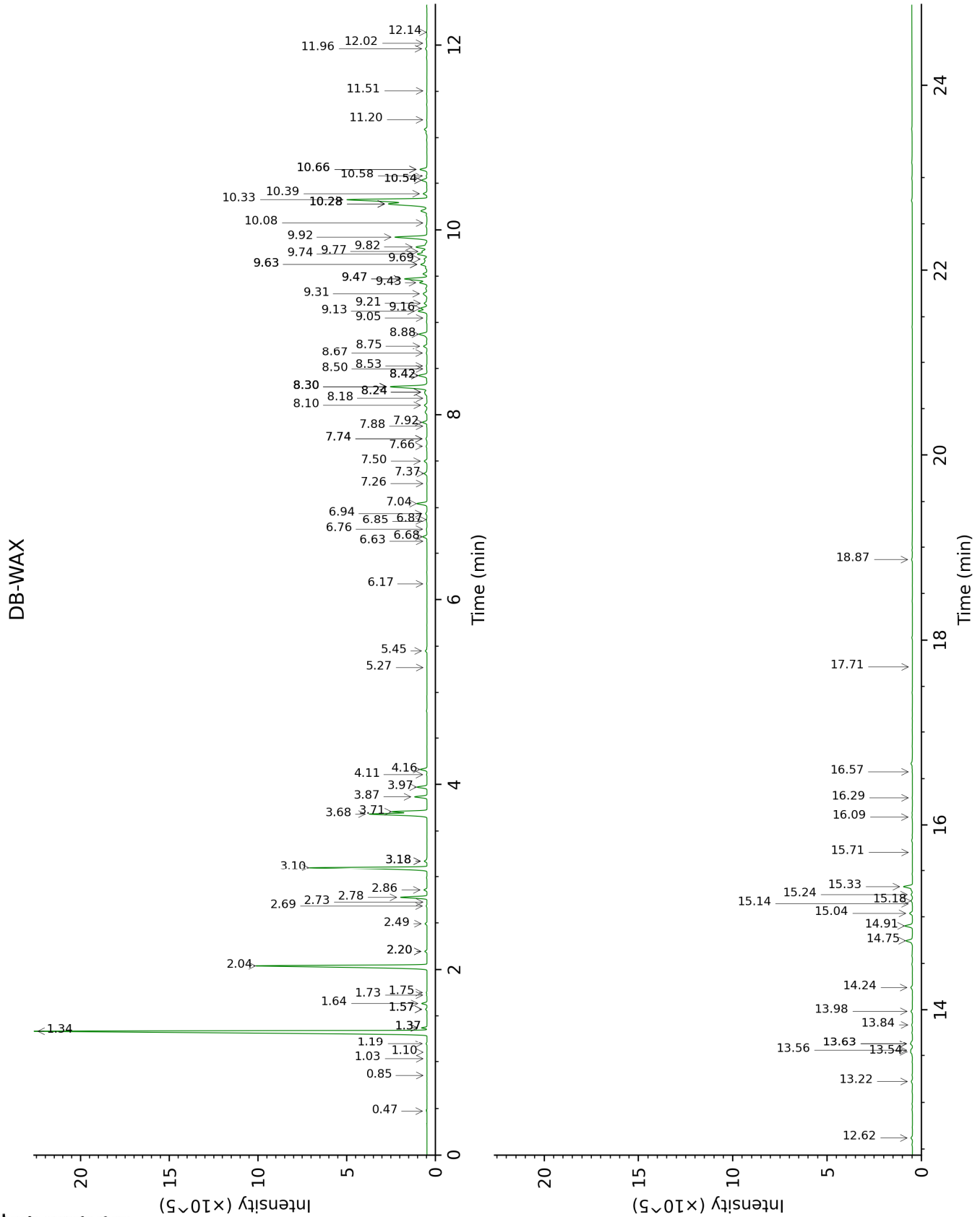
Note: no correction factor was applied

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-Ethylfuran	0.68	697	tr	0.85	918	tr
2-Methyl-3-pentanone	0.95	742	tr	1.10	959	tr
Toluene	1.05	758	0.01	1.37*	1002	0.26
Octane	1.33	802	0.02	0.47	785	0.01
5-Methyl-3-hexanone	1.68	833	0.03	1.75	1040	0.04
4-Methyl-3-hexanone	1.72	837	0.02	1.72	1038	0.02
Ethyl 2-methylbutyrate	1.86	849	tr	1.57*	1022	0.09
Bornylene	2.48	903	0.01	1.03	948	tr
Tricyclene	2.69	917	0.05	1.19	974	0.05
α -Thujene	2.80	925	0.23	1.37*	1002	[0.26]
α -Pinene	2.90	932	29.90	1.34	998	29.80
α -Fenchene	3.06*	942	0.43	1.57*	1022	[0.09]
Camphene	3.06*	942	[0.43]	1.64	1029	0.32
Thuja-2,4(10)-diene	3.15	949	tr	2.20*	1085	0.13
Sabinene	3.49*	972	12.89	2.20*	1085	[0.13]
β -Pinene	3.49*	972	[12.89]	2.04	1069	12.73
Octen-3-ol	3.69	985	0.01	6.63	1419	0.02
Myrcene	3.80	992	1.58	2.78	1134	1.58
Pseudolimonene	3.92*	1001	0.06	2.73	1130	0.01
α -Phellandrene	3.92*	1001	[0.06]	2.68	1127	0.05
Δ^3 -Carene	4.01	1006	0.12	2.49	1112	0.12
α -Terpinene	4.12	1013	0.19	2.86	1141	0.19
para-Cymene	4.25	1021	0.65	3.97	1228	0.65
β -Phellandrene	4.33*	1026	9.13	3.18*	1166	0.19
1,8-Cineole	4.33*	1026	[9.13]	3.18*	1166	[0.19]
Limonene	4.33*	1026	[9.13]	3.10	1160	8.94
(Z)- β -Ocimene	4.54	1040	3.78	3.68	1207	4.24
2-Heptyl acetate	4.64	1046	0.03	4.11	1238	0.03
(E)- β -Ocimene	4.69	1049	0.77	3.87	1220	0.78
γ -Terpinene	4.80	1056	2.46	3.71	1208	2.02
Terpinolene	5.25*	1084	0.45	4.16	1242	0.43
para-Cymenene	5.25*	1084	[0.45]	6.17	1386	0.02
α -Pinene oxide	5.42	1095	0.02	5.27	1322	0.01
Linalool	5.53	1102	0.29	7.92	1515	0.31
endo-Fenchol	5.63	1109	0.01	8.24*	1540	0.31
allo-Ocimene	5.95	1129	0.12	5.45	1335	0.11
<i>trans</i> -Pinocarveol	6.02	1134	0.03	9.05	1603	0.01
Camphene hydrate	6.16	1142	0.04	8.30*	1545	3.13
Borneol	6.47	1162	0.05	9.63*	1650	0.66
Terpinen-4-ol	6.64	1173	0.24	8.42*	1554	0.68
α -Terpineol	6.88	1189	0.42	9.63*	1650	[0.66]

Myrtenol	6.96	1194	0.02	10.66*	1736	0.54
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.25	1213	0.03	11.20	1781	0.02
Citronellol	7.55	1232	0.04	10.58	1729	0.05
2-Nonyl acetate	7.72	1244	tr	6.87	1437	0.03
Unknown [m/z 68, 43 (71), 82 (59), 67 (52), 95 (24), 81 (24)...]	7.82	1251	0.04	7.26	1466	0.02
Geraniol	7.93	1258	0.03	11.51	1808	0.01
<i>trans</i> -Ascaridole glycol	8.10	1270	0.02	13.98	2037	0.12
Bornyl acetate	8.27	1281	0.16	8.10	1530	0.20
2-Undecanone	8.47	1294	0.01	8.50	1560	0.03
Bicycloelemene	9.02	1333	0.02	6.94	1442	0.10
α -Cubebene	9.19	1344	0.33	6.68	1423	0.30
Citronellyl acetate	9.33	1354	0.23	9.31	1624	0.39
Cyclosativene I	9.39	1359	0.02	6.76	1429	0.06
α -Ylangene	9.47	1364	0.14	6.85	1436	0.04
α -Copaene	9.54	1369	0.75	7.04	1450	0.76
β -Bourbonene	9.64	1376	0.22	7.37	1474	0.24
β -Cubebene	9.75	1384	0.05	7.66	1496	0.06
β -Elemene	9.79	1387	0.23	8.30*	1545	[3.13]
7-epi-Sesquithujene	9.82	1389	0.03	7.74*	1502	0.09
α -Funebrene	9.87	1392	0.05	7.74*	1502	[0.09]
α -Gurjunene	9.99*	1400	0.24	7.50	1484	0.22
α -Cedrene	9.99*	1400	[0.24]	7.88	1512	0.02
β -Caryophyllene	10.12	1410	3.01	8.30*	1545	[3.13]
β -Copaene	10.25	1420	0.27	8.24*	1540	[0.31]
β -Gurjunene	10.30	1424	0.04	8.18	1535	0.02
<i>trans</i> - α -Bergamotene	10.37*	1429	0.48	8.30*	1545	[3.13]
Aromadendrene	10.37*	1429	[0.48]	8.42*	1554	[0.68]
Selina-5,11-diene	10.50	1438	0.11	8.53	1562	0.04
<i>cis</i> -Muurolo-3,5-diene	10.54*	1441	0.31	8.75	1580	0.26
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	10.54*	1441	[0.31]	8.67	1573	0.05
α -Humulene	10.57	1444	0.50	9.16	1612	0.48
allo-Aromadendrene	10.66	1451	0.54	8.88	1590	0.70
<i>cis</i> -Muurolo-4(15),5-diene	10.70	1454	0.33	9.21	1616	0.26
(E)- β -Farnesene	10.74	1456	0.49	9.43	1634	0.54

<i>trans</i> -Cadinane-1(6),4-diene	10.87	1466	0.78	9.13	1609	0.68
γ -Muurolole	10.92	1470	1.76	9.47*	1637	1.79
α -Amorphene	10.96	1472	0.29	9.47*	1637	[1.79]
β -Selinene	11.01	1477	0.95	9.74	1659	0.80
α -Curcumene	11.04	1479	0.20	10.54*	1725	0.41
γ -Amorphene	11.08	1482	0.27	9.69	1655	0.24
α -Selinene	11.14*	1486	1.39	9.82	1665	1.00
Valencene	11.14*	1486	[1.39]	9.77	1662	0.38
α -Muurolole	11.25*	1494	2.90	9.92	1674	2.57
Unknown [m/z 161, 105 (77), 204 (73), 119 (65), 189 (57), 91 (53)]	11.25*	1494	[2.90]	10.28*	1703	3.69
γ -Cadinene	11.41*	1507	3.69	10.28*	1703	[3.69]
(3E,6E)- α -Farnesene	11.41*	1507	[3.69]	10.39	1712	0.29
β -Curcumene	11.41*	1507	[3.69]	10.08	1686	0.01
δ -Cadinene	11.57*	1519	8.31	10.33	1707	7.05
Zonarene	11.57*	1519	[8.31]	10.28*	1703	[3.69]
<i>trans</i> -Cadinane-1,4-diene	11.65	1525	0.34	10.54*	1725	[0.41]
α -Cadinene	11.71	1530	0.54	10.66*	1736	[0.54]
α -Calacorene	11.76	1534	0.11	11.96	1849	0.13
Isocaryophyllene epoxide B	11.85	1541	0.06	12.02	1854	0.03
Palustrol	12.05	1556	0.05	12.14	1864	0.03
(E)-Nerolidol	12.13	1562	0.12	13.63*	2002	0.23
Germacrene D-4-ol	12.21	1569	0.16	13.54	1994	0.18
Spathulenol	12.24	1571	0.13	14.24	2062	0.14
Caryophyllene oxide	12.29	1575	0.06	12.62	1908	0.12
Unknown [m/z 109, 43 (95), 81 (81), 93 (76), 69 (75), 95 (74), 107 (71)... 204 (22), 220 (6)]	12.34	1579	0.03			
Viridiflorol	12.41	1585	0.01	13.84	2022	0.06
Ledol	12.51	1592	0.11	13.22	1964	0.10
Unknown [m/z 149, 43 (95), 93 (84), 177 (66), 109 (62), 67 (60)...220 (11)]	12.61	1600	0.01			
10-epi-Cubenol	12.68	1606	0.16	13.56	1996	0.12
1-epi-Cubenol	12.84	1620	0.23	13.63*	2002	[0.23]
τ -Muurolol	13.02	1634	0.53	14.91	2127	0.57
τ -Cadinol	13.03	1635	0.60	14.75	2111	0.54
α -Muurolol	13.08	1640	0.31	15.04	2141	0.21

α -Eudesmol	13.14	1644	0.11	15.14	2152	0.01
α -Cadinol	13.18	1648	0.68	15.33	2170	0.76
<i>cis</i> -Calamenen-10-ol	13.23	1652	0.02	16.29	2271	0.02
<i>trans</i> -Calamenen-10-ol	13.32	1659	0.01	16.57	2301	0.02
Cadalene	13.43	1668	0.14	15.18	2155	0.10
Shyobunol	13.59*	1681	0.13	16.09	2249	0.04
α -Bisabolol	13.59*	1681	[0.13]	15.24	2162	0.10
Unknown [m/z 91, 175 (93), 105 (76), 79 (73), 133 (69), 107 (60)...218 (33)]	14.15	1729	0.06	15.70	2209	0.02
Unknown [m/z 91, 177 (75), 79 (68), 105 (65), 93 (62), 159 (60)...220 (16)]	14.39	1749	0.04	17.71	2427	0.01
Unknown [m/z 43, 41 (72), 95 (69), 81 (66), 67 (55), 55 (52), 79 (52), 69 (50)...238 (1)]	14.93	1796	0.05	18.87	2561	0.07
Total identified		97.89%			95.93%	
Total reported		98.12%			96.10%	

*: Two or more compounds are coeluting on this column

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

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